SREE VIDYANIKETHAN ENGINEERING COLLEGE

(Autonomous)
(Affiliated to J.N.T. University Anantapur, Anantapuramu)

ACADEMIC REGULATIONS

CHOICE BASED CREDIT SYSTEM

B.Tech. Regular Four Year Degree Program
(for the batches admitted from the academic year 2016–17)
&
B.Tech. (Lateral Entry Scheme)
(for the batches admitted from the academic year 2017–18)

For pursuing four year undergraduate Degree Program of study in Engineering (B.Tech) offered by Sree Vidyanikethan Engineering College under Autonomous status and herein after referred to as SVEC (Autonomous):

1. Applicability : All the rules specified herein, approved by the Academic Council, shall be in force and applicable to students admitted from the academic year 2016-2017 onwards. Any reference to "College" in these rules and regulations stands for SVEC (Autonomous).

2. Extent: All the rules and regulations, specified hereinafter shall be read as a whole for the purpose of interpretation and as and when a doubt arises, the interpretation of the Chairman, Academic Council is final. It shall be ratified by Academic Council in the forth coming meeting. As per the requirements of statutory bodies, Principal, Sree Vidyanikethan Engineering College shall be the Chairman, Academic Council.

3. Admission :

3.1. Admission into First Year of Four Year B.Tech. Degree Program of study in Engineering:

3.1.1. Eligibility: A candidate seeking admission into the First Year of four year B.Tech. Degree Program should have

(i) passed either Intermediate Public Examination (I.P.E.) conducted by the Board of Intermediate Education, Andhra Pradesh, with Mathematics, Physics and Chemistry as optional courses (or any equivalent examination recognized by JNTUA, Anantapuramu) for admission as per the guidelines of Andhra Pradesh State Council of Higher Education (APSCHE).

(ii) secured a rank in the EAMCET examination conducted by APSCHE for allotment of a seat by the Convener, EAMCET for admission.

3.1.2. Admission Procedure: Admissions shall be made into the first year of four year B.Tech. Degree Program as per the stipulations of APSCHE, Government of Andhra Pradesh:

(a) By the Convener, EAMCET, (for Category-A Seats).
(b) By the Management (for Category-B Seats).

3.2. Admission into the Second Year of Four year B.Tech Degree Program in Engineering (Lateral Entry).

3.2.1. Eligibility: A candidate seeking admission into the Second Year of four year B.Tech. Degree Program (Lateral Entry) should have

(i) Diploma in Engineering in the relevant branch conducted by the Board of Technical Education, Andhra Pradesh (or equivalent Diploma recognized by JNTUA, Anantapuramu). (ii) Candidates qualified in ECET and admitted by the Convener, ECET. In all such cases for admission, when needed, permissions from the statutory bodies are to be obtained.

3.2.2. Admission Procedure: 20% of the sanctioned strength in each Program of study as lateral entry students or as stipulated by APSCHE shall be filled by the Convener, ECET.

4. Programs of study offered leading to the award of B.Tech. Degree Following are the four year undergraduate Degree Programs of study offered in various branches in SVEC (Autonomous) leading to the award of B.Tech (Bachelor of Technology) Degree:

1) B.Tech (Civil Engineering)
2) B.Tech (Computer Science & Engineering)
3) B.Tech (Computer Science & Systems Engineering)
4) B.Tech (Electrical & Electronics Engineering)
5) B.Tech (Electronics & Communication Engineering)
6) B.Tech (Electronics & Instrumentation Engineering)
7) B.Tech (Information Technology)
8) B.Tech (Mechanical Engineering)

5. Duration of the Program:

5.1 Minimum Duration: The program will extend over a period of four years leading to the Degree of Bachelor of Technology (B.Tech) of the JNTUA, Ananthapuramu. The four academic years will be divided into eight semesters with two semesters per year. Each semester shall normally consist of 22 weeks (?90 working days) having - Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)'. Choice Based Credit System (CBCS) and Credit Based Semester System

(CBSS) as suggested by UGC and Curriculum/ Course Structure as suggested by AICTE are followed. Provision is made for lateral entry of students in the Second Year of the program in all branches of study and they will be required to satisfy the conditions of admissions thereto prescribed by the JNTUA, Ananthapuramu and Government of Andhra Pradesh.

5.2 Maximum Duration: The student shall complete all the passing requirements of the B.Tech degree program within a maximum duration of 8 years (6 years for lateral entry), these durations reckoned from the commencement of the semester to which the student was first admitted to the program.

First Semester (22 weeks)	Instruction Period: I Spell : 7 weeks II Spell: 9 weeks	16 weeks
	Mid-term Examinations: I Mid : 1 week II Mid : 1 week	2 weeks
	Preparation & Practical Examinations	2 weeks
	Semester-end examinations	2 weeks
	Semester Break	2 weeks
Second Semester (22 weeks)	Instruction Period: I Spell : 7 weeks II Spell: 9 weeks	16 weeks
	Mid-term Examinations: I Mid :1 week II Mid : 1 week	2 weeks
	Preparation & Practical Examinations	2 weeks
	Semester-end examinations	2 weeks
	Summer Vacation	6 weeks

6. Structure of the Program: Each Program of study shall consist of:
(a) Foundation Courses,
(b) Core Courses and Elective Courses.

➢ Foundation Courses are further categorized as :
(i) HS (Humanities and Social Sciences),

(ii) BS (Basic Sciences) and
(iii) ES (Engineering Sciences).

➢ Core Courses and Elective Courses are categorized as PS (Professional Courses), which are further subdivided as:
(i) PC (Professional Core) Courses,
(ii) PE (Professional Electives),
(iii) IDE (Inter Disciplinary Electives),
(iv) OE (Open Electives),
(v) Comprehensive Assessment
(vi) Seminar
(vii) PW (Project Work).

S.No	Broad Course Classification	Course Group/ Category	Course Type	Range of Credits
1.	Foundation Courses	HS – Humanities and Social Sciences	Humanities, Social Sciences and Management.	**5% - 10%**
2.		BS – Basic Sciences	Mathematics, Physics and Chemistry Courses, etc.	**15% - 20%**
3.		ES – Engineering Sciences	Fundamental engineering courses.	**15% - 20%**
4.	Core Courses	PC – Professional Core	Core courses related to the Parent Discipline/ Branch of Engg.	**30% - 40%**
5.	Elective Courses	PE – Professional Electives	Elective courses related to the Parent Discipline/ Branch of Engg.	**10% - 15%**
6.		IDE - Interdisciplinary Electives	Courses in an area outside the Parent Discipline / Branch of Engg.	**5% - 10%**
7.		OE – Open Electives	Common Elective courses offered for all programs / Branches of Engg.	**5% - 10%**
8.	Core Courses	Seminar	A course of study with discussion and report.	**10% - 15%**
9.		Comprehensive Assessment	A comprehensive review of foundations and key concepts of the courses studied.	
10.		Project Work	A course of planned minor research work.	

Contact Periods: Depending on the complexity and volume of the course, the number of contact periods per week shall be assigned.

7. Credit Courses:

All Courses are to be registered by a student in a Semester to earn Credits. Credits shall be assigned to each Course in a L: T: P: C (Lecture Periods: Tutorial Periods: Practical Periods: Credits) Structure, based on the following general pattern.

➢ One Credit - for One Period/ Week/ Semester for Theory/Lecture (L) Courses;
➢ Two Credits - for Three Periods/ Week/ Semester for Laboratory/ Practical (P) Courses.

Tutorials will not carry Credits.

i) Other student activities like NCC, NSS, Sports, Study Tour, Guest Lecture etc. will not carry Credits.

ii) For courses like Project/Seminar/Comprehensive Online Assessment, where formal contact periods are not specified, credits are assigned based on the complexity of the work to be carried out.

The four year curriculum of any B. Tech Program of study shall have total of **180** credits (24 credits in each semester from I B. Tech. I Semester to IV B. Tech I

Semester and 12 credits in IV B. Tech II Semester). However the curriculum for lateral entry students shall have a total of **132** credits (24 credits in each semester from II B. Tech. I Semester to IV B. Tech I Semester and 12 credits in IV B. Tech II Semester).

8. Choice Based Credit System (CBCS):

- Choice Based Credit System (CBCS) is introduced based on UGC guidelines in order to promote:
- Student centered learning
- Cafeteria approach
- Students to learn courses of their choice
- Learning at their own pace
- Interdisciplinary learning
- A student is introduced to "Choice Based Credit System (CBCS)"
- The total credits for the Program is **180** for regular students and **132** for lateral entry students.
- A student has a choice of registering for credits from the theory courses offered in the program ensuring the total credits in a semester are between 21 and 30.
- From the II B.Tech I Semester to IV B.Tech I Semester, the student has the option of registering for additional theory courses from the latter semesters or dropping existing theory courses of the current semester within the course structure of the program. However the number of credits the student can register in a particular semester should not below 21 (minimum) and should not exceed 30 (maximum).
- Grade points, based on percentage of marks awarded for each course will form the basis for calculation of SGPA (Semester Grade Point Average) and CGPA (Cumulative Grade Point Average).

All the registered credits will be considered for the calculation of final CGPA.

9. Course Enrollment and Registration

9.1 Each student, on admission shall be assigned to a Faculty Advisor (Mentor) who shall advice and counsel the student about the details of the academic programme and the choice of courses considering the student's academic background and career objectives.

9.2 Each student on admission shall register for all the courses prescribed in the curriculum in the student's first and second Semesters of study. The student shall enroll for the courses
with the help of the student's Faculty Advisor (Mentor). The enrollment for the courses from II B.Tech I Semester to IV B.Tech I Semester will commence 10 days prior to the last instructional day of the preceding semester for registration process. If the student wishes, the student may drop or add courses (vide clause 8) within Ten days before commencement of the concerned semester and complete the registration process duly authorized by the Chairman, Board of studies of concern department.

9.3 If any student fails to register the courses in a semester, he shall undergo the courses as per the program structure.

9.4 After registering for a course, a student shall attend the classes, satisfy the attendance requirements, earn Continuous Assessment marks and appear for the Semester-end Examinations.

9.5 No course shall be offered by a Department unless a minimum of 40 students register for that course.

10. Massive Open Online Course (MOOC)

A Massive Open Online Course (MOOC) is an online course aimed at unlimited participation and open access via the web. MOOC is a model for delivering learning content online to any person who takes a course, with no limit on attendance.

- A student shall undergo a "Massive Open Online Course (MOOC)" for award of the degree besides other requirements.
- A student is offered this Online Course at the beginning of his III B.Tech I Semester of study and the course has to be completed by the end of III B.Tech II Semester. If the student fails to complete the course by the end of III B.Tech II Semester, it shall be treated as a backlog and needs to be completed before completion of the program for the award of the degree.

- The student shall confirm registration by enrolling the course within 10 days prior to the last instructional day of the II B. Tech. II Semester like other courses.
- The courses will be approved by the Chairman, Academic Council, SVEC based on the recommendations of the Chairman, Board of Studies of concerned program considering current needs.
- A student has a choice of registering for only one MOOC with the recommendation of Chairman, Board of studies of concerned program and duly approved by the Chairman, Academic Council, SVEC.
- The student shall undergo MOOC without disturbing the normal schedule of regular class work.
- One faculty member assigned by the Head of the Department shall be responsible for the periodic monitoring of the course implementation.
- No formal lectures need be delivered by the faculty member assigned to the students.
- If any student wants to change the MOOC course already registered, he will be given choice to register a new MOOC course in III B. Tech. only, with the recommendation of Chairman, Board of studies of concerned program and duly approved by the Chairman, Academic Council, SVEC.
- Finally, the performance of the student in the course will be evaluated as stipulated by the course provider. A certificate will be issued on successful completion of the course by the course provider.
- The performance in the MOOC will not be considered for the calculation of SGPA and CGPA of the student.
- The MOOC course will be listed in the grade sheet of the student.

11. Break of Study from a Program (Gap Year)

11.1 A student is permitted to go on break of study for a maximum period of two years either as two breaks of one year each or a single break of two years.

11.2 The student shall apply for break of study in advance, in any case, not later than the last date of the first assessment period in a semester. The application downloaded from website and duly filled by the student shall be submitted to the Head of the Department. In the case of start-up for incubation of idea only, the application for break of study shall be forwarded by the Head of the Department to the Principal, SVEC. A sub-committee appointed by the principal shall give recommendations for approval.

11.3 The students permitted to rejoin the program after break of study shall be governed by the Curriculum and Regulations in force at the time of rejoining. The students rejoining in new regulations shall apply to the Principal, SVEC in the prescribed format through Head of the Department at the beginning of the readmitted semester itself for prescribing additional/equivalent courses, if any, from any semester of the regulations in-force,
so as to bridge the curriculum in-force and the old curriculum.

11.4 The total period for completion of the programme reckoned from the commencement of the I B.Tech I Semester to which the student was admitted shall not exceed the maximum period specified in clause 5.2 irrespective of the period of break of study in order that the student may be eligible for the award of the degree (vide clause 18).

11.5 In case, if a student applies for break of study for one year and wishes to extend it for one more consecutive year, he shall be permitted with the prior approval of the Principal, SVEC through the concerned Head of the Department before beginning of the semester in which the student has taken break of study.

11.6 If a student has not reported to the department after approved period of break of study without any intimation, the student is treated as detained in that semester. Such students are eligible for readmission for the semester when offered next.

12. Examination System: All components in any Program of study shall be evaluated through internal evaluation and / or an external evaluation conducted as Semester-end examination.

<table>
<tr><th>Sl. No.</th><th>Course</th><th>Marks</th><th colspan="2">Examination and Evaluation</th><th>Scheme of examination</th></tr>
<tr><td rowspan="3">1.</td><td rowspan="3">Theory</td><td>70</td><td colspan="2">Semester-end examination of 3 hours duration (External evaluation)</td><td>The examination question paper in theory courses shall be for a maximum of 70 marks. The question paper shall be of descriptive type with 5 questions, taken one from each unit of syllabus, having internal choice and all 5 questions shall be answered. All questions carry equal marks.</td></tr>
<tr><td rowspan="2">30</td><td colspan="2" rowspan="2">Mid-term Examination of 2 hours duration (Internal evaluation).</td><td>The question paper shall be of descriptive type with 4 essay type questions out of which 3 are to be answered and evaluated for 24 marks and also 6 short answer questions out of which all are to be answered and evaluated for 6 marks.</td></tr>
<tr><td>Two mid-term examinations each for 30 marks are to be conducted. For a total of 30 marks, 75% of better one of the two and 25% of the other one are added and finalized.
Mid-I: After first spell of instruction (I to II Units).
Mid-II: After second spell of instruction (III to V Units).</td></tr>
<tr><td rowspan="3">2</td><td rowspan="3">Laboratory</td><td>50</td><td colspan="2">Semester-end Lab Examination for 3 hours duration (External evaluation)</td><td>50 marks are allotted for laboratory/drawing examination during semester-end.</td></tr>
<tr><td rowspan="2">50</td><td>30</td><td>Day-to-Day evaluation for Performance in laboratory experiments and Record. (Internal evaluation).</td><td rowspan="2">Two laboratory examinations, which includes Day-to-Day evaluation and Practical test, each for 50 marks are to be evaluated. For a total of 50 marks 75% of better one of the two and 25% of the other one are added and finalized.
Laboratory examination-I: Shall be conducted just before I mid-term examinations.
Laboratory examination-II: Shall be conducted just before II mid-term examinations.</td></tr>
<tr><td>20</td><td>Practical test (Internal evaluation).</td></tr>
<tr><td rowspan="2">3</td><td>a) Seminar</td><td>100</td><td colspan="2">Semester-end Examination</td><td>100 marks are allotted for Seminar during semester-end evaluation by the Seminar Evaluation Committees (SECs) as given in 12.2.1.</td></tr>
<tr><td>b)Comprehensive Assessment</td><td>100</td><td colspan="2">Semester-end Examination</td><td>Comprehensive Assessment shall be conducted as given in 12.2.2 as semester-end evaluation for 100 marks.</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Project Work</td><td rowspan="2">200</td><td>100</td><td>External evaluation</td><td>Semester-end Project Viva-Voce Examination by Committee as detailed in 12.2.3 for 100 marks.</td></tr>
<tr><td>100</td><td>Internal evaluation</td><td>Continuous evaluation by the Project Evaluation Committees (PECs) as detailed in 12.2.3 for 100 marks.</td></tr>
</table>

12.2 Seminar/Comprehensive Assessment /Project Work Evaluation:

12.2.1 For the seminar, the student shall collect information through literature survey on a specialized topic and prepare a technical report, showing his understanding over the topic, and submit to the Department just before presentation. The report and the presentation shall be evaluated at the end of the semester by the Seminar Evaluation Committees (SECs), each consisting of concerned supervisor and two senior faculty members. The SECs are constituted by the Principal on the recommendations of the Head of the Department.

12.2.2 Comprehensive Assessment shall be conducted by the department through (i) online with 50 objective questions for 50 marks and (ii) viva-voce for the remaining 50 marks, covering all the courses from I B.Tech I Semester to IV B.Tech I Semester. The viva-voce will be conducted by Comprehensive Assessment Committees (CACs), each consisting of three faculty members (out of whom at least two are seniors). The CACs are constituted by the Principal on the recommendations of the Head of the Department. The HODs of the respective departments are given the responsibility of preparing question bank/question paper for conducting the online examination.

12.2.3 The project Viva-Voce examination shall be conducted by a Committee consisting of External examiner (nominated by the Chief Controller of Examinations), HOD and concerned Supervisor. The evaluation of project work shall be conducted at the end of the IV B.Tech II Semester. The Internal Evaluation shall be made by the Project Evaluation Committees (PECs), each consisting of concerned supervisor and two senior faculty members on the basis of two project reviews conducted on the topic of the project. The PECs are constituted by the Principal on the recommendations of the Head of the Department.

12.3. Eligibility to appear for the semester-end examination:

12.3.1 A student shall be eligible to appear for semester-end examinations if he acquires a minimum of 75% of attendance in aggregate of all the courses in a semester.

12.3.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee.

12.3.3 Shortage of Attendance below 65% in aggregate shall in no case be condoned.

12.3.4 Students whose shortage of attendance is not condoned in any semester is not eligible to take their end examination of that class and their registration shall stand cancelled.

12.3.5 A student shall not be promoted to the next semester unless he satisfies the attendance requirements of the current semester, as applicable. The student may seek readmission for the semester when offered next. He will not be allowed to register for the courses of the semester while he is in detention. A student detained due to shortage of attendance, will have to repeat that semester when offered next.

12.3.6 A stipulated fee shall be payable to the College towards condonation of shortage of attendance.

12.4. Evaluation: Following procedure governs the evaluation.

12.4.1. Marks for components evaluated internally by the faculty shall be submitted to the Controller of Examinations one week before the commencement of the End examinations. The marks for the internal evaluation components shall be added to the external evaluation marks secured in the Semester-end examinations, to arrive at total marks for any course in that semester.

12.4.2. Performance in all the courses is tabulated course-wise and shall be scrutinized by the Results Committee and moderation is applied if needed and course-wise marks are finalized. Total marks obtained in each course are converted into letter grades.

12.4.3. Student-wise tabulation shall be done and individual grade Sheet shall be generated and issued to the student.

12.5. Personal verification / Revaluation / Recounting:

Students shall be permitted for personal verification/request for recounting/ revaluation of the Semester-end examination answer scripts within a stipulated period after payment of prescribed fee. After recounting or revaluation, records are updated with changes if any and the student shall be issued a revised grade sheet. If there are no changes, the student shall be intimated the same through a notice.

12.6. Supplementary Examination:

In addition to the regular semester-end examinations conducted, the College may also schedule and conduct supplementary examinations for all the courses of other semesters when feasible for the benefit of students. Such of the candidates writing supplementary examinations may have to write more than one examination per day.

13. Academic Requirements for promotion/ completion of regular B.Tech Program of study:

The following academic requirements have to be satisfied in addition to the attendance requirements for promotion/ completion of regular B.Tech Program of study.

For students admitted into B.Tech. (Regular) Program:

13.1 A student shall be deemed to have satisfied the minimum academic requirements for each theory, laboratory course and project work, if he secures not less than 40% of marks in the semester-end examination and a minimum of 40% of marks in the sum total of the internal evaluation and Semester-end examination taken together. For the seminar and comprehensive Viva-Voce, he should secure not less than 40% of marks in the semester-end examination.

13.2 A student shall be promoted from second year to third year of Program of study only if he fulfills the academic requirement of securing 36 credits from

a. Two regular and one supplementary examinations of I B.Tech I Semester.
b. One regular and one supplementary examinations of I B.Tech II Semester.
c. One regular examination of II B.Tech I Semester.

Irrespective of whether or not the candidate appears for the semester-end examination as per the normal course of study.

13.3 A student shall be promoted from third year to fourth year of Program of study only if he fulfills the academic requirements of securing 60 credits from the following examinations,

a. Three regular and two supplementary examinations of I B.Tech I Semester.
b. Two regular and two supplementary examinations of I B.Tech II Semester.
c. Two regular and one supplementary examinations of II B.Tech I Semester.
d. One regular and one supplementary examinations of II B.Tech II Semester.
e. One regular examination of III B.Tech I Semester.

Irrespective of whether or not the candidate appears for the semester-end examination as per the normal course of study and in case of getting detained for want of credits by sections 13.2 and 13.3 above, the student may make up the credits through supplementary examinations.

13.4 A student shall register for all the 180 credits and earn all the 180 credits. Marks obtained in all the 180 credits shall be considered for the calculation of the DIVISION based on CGPA.

13.5 A student who fails to earn 180 credits as indicated in the course structure within eight academic years from the year of their admission shall forfeit his seat in B.Tech. Program and his admission stands cancelled.

For Lateral Entry Students (batches admitted from the academic year 2017-2018):

13.6 A student shall be deemed to have satisfied the minimum academic requirements for each theory, practical course and project, if he secures not less than 40% of marks in the semester-end examination and a minimum of 40% of marks in the sum total of the internal evaluation and semester-end examination taken together. For the seminar and comprehensive Viva-Voce, he should secure not less than 40% of marks in the semester-end examination.

13.7 A student shall be promoted from third year to fourth year only if he fulfills the academic requirements of securing 36 credits from the following examinations.

a. Two regular and one supplementary examinations of II B.Tech I Semester.
b. One regular and one supplementary examinations of II B.Tech II Semester.
c. One regular examination of III B.Tech I Semester.

Irrespective of whether or not the candidate appears for the semester-end examination as per the normal course of study and in case of getting detained for want of credits the student may make up the credits through supplementary examinations.

13.8 A student shall register for all 132 credits and earn all the 132 credits. Marks obtained in all the 132 credits shall be considered for the calculation of the DIVISION based on CGPA.

13.9 A student who fails to earn 132 credits as indicated in the course structure within six academic years from the year of their admission shall forfeit his seat in B.Tech Program and his admission stands cancelled.

14. Transitory Regulations:

Students who got detained for want of attendance (or) who have not fulfilled academic requirements (or) who have failed after having undergone the Program in earlier regulations (or) who have discontinued and wish to continue the Program are eligible for admission into the unfinished semester from the date of commencement of class work with the same (or) equivalent courses as and when courses are offered and they will be in the academic regulations into which they are presently readmitted.

A regular student has to satisfy all the eligibility requirements within the maximum stipulated period of eight years and a lateral entry student within six years for the award of B.Tech Degree.

15. Grades, Semester Grade Point Average and Cumulative Grade Point Average:

15.1. Grade System: After all the components and sub-components of any course (including laboratory courses) are evaluated, the final total marks obtained shall be converted into letter grades on a "10 point scale" as described below.

Grades conversion and Grade points attached

% of Marks obtained	Grade	Description of Grade	Grade Points (GP)
> = 95	O	Outstanding	10
> = 85 to < 95	S	Superior	9
> = 75 to < 85	A	Excellent	8
> = 65 to < 75	B	Very Good	7
> = 55 to < 65	C	Good	6
> = 45 to < 55	D	Fair	5
> = 40 to < 45	E	Pass	4
< 40	F	Fail	0
Not Appeared	N	Absent	0

Pass Marks: A student shall be declared to have passed theory course, laboratory course and project work if he secures minimum of 40% marks in external examination, and a minimum of 40% marks in the sum total of internal evaluation and external examination taken together. For the seminar and comprehensive Assessment, he shall be declared to have passed if he secures minimum of 40% of marks in the semester-end examination. Otherwise he shall be awarded fail grade - **F** in such a course irrespective of internal marks. **F** is considered as a fail grade indicating that the student has to pass the semester-end examination in that course in future and obtain a grade other than **F** and **N** for passing the course.

15.2. Semester Grade Point Average (SGPA): SGPA shall be calculated as given below on a "10 point scale" as an index of the student's performance at the end of each semester:

$$SGPA = \frac{\sum (C \ X \ GP)}{\sum C}$$

where C denotes the credits assigned to the courses undertaken in that semester and GP denotes the grade points earned by the student in the respective courses.

Note: SGPA is calculated only for the candidates who passed all the courses in that Semester.

15.3. Cumulative Grade Point Average (CGPA):

The CGPA for any student is awarded only when he completes the Program i.e., when the student passes in all the courses prescribed in the Program. The CGPA is computed on a 10 point scale as given below:

$$CGPA = \frac{\sum (C \ X \ GP)}{\sum C}$$

where C denotes the credits assigned to courses undertaken up to the end of the Program and GP denotes the grade points earned by the student in the respective courses.

16. **Grade Sheet:** A grade sheet (Marks Memorandum) shall be issued to each student indicating his performance in all courses registered in that semester indicating the **SGPA.**

17. **Consolidated Grade Sheet:** After successful completion of the entire Program of study, a Consolidated Grade Sheet containing performance of all academic years shall be issued as a final record. Duplicate Consolidated Grade Sheet will also be issued, if required, after payment of requisite fee.

18. **Award of Degree**: <u>The Degree shall be conferred and awarded by Jawaharlal Nehru Technological University Anantapur, Ananthapuramu on the recommendations of the Chairman, Academic Council of SVEC (Autonomous).</u>

18.1. **Eligibility:** A student shall be eligible for the award of B.Tech Degree if he fulfills all the following conditions:

- Registered and successfully completed all the components prescribed in the Program of study to which he is admitted.
- Successfully acquired the minimum required credits as specified in the curriculum corresponding to the branch of study within the stipulated time.
- Obtained CGPA greater than or equal to 4.0 (Minimum requirement for declaring as passed).
- Has no dues to the College, Hostel, Library etc. and to any other amenities provided by the College.
- No disciplinary action is pending against him.

18.2. Award of Division: Declaration of Division is based on CGPA.

Awarding of Division

CGPA	Division
> = 7.0	First Class with Distinction
> = 6.0 and < 7.0	First Class
> = 5.0 and < 6.0	Second Class
> = 4.0 and < 5.0	Pass Class

19. Additional academic regulations:

19.1 A student may appear for any number of supplementary examinations within the stipulated time to fulfill regulatory requirements for award of the degree.

19.2 In case of malpractice/improper conduct during the examinations, guidelines shall be followed as given in the Annexure-I.

19.3 Courses such as Project, Seminar and Comprehensive Assessment may be repeated only by registering in supplementary examinations.

19.4 When a student is absent for any examination (Mid-term or Semester-end) he shall be awarded zero marks in that component (course) and grading will be done accordingly.

19.5 When a component is cancelled as a penalty, he shall be awarded zero marks in that component.

20. Withholding of Results:

If the candidate has not paid dues to the College/University (or) if any case of indiscipline is pending against him, the result of the candidate shall be withheld and he will not be allowed/promoted to the next higher semester.

21. Amendments to regulations:

The Academic Council of SVEC (Autonomous) reserves the right to revise, amend, or change the Regulations, Scheme of Examinations, and / or Syllabi or any other policy relevant to the needs of the society or industrial requirements etc., with the recommendations of the concerned Board(s) of Studies.

22. Attendance for student development activity periods indicated in the class time tables shall be considered as in the case of a regular course for calculation of overall percentage of attendance in a semester.

23. General: The words such as "he", "him", "his" and "himself" shall be understood to include all students irrespective of gender connotation.

Note: Failure to read and understand the regulations is not an excuse.

Annexure-I

GUIDELINES FOR DISCIPLINARY ACTION FOR MALPRACTICES / IMPROPER CONDUCT IN EXAMINATIONS

Rule No.	Nature of Malpractices/ Improper conduct	Punishment
	If the candidate:	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the course of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the course of the examination)	Expulsion from the examination hall and cancellation of the performance in that course only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that course only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the course of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the courses of that Semester. The Hall Ticket of the candidate is to be cancelled.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred for four consecutive semesters from class work and all Semester-end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the courses of the examination (including labs and project work) already appeared and shall not be allowed to appear for examinations of the remaining courses of that semester. The candidate is also debarred for four consecutive semesters from class work and all Semester-end examinations, if his involvement is established. Otherwise, The candidate is debarred for two consecutive semesters from class work and all Semester-end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or	Expulsion from the examination hall and

	takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The candidate is also debarred for two consecutive semesters from class work and all Semester-end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that course only.
6.	Refuses to obey the orders of the Chief Controller of Examinations/Controller of Examinations/any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the Controller of Examinations or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the Controller of Examinations, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that course and all other courses the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the courses of that semester. If the candidate physically assaults the invigilator/Controller of the Examinations, then the candidate is also debarred and forfeits his/her seat. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The candidate is also debarred for two consecutive semesters from class work and all Semester-end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The candidate is also debarred and forfeits the seat.

Note: Whenever the performance of a student is cancelled in any course(s) due to Malpractice, he has to register for Semester- end Examinations in that course(s) consequently and has to fulfill all the norms required for the award of Degree.

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(Autonomous)

COURSE STRUCTURE (2016-2017)

COMPUTER SCIENCE AND ENGINEERING

I B.Tech. (I Semester)

S. No	Course Code	Course Title	Contact Periods/ Week				Credits (C)	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
I Year - I Semester (CSE)										
1.	16BT1HS01	Technical English	3	1	-	4	3	30	70	100
2.	16BT1BS01	Engineering Chemistry	3	1	-	4	3	30	70	100
3.	16BT1BS03	Matrices and Numerical Methods	3	1	-	4	3	30	70	100
4.	16BT1BS04	Multi-variable calculus and Differential equations	3	1	-	4	3	30	70	100
5.	16BT10501	Programming in C	3	1	-	4	3	30	70	100
6.	16BT1HS31	English Language Lab	-	-	3	3	2	50	50	100
7.	16BT1BS31	Engineering Chemistry Lab	-	-	3	3	2	50	50	100
8.	16BT10331	Computer Aided Engineering Drawing	-	1	6	7	3	50	50	100
9.	16BT10531	Programming in C Lab	-	-	3	3	2	50	50	100
	Total		**15**	**6**	**15**	**36**	**24**	**350**	**550**	**900**

I B.Tech. (II Semester)

S. No	Course Code	Course Title	Contact Periods/ Week				Credits (C)	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
I Year - II Semester (CSE)										
1.	16BT1BS02	Engineering Physics	3	1	-	4	3	30	70	100
2.	16BT2BS01	Transformation Techniques and Partial Differential Equations	3	1	-	4	3	30	70	100
3.	16BT20441	Basic Electronic Devices and Circuits	3	1	-	4	3	30	70	100
4.	16BT21201	Object Oriented Programming through C++	4	1	-	5	4	30	70	100
5.	16BT21501	Digital Logic Design	3	1	-	4	3	30	70	100
6.	16BT1BS32	Engineering Physics Lab	-	-	3	3	2	50	50	100
7.	16BT20451	Analog and Digital Electronics Laboratory	-	-	3	3	2	50	50	100
8.	16BT20531	Workshop in Computer Science	-	-	3	3	2	50	50	100
9.	16BT21232	Object Oriented Programming Lab	-	-	3	3	2	50	50	100
	Total		**16**	**5**	**12**	**33**	**24**	**350**	**550**	**900**

II B.Tech. (I Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits (C)	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
II Year - I Semester (CSE)										
1	16BT3BS01	Probability Distributions and Statistical Methods	3	1	-	4	3	30	70	100
2.	16BT30501	Computer Organization	3	1	-	4	3	30	70	100
3.	16BT30502	Data Structures	3	1	-	4	3	30	70	100
4.	16BT31201	Discrete Mathematical Structures	3	1	-	4	3	30	70	100
5.	16BT30503	Python Programming	3	1	-	4	3	30	70	100
6.	16BT31501	Operating Systems	3	1	-	4	3	30	70	100
7.	16BT30531	Data Structures lab	-	-	3	3	2	50	50	100
8.	16BT30532	Python Programming lab	-	-	3	3	2	50	50	100
9.	16BT31531	Operating Systems Lab	-	-	3	3	2	50	50	100
Total			**18**	**6**	**9**	**33**	**24**	**330**	**570**	**900**

II B.Tech. (II Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits (C)	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
II Year - II Semester (CSE)										
1.	16BT3HS01	Environmental Studies	3	-	-	3	3	30	70	100
2.	16BT40501	Computer Graphics	3	1	-	4	3	30	70	100
3.	16BT40502	Database Management Systems	3	1	-	4	3	30	70	100
4.	16BT41201	Design and Analysis of Algorithms	3	1	-	4	3	30	70	100
5.	16BT41202	Java Programming	3	1	-	4	3	30	70	100
6.	16BT41203	Software Engineering	3	1	-	4	3	30	70	100
7.	16BT40531	Database Management Systems Lab	-	-	3	3	2	50	50	100
8.	16BT31231	Java Programming Lab	-	-	3	3	2	50	50	100
9.	16BT4HS31	Soft Skills Lab	-	-	3	3	2	50	50	100
Total			**18**	**5**	**9**	**32**	**24**	**330**	**570**	**900**

III B.Tech. (I Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits (C)	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
III Year - I Semester (CSE)										
1.	16BT5HS01	Management Science	3	1	-	4	3	30	70	100
2.	16BT50501	Computer Networks	3	1	-	4	3	30	70	100
3.	16BT50502	Linux Programming	3	1	-	4	3	30	70	100
4.	16BT51202	Object Oriented Analysis and Design	3	1	-	4	3	30	70	100
5.	16BT41204	Theory of Computation	3	1	-	4	3	30	70	100
6.		**Interdisciplinary Elective-1**	3	1	-	4	3	30	70	100
	16BT50442	Micro Processors and Interfacing								
	16BT50503	Computer Vision								
	16BT50504	Data Communications								
	16BT51541	Modeling and Simulation								
7.	16BT50531	Computer Networks Lab	-	-	3	3	2	50	50	100
8.	16BT50532	Linux Programming Lab	-	-	3	3	2	50	50	100
9.	16BT50533	Object Oriented Analysis and Design Lab	-	-	3	3	2	50	50	100
	Total		**18**	**6**	**9**	**33**	**24**	**330**	**570**	**900**

III B.Tech. (II Semester)

S. No	Course Code	Course Title	Contact Periods/ Week				Credits (C)	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
		III Year - II Semester (CSE)								
1.	16BT3HS02	Managerial Economics and Principles of Accountancy	3	1	-	4	3	30	70	100
2.	16BT61501	Data Warehousing and Data Mining	3	1	-	4	3	30	70	100
3.	16BT60501	Software Testing	3	1	-	4	3	30	70	100
4.		**Inter Disciplinary Elective–2**	3	1	-	4	3	30	70	100
	16BT70402	Embedded Systems								
	16BT50341	Optimization Techniques								
	16BT60502	Soft Computing								
	16BT60503	Wireless Networks								
5.		**Program Elective–1**	3	1	-	4	3	30	70	100
	16BT71210	High Performance Computing								
	16BT71202	Mobile Application Development								
	16BT71204	Mobile Computing								
	16BT60504	Principles of Programming Languages								
6.		**Open Elective**	3	1	-	4	3	30	70	100
7.	16BT61531	Data Warehousing and Data Mining Lab	-	-	3	3	2	50	50	100
8.	16BT60531	Software Testing Lab	-	-	3	3	2	50	50	100
9.	16BT60532	Seminar		-	-	-	2	-	100	100
10.	16BT6MOOC	MOOC	-	-	-	-	-	-	-	-
	Total		**18**	**6**	**6**	**30**	**24**	**280**	**620**	**900**

Sl. No.	Course Code	Open Elective Course Title	Sl. No.	Course Code	Open Elective Course Title
1.	16BT6HS01	Banking and Insurance	16.	16BT60114	Disaster Mitigation and Management
2.	16BT6HS02	Business Communication and Career Skills	17.	16BT60115	Environmental Pollution and Control
3.	16BT6HS03	Cost Accounting and Financial Management	18.	16BT60116	Planning for Sustainable Development
4.	16BT6HS04	Entrepreneurship for Micro, Small and Medium Enterprises	19.	16BT60117	Professional Ethics
5.	16BT6HS05	French Language	20.	16BT60118	Rural Technology
6.	16BT6HS06	German Language	21.	16BT60308	Global Strategy and Technology
7.	16BT6HS07	Indian Constitution	22.	16BT60309	Intellectual Property Rights and Management
8.	16BT6HS08	Indian Economy	23.	16BT60310	Managing Innovation and Entrepreneurship
9.	16BT6HS09	Indian Heritage and Culture	24.	16BT60311	Materials Science
10.	16BT6HS10	Indian History	25.	16BT70412	Green Technologies
11.	16BT6HS11	Personality Development	26.	16BT70413	Introduction to Nanoscience and Technology
12.	16BT6HS12	Philosophy of Education	27.	16BT60505	Engineering System Analysis and Design
13.	16BT6HS13	Public Administration	28.	16BT71011	Micro-Electro-Mechanical Systems
14.	16BT60112	Building Maintenance and Repair	29.	16BT61205	Cyber Security and Laws
15.	16BT60113	Contract Laws and Regulations	30.	16BT61505	Bio-informatics

IV B.Tech. (I Semester)

S. No	Course Code	Course Title	Contact Periods/ Week				Credits	Scheme of Examination		
							(C)	Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
IV Year - I Semester (CSE)										
1.	16BT61201	Cloud Computing	3	1	-	4	3	30	70	100
2.	16BT51501	Compiler Design	3	1	-	4	3	30	70	100
3.	16BT51203	Web Technologies	3	1	-	4	3	30	70	100
4.	**Program Elective–2**		3	1	-	4	3	30	70	100
	16BT70501	Big Data Analytics								
	16BT71205	Cryptography and Network Security								
	16BT70502	Ethical Hacking								
	16BT61503	Software Project Management								
5.	**Program Elective–3**		3	1	-	4	3	30	70	100
	16BT70503	Computer Forensics								
	16BT70504	Design Patterns								
	16BT71508	Internet of Things								
	16BT71208	Service Oriented Architecture								
6.	**Program Elective–4**		3	1	-	4	3	30	70	100
	16BT70505	Human Computer Interaction								
	16BT71203	Information Retrieval Systems								
	16BT70506	Multimedia Application Development								
	16BT61204	Semantic Web								
7.	16BT61231	Cloud Computing Lab	-	-	3	3	2	50	50	100
8.	16BT51233	Web Technologies Lab	-	-	3	3	2	50	50	100
9.	16BT70531	Comprehensive Assessment	-	-	-	-	2	-	100	100
	Total		**18**	**6**	**6**	**30**	**24**	**280**	**620**	**900**

IV B.Tech. (II Semester)

S. No.	Course Code	Course Title	L	T	P	Contact Periods/ Week	Credits (C)	Scheme of Examination Max. Marks		
								Int. Marks	Ext. Marks	Total Marks
IV Year – II Semester – Group – CSE										
1.	16BT80531	Project Work*	-	-	-	-	12	100	100	200
	Total		**-**	**-**	**-**	**-**	**12**	**100**	**100**	**200**

*Full-time project work

I B. Tech. - I Semester

(16BT1HS01) **Technical English**

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: ***English at Intermediate level***

COURSE DESCRIPTION: Introduction to Communication; Active Listening; Effective Speaking; Reading; and Writing.

COURSE OUTCOMES: On successful completion of this course, the students will be able to

CO1: Demonstrate knowledge in
- Process of communication
- Modes of listening
- Paralinguistic features
- Skimming and Scanning
- Elements of style in writing

CO2: Analyze the possibilities and limitations of language for understanding
- Barriers to Communication
- Barriers to Effective Listening
- Barriers to Speaking
- Formal and metaphorical language

CO3: Design and develop functional skills for professional practice.

CO4: Apply writing skills in preparing and presenting documents

CO5: Function effectively as an individual and as a member in diverse teams.

CO6*:* Communicate effectively with the engineering community and society in formal and informal situations.

DETAILED SYLLABUS:

UNIT I - **INTRODUCTION TO COMMUNICATION:** **(9 periods)**

Introduction –Language as a Tool of Communication – Communicative Skills (Listening, Speaking, Reading and Writing) – Effective Communication – Modes of Communication – Barriers to Communication (classification)

UNIT II - **ACTIVE LISTENING:** **(9 periods)**

Introduction – Reasons for poor Listening – Traits of a Good Listener – Listening Modes – Types of Listening – Barriers to Effective Listening – Listening for General Content and Specific Information

UNIT III - **EFFECTIVE SPEAKING:** **(9 periods)**

Introduction – Achieving Confidence, Clarity and Fluency – Paralinguistic Features – Barriers to Speaking – Types of Speaking – Persuasive Speaking

UNIT IV - **READING**: **(9 periods)**

Introduction and Reading Rates – Reading and Interpretation – Intensive and Extensive Reading – Critical Reading – Reading for Different Purposes – SQ3R Reading Technique –Study Skills

UNIT V – **WRITING**: **(9 periods)**

Introduction – Language – Elements of Style – Techniques for Good Technical Writing – Referencing and Styling – Right Words and Phrases – Sentences

Total Periods: *45*

TEXT BOOK:
1. Meenakshi Raman & Sangeetha Sharma, *Technical Communication*, Oxford University Press, New Delhi, 2012.

REFERENCE BOOKS:

1. Ashraf Rizvi*, Effective Technical Communication*, McGraw-Hill Education (India) Pvt.Ltd., New Delhi, 2015.
2. Sanjay Kumar & Pushp Lata, *Communication Skills*, Oxford University Press, New Delhi, 2013.
3. Teri Kwal Gamble and Michael Gamble, *Communication Works*, Tata Mc Graw-Hill, New Delhi, 2010.
4. Rajendra Pal and J.S. Korlahalli, *Essentials of Business Communication*, Sultan Chand and Sons (P) Ltd., New Delhi, 2010.

I-B. Tech - I Semester

(16BT1BS01) ENGINEERING CHEMISTRY

(Common to CSE,CSSE,IT,CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITE: Intermediate/Senior Secondary Chemistry

COURSE DESCRIPTION: Water technology, Chemistry of Engineering materials, Nanochemistry, Green Chemistry, Electro chemical cells, Sensors, Corrosion and Lubricants.

COURSE OUTCOMES:

After completion of the course, a successful student is able to:

CO1: Acquire basic knowledge in water technology, engineering plastics, conducting polymers, composites, Electro chemical cells, Nano Chemistry, principles of Green Chemistry, corrosion phenomenon and lubricants.

CO2: Develop analytical skills in:

a. Determination of hardness of water.
b. Determination of viscosity, flame and fire points, cloud and pour points.

CO3: Develop designing skills in:

a. Synthesis of engineering plastics.
b. Chemical methods for the synthesis of Nano materials.

CO4: Develop skills for providing solutions through:

a. Mitigation of hardness of water.
b. Newer Nanomaterials and engineering plastics for specific applications

CO5: Acquire awareness to practice engineering in compliance to modern techniques such as:

a. Nalgonda technique for defluoridation of water
b. Electroplating technique for control of corrosion.

CO6: Acquire awareness to societal issues on:

a. Quality of water.
b. Bio-diesel
c. Chemical materials utility and their impact.

DETAILED SYLLABUS:

UNIT–I: WATER TECHNOLOGY (9 periods)

Introduction: Types of water, impurities in water and their consequences, types of hardness of water, units of hardness of water, disadvantages of hardness of water, estimation of hardness of water by EDTA method, Boiler troubles: Scales and Sludges, Caustic embrittlement, Boiler corrosion and Priming and Foaming.

Softening of water: Zeolite process and Ion exchange process, advantages and disadvantages. Desalination of brackish water by Reverse Osmosis, Numerical problems on estimation of hardness of water.

Fluorides in water: Effects on human health, defluoridation method-Nalgonda method; comparison of merits and demerits of various defluoridation methods (Nalgonda, Bone Charcoal, Activated Alumina, Contact precipitation, Brick, Reverse osmosis).

UNIT – II: CHEMISTRY OF ENGINEERING MATERIALS (9 periods)

Engineering Plastics: Definition, general properties, synthesis, properties and applications of PC, PTFE, and PMMA.

Conducting polymers: Definition, types of conducting polymers: Intrinsic and extrinsic conducting polymers with examples, engineering applications of conducting polymers.

Biodegradable polymers: Definition, properties, classification, mechanism of degradation of biodegradable polymers and their applications.

Composites – Introduction, types of composites: fiber reinforced particulate and layered composites with examples, advantages of composites and applications.

UNIT– III: NANOCHEMISTRY AND GREEN CHEMISTRY (9 periods)

Nanochemistry: Introduction, classification, properties and applications of Nano materials (nano particles, nano tubes, nano wires, nano composites, dendrimers); synthesis of Nano materials – Sol-gel process.

Green Chemistry: Introduction, principles of green chemistry, Tools of Green Chemistry with Examples, Applications of Green Chemistry in science and technology.

Biodiesel: Introduction, Synthesis (Trans esterification method), advantages, disadvantages and applications.

UNIT–IV: ELECTROCHEMICAL CELLS AND SENSORS (9 periods)

Electrochemical cell: Introduction, EMF of an electrochemical cell.

Batteries: Introduction, types of Batteries: primary and secondary batteries with examples, Ni-Cd batteries, Lithium-ion batteries, Lithium- Polymer batteries, Applications of batteries.

Fuel Cells: Definition, examples: $H_2 – O_2$ Fuel cell, solid oxide fuel cell, Bio-fuel cell and applications of fuel cells.

Sensors - Introduction, Types of Sensors, electrochemical sensor: construction and working principle of potentiometric sensor, and applications of electrochemical sensors.

UNIT–V: CORROSION AND LUBRICANTS (9 periods)

Corrosion: Introduction, Definition, types of corrosion (dry and wet corrosion), galvanic corrosion, concentration cell corrosion, Factors influencing corrosion, Corrosion control: cathodic protection; sacrificial anodic protection and impressed current cathodic protection; protective coatings: Galvanizing and Electroplating (Nickel).

Lubricants: Definition, functions of lubricants, mechanism of lubrication, classification of lubricants, properties of lubricants – viscosity, flash and fire points, cloud and pour points, Aniline points, neutralization number and mechanical strength.

Total periods: 45 periods

TEXT BOOKS:

1. P.C.Jain & Monika Jain, **Engineering Chemistry**, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 16th edition, 2013.
2. K.N. Jayaveera, G.V. Subba Reddy & C. Ramachandraiah **Engineering Chemistry**, Mc. Graw-Hill Higher Education, Hyderabad, 1st edition, 2015.

REFERENCE BOOKS:

1. A.K. Bandyopadhyay, **Nano Materials,** New Age international publishers, 2nd edition, 2014.
2. Paul T. Anastas and John C Warner, **Green Chemistry: Theory and practice,** Oxford University Press, 2000.

I B. Tech. - I Semester
(16BT1BS03) MATRICES AND NUMERICAL METHODS
(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate /Senior secondary mathematics
COURSE DESCRIPTION: Fundamentals of matrix theory; numerical solutions of equations, curve fitting; interpolation; numerical differentiation and integration; numerical solutions of ordinary differential equations.
COURSE OUTCOMES: After completion of the course a successful student is able to
CO1: Acquire basic **knowledge** in
- (a) Finding the rank of matrices and analyzing them.
- (b) Solving algebraic and transcendental equations by various numerical methods.
- (c) Fitting of various types of curves to the experimental data.
- (d) Estimating the missing data through interpolation methods.
- (e) Identification of errors in the experimental data
- (f) Finding the values of derivatives and integrals through various numerical methods.
- (g) Solving differential equations numerically when analytical methods fail.

CO2: Develop skills in **analyzing** the
- (a) methods of interpolating a given data
- (b) properties of interpolating polynomials and derive conclusions
- (c) properties of curves of best fit to the given data
- (d) algebraic and transcendental equations through their solutions
- (e) properties of functions through numerical differentiation and integration
- (f) properties of numerical solutions of differential equations

CO3: Develop skills in **designing** mathematical models for
- (a) Fitting geometrical curves to the given data
- (b) Solving differential equations
- (c) Constructing polynomials to the given data and drawing inferences.

CO4: Develop numerical skills in **solving the problems** involving
- (a) Systems of linear equations
- (b) Fitting of polynomials and different types of equations to the experimental data
- (c) Derivatives and integrals
- (d) Ordinary differential equations

CO5: Use relevant numerical **techniques** for
- (a) Diagonalising the matrices of quadratic forms
- (b) Interpolation of data and fitting interpolation polynomials
- (c) Fitting of different types of curves to experimental data
- (d) obtaining derivatives of required order for given experimental data
- (e) Expressing the functions as sum of partial fractions

DETAILED SYLLABUS:
UNIT–I : MATRICES (11 periods)
Rank of a matrix, echelon form, normal form, inverse of a matrix by elementary row operations. Solutions of linear system of equations. Eigen values, Eigen vectors and properties (without proof), Diagonalization. Quadratic form (QF), reductions to canonical form using orthogonal transformation and nature of QF.
UNIT-II NUMERICAL SOLUTIONS OF EQUATIONS AND CURVE FITTING (8 periods)
Solutions of Algebraic and Transcendental equations by bisection method, Regula-Falsi method, Newton – Raphson's method. Curve fitting by the principle of least squares, fitting of a straight line, parabola and exponential curves.
UNIT- III INTERPOLATION (8 periods)
Interpolation, difference operators and their relationships, Newton's forward and backward formulae, Lagrange's interpolation formula. Partial fractions using Lagrange's interpolation formula.
UNIT-IV NUMERICAL DIFFERENTIATION AND INTEGRATION (8 periods)
Numerical differentiation using Newton's forward and backward formulae. Numerical integration using Trapezoidal rule, Simpson's $1/3^{rd}$ rule and $3/8^{th}$ rule.
UNIT- V NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS (10 periods)
Numerical solutions of first order Initial value problems using Taylor series method, Euler's method , modified Euler's method, Runge – Kutta method (4^{th} order only) and Milne's predictor – corrector method.
Total no. of periods: 45

TEXT BOOK:
1. T.K.V. Iyenger, B. Krishna Gandhi, S.Ranganadham and M.V.S.S.N.Prasad, ***Mathematical Methods,*** S.Chand and Company, 8/e, 2013

REFERENCE BOOKS:

1. B.S. Grewal, ***Higher engineering mathematics***, Khanna Publishers, 42nd Edition. 2012
2. S.S.Sastry, ***Introductory methods of Numerical Analysis***, Prentice Hall of India, 5/e, 2013

I B. Tech. - I Semester

(16BT1BS04) MULTI - VARIABLE CALCULUS AND DIFFERENTIAL EQUATIONS

(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate /Senior secondary mathematics

COURSE DESCRIPTION: First order differential equations; higher order linear differential equations; functions of several variables; applications of integration; multiple integrals; vector calculus.

COURSE OUTCOMES: After completion of the course a successful student is able to

CO1: Acquire knowledge in
- (a) Higher order Differential equations
- (b) Maximum and minimum values for the functions of several variables
- (c) Double and triple integrals
- (d) Differentiation and integration of vector functions.
- (e) Line and surface volume
- (f) transforming integrals from three dimensional surfaces and volumes on to plane surfaces

CO2: Develop skills in analyzing the
- (a) methods for differential equation for obtaining appropriate solutions,
- (b) Properties of oscillatory electrical circuits and heat transfer in engineering systems
- (c) The variations in the properties of functions near their stationary values
- (d) Flow patterns of fluids, electrical and magnetic flux and related aspects

CO3: Develop skills in designing mathematical models for
- (a) R-C and L-R-C oscillatory electrical circuits
- (b) Heat transfer and Newton's law of cooling
- (c) Engineering concepts involving lengths of curves and areas of planes, Flux across surfaces

CO4: Develop analytical skills in solving the problems involving
- (a) Newton's law of cooling
- (b) non homogeneous linear differential equations
- (c) maximum and minimum values for the functions
- (d) lengths of curves, areas of surfaces and volumes of solids in engineering
- (e) transformation of integrals from three dimensional surfaces and volumes on to plane surfaces

CO5: Use relevant mathematical techniques for evaluating
- (a) various types of particular integrals in differential equations
- (b) stationary values for multi variable functions
- (c) multiple integrals in change of variables
- (d) integrations of vector functions.

DETAILED SYLLABUS:

UNIT-I: FIRST ORDER DIFFERENTIAL EQUATIONS (6 periods)

Linear and Bernoulli type, exact equations and reducible to exact. Orthogonal trajectories (Both Cartesian and polar forms). Newton's law of cooling.

UNIT II: HIGHER ORDER LINEAR DIFFERENTIAL EQUATIONS (9 periods)

Method for solution of linear equations- Differential operator *D*, Solution of second order linear homogeneous equations with constant coefficients, Solution of Higher order homogeneous linear equations with constant coefficients, **Solution of Non homogeneous linear equations**-Operator methods for finding particular integrals- for cases – e^{ax}, sin ax, cos ax, x^n, $e^{ax}V(x)$, xV(x). Method of Variation of parameters. Applications to oscillatory electrical circuits.

UNIT-III: FUNCTIONS OF SEVERAL VARIABLES (8 periods)

Functions of Two Variables: Limits, Continuity; **Partial Derivatives**: Total Differential and Derivatives, Jacobian, Functional dependence, Taylor's Theorem, maxima and minima of functions of two variables with and without constraints – Lagrange's method of undetermined multipliers.

UNIT-IV: APPLICATIONS OF INTEGRATION AND MULTIPLE INTEGRALS (10 periods)

Applications of integration to – lengths of curves, areas of surfaces of revolution, Double and Triple integrals – change of order of integration, change of variables in integrals. Area enclosed by plane curves, volumes of solids.

UNIT-V: VECTOR CALCULUS (12 periods)

Vector differentiation: Gradient of a scalar field and Directional Derivative, Divergence and Curl of a Vector field

Line integrals: Line integrals independent of path – work done.

Surface area and Surface Integrals: Surface Area, Surface Integrals, Flux across a surface.

Green's Theorem: Green's Theorem (without proof)-verification- applications

Gauss Divergence Theorem and Stoke's Theorem: Gauss Divergence theorem (without proof), Stokes's Theorem (without proof) –verifications and applications. **Total no. of periods: 45**

TEXT BOOK:

1. T.K.V. Iyengar, B. Krishna Gandhi,S.Ranganatham and M.V.S.S.N. Prasad, ***Engineering Mathematics, Vol-1***, S. Chand &Company, 13/e, 2014

REFERENCE BOOKS:

1. Grewal, B.S., ***Higher engineering mathematics***,Khanna publishers, Delhi, 42/e. 2012.
2. Kreyszig, E., ***Advanced Engineering Mathematics***,John Wiley and Sons, Inc.,9/e.2012.

I B. Tech. - I Semester

(16BT10501) PROGRAMMING IN C

(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: NIL

COURSE DESCRIPTION:

Program design; Operators and Expressions; Data Input and Output; Control Statements; Functions; Arrays; Strings; Pointers; Structures & Unions and File handling Techniques;

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1: Demonstrate knowledge in:
- o Elements of C Language
- o Selection and Repetition statements.
- o Arrays, Strings and Functional statements.
- o Derived data types, Files and Pointers

CO2: Analyze complex engineering problems to develop suitable solutions

CO3: Design algorithms for specified engineering problems

CO4: Use appropriate 'C' language constructs for solving engineering problems

CO5: Write programs using 'C' language to implement algorithms

DETAILED SYLLABUS:

UNIT I – INTRODUCTION TO C PROGRAMMING, OPERATORS & EXPRESSIONS (08 periods)

Introduction to C Programming: The C Character set, Writing First Program of C, Identifiers and Keywords, Data types, Constants, Variables and Arrays, Declarations, Expressions, Statements and Symbolic Constants.

Operators and Expressions: Arithmetic Operators, Unary Operators, Relational and Logical Operators, Assignment Operators, the Conditional Operators.

UNIT II – DATA INPUT AND OUTPUT & CONTROL STATEMENTS (08 periods)

Data Input and Output: Single Character Input and Output, Input Data & Output data, The gets and puts Function.

Control Statements: Branching: The if-else Statement, Looping: The while Statement, More Looping: The do-while Statement, Still More Looping: The for Statement, Nested Control Statement, The switch Statement, The break & continue Statements, The goto Statement.

UNIT III – FUNCTIONS, PROGRAM STRUCTURES & ARRAYS (11 p*eriods*)

Functions: A Brief Overview, Defining a Function, Accessing a Function, Function Prototypes, Parsing Argument to a Function, Recursion.

Program Structure: Storage Classes, Automatic Variables, External (Global) Variables, Static Variables, Multi file Programs,

Arrays: Defining an Array, Processing an Array, Processing Array to function, Multidimensional Arrays. Linear search, Binary search, Fibonacci search, Bubble sort and Insertion sort

UNIT IV – STRINGS & POINTERS (09 periods)

Strings: Defining a String, NULL Character, Initialization of Strings, Reading and Writing a String, Processing a Strings, Character Arithmetic, Searching and Sorting of Strings, Library Functions for Strings.

Pointers: Pointer Declaration, Passing Pointers to a Function, Pointers and One-dimensional Arrays, Dynamic Memory Allocation, Operations on Pointers, Pointers and Multidimensional Arrays, Arrays of Pointers.

UNIT V – STRUCTURES AND UNIONS & FILE HANDLING (09 periods)

Structures and Unions: Defining a Structure, Processing a Structure, User-Defined Data types (typedef), Structures and Pointers, Passing Structures to Function, Self –Referential Structures, Unions

File Handling: Files introduction, Opening and Closing a Data File, Reading and Writing a Data File, Processing a Data File, Unformatted Data File, Concept of Binary Files, Accessing the File Randomly.

Total Periods: *45*

TEXT BOOK:

1. Byron Gottfried and Jitender Kumar C "*Programming with C*," Third Edition, McGraw Hill Education (India) Pvt, Ltd, New Delhi, 2016.

REFERENCE BOOKS:

1. PradipDey and Manas Ghosh, *"Programming in C",* Second Edition, Oxford University Press, NewDelhi, 2007.

2. E. Balagurusamy, "*Programming in C*", Seventh Edition, Mc Graw Hill Education (India) Pvt, Ltd, New Delhi, 2014.

I B. Tech. - I Semester

(16BT1HS31) **ENGLISH LANGUAGE LAB**

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: English at intermediate or equivalent level.

COURSE DESCRIPTION: Phonetics; Vocabulary Building; Functional Grammar; Just a Minute; Elocution/Impromptu; Giving Directions/Conversation Starters; Role Play; Public Speaking; Describing People, Places, Objects and Events; Reading Comprehension; Listening Comprehension; Information Transfer.

COURSE OUTCOMES: On successful completion of this course the students will be able to

CO1: Demonstrate knowledge in
- Phonetics
- Information Transfer

CO2: Analyze the situations in professional context by using
- Vocabulary
- Grammar

CO3: Design and develop functional skills for professional practice.

CO4: Apply the techniques of Listening and Reading skills to comprehend Listening and Reading comprehension.

CO5: Function effectively as an individual and as a member in diverse teams through
- Extempore talk and
- Role Play

CO6: Communicate effectively in public speaking in formal and informal situations.

CO7: Recognize the need to engage in lifelong learning to upgrade competence of knowledge and communication.

LIST OF EXERCISES:

1. Phonetics
2. Vocabulary Building
3. Functional Grammar
4. Just a Minute
5. Elocution/Impromptu
6. Giving Directions/Conversation Starters
7. Role Play
8. Public Speaking
9. Describing People, Places, Objects and Events.
10. Reading Comprehension
11. Listening Comprehension
12. Information Transfer

Total Lab Slots: 10

TEXT BOOK:

1. Department Lab Manual

REFERENCE BOOKS:

1. D. Sudha Rani, *A Manual for English Language Laboratories*, Pearson Education.
2. D. Sudha Rani, *Advanced Communication Skills Laboratory Manual*, Pearson Education.
3. R. Manivannan and G. Immanuel, *Communication Skills Laboratory*, VK Publications, Sivakasi, 2013
4. Nira Kumar*, English Language Laboratories*, PHI Learning Pvt. Ltd., New Delhi, 2011.

SUGGESTED SOFTWARE: (16BT1HS31)

1. ETNL Language Lab Software Version 4.0
2. GEMS – Globarena E- Mentoring System.
3. Speech Solutions.
4. English Pronunciation Dictionary by Daniel Jones.
5. Learn to Speak English 8.1, The Learning Company – 4 CDs.
6. Mastering English: Grammar, Punctuation and Composition.
7. English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
8. Dorling Kindersley Series - Grammar.
9. Language in Use 1, 2 & 3.
10. Cambridge Advanced Learner's Dictionary - 3rd Edition.

11. Centronix – Phonetics.
12. Let's Talk English, Regional Institute of English South India.
13. The Ultimate English Tutor.

I-B. Tech - I Semester

16BT1BS31: ENGINEERING CHEMISTRY LAB

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE REQUISITE: Intermediate/Senior Secondary Chemistry

COURSE DESCRIPTION: Estimation of hardness, alkalinity, dissolved oxygen of water samples and estimation of Iron by volumetric methods, determination of effect of P^H on rate of corrosion, measurement of viscosity of lubricants; Instrumental methods like potentiometer, conductivity meter, P^H meter and colorimeter; synthesis of Polymers and Nano materials.

COURSE OUTCOMES:

After completion of the course, a successful student is able to:

CO1: Acquire basic Knowledge about the volumetric analysis and synthesis of materials used for engineering applications.

CO2: Acquire analytical skills in the estimation of hardness of water, alkalinity of water, dissolved oxygen in water and estimation of Iron through wet laboratory methods.

CO3: Develop designing skills for the synthesis of polymers and Nanomaterials.

CO4: Acquire skills to use instrumental techniques for the determination of Electrical conductance of electrolytes, EMF of a cell, PH of a solution, determination of viscosity of lubricants and estimation of iron in cement.

CO5: Provide solutions for environmental issues through determination of quality of water.

List of Experiments:

A minimum of any **Ten** experiments are to be conducted among the following:.

1. Estimation of Hardness of water by EDTA method.
2. Estimation of alkalinity of Water.
3. Estimation of Dissolved Oxygen in water.
4. Estimation of Ferrous Iron by Dichrometry.
5. Preparation of Novalac Resin.
6. Synthesis of Nano metal-oxide using sol– gel process.
7. Conductometric titration of strong acid Vs strong base
8. Estimation of Ferrous ion by Potentiometry.
9. Determination of amount of corrosion of metals in different medium
10. Measurement of viscosity of lubricants by Ostwald viscometer.
11. Determination of P^H of a given solution by P^H metry.
12. Estimation of Ferric iron in cement by Colorimetric method.

Total Time Slots: 12

I B. Tech. I Semester

16BT10331: **COMPUTER AIDED ENGINEERING DRAWING**

(Common to CSE,CSSE,IT,CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	1	6	3

PRE-REQUISITES: *None*

COURSE DESCRIPTION:

Engineering drawing conventions; importance of engineering drawing; fundamental concepts of sketching; computed aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.

COURSE OUTCOMES:

After completion of the course, a successful student is able to:

- CO1: Understand, write and read the language of engineering drawing in industry through International System of Standards.
- CO2: Develop the imagination and mental visualization ability for interpreting the geometrical details of engineering objects.
- CO3: Produce different views and projection in drawing.
- CO4: Use modern CAD software for design and drafting of drawings.
- CO5: Create multi-view drawings suitable for presentation to Engineering community.
- CO6: Introduce and communicate universally accepted conventions and symbols for their usage in technical drawing.

DETAILED SYLLABUS:

UNIT : I - BASICS OF ENGINEERING DRAWING PRACTICE, GEOMETRICAL CONSTRUCTIONS, CONICS AND SPECIAL CURVES (18 periods)

Introduction, drawing instruments and its uses, sheet layout, BIS conventions, lines, lettering and dimensioning practices. Geometrical constructions: Construction of regular polygons: Pentagon, Hexagon, Heptagon and Octagon. Conic sections**:** Introduction, construction of ellipse: rectangular method, eccentricity method. Construction of parabola: rectangular method, eccentricity method. Construction of hyperbola: eccentricity method. Special curves***:*** cycloid, involute.

UNIT: II – INTRODUCTION TO COMPUTER AIDED SKETCHING (18 periods)

Computer screen, layout of the software, creation of 2D/3D environment, selection of drawing size and scale, Standard tool bar/menus, Coordinate system, description of most commonly used toolbars, navigational tools: commands and creation of lines, Co-ordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination and perpendicularity.

UNIT: III – PROJECTION OF POINTS, STRAIGHT LINES AND PLANES (21 periods)

Introduction, method of projection, planes of projection, reference line and notations. Projection of points: Points in all the four quadrants. Projection of straight lines**:** lines inclined to HP / VP plane, inclined to both HP and VP planes (straight lines are assumed to be in first quadrant only)**.** Projection of planes**:** projection of triangle, square, rectangle, rhombus, pentagon, hexagon and circular plane for the condition inclined to HP / VP by change of position method.

UNIT IV –PROJECTION OF SOLIDS AND SECTION OF SOLIDS (21 Periods)

Projections of Solids: Introduction, projection of solids: prisms, pyramids, cylinders and cones with axis perpendicular to VP/HP and axis inclined to VP/HP only. Sections of solids**:** Introduction, Cutting plane, sectional views of right regular solids resting with base on HP: prisms, pyramids, cylinder and cone and true shapes of the sections.

UNIT V –ORTHOGRAPHIC AND ISOMETRIC PROJECTIONS AND DEVELOPMENT OF SURFACES (22 periods)

Orthographic projection: simple exercises. Isometric projection: Simple exercises.

Development of surfaces: prisms, pyramids, cylinders, cone and miscellaneous surfaces

Total Periods: *100*

Note: *Student shall practice Unit-I using sketch book only and remaining units using sketch book first and later CAD package.*

TEXT BOOKS:

1. D.M.Kulkarni, A.P.Rastogi, A.K.Sarkar, Engineering Graphics with AutoCAD, PHI Learning Private Limited, New Delhi, Revised Edition, 2010.
2. N D Bhat & V M Panchal, Engineering Drawing, Charotar Publishing House, Gujarat, 51st edition, 2013.

REFERENCE BOOKS:

1. Sham Tickoo, AutoCAD 2013 for Engineers and Designers, Dreamtech Press, 2013.
2. M.H.Annaiah & Rajashekar Patil, Computer Aided Engineering Drawing, New Age International Publishers, 4th Edition, 2012.
3. T.Jeyapoovan, Engineering Drawing and Graphics Using AutoCAD, Vikas Publishing House, 3rd Edition, 2010.
4. Jolhe, Engineering Drawing, Tata McGraw Hill Education Private Limited, 1st Edition, 2007.

5. Basant Aggarwal, Engineering Drawing, Tata McGraw Hill Education Private Limited, 1st Edition, 2008.

I B. Tech. - I Semester
16BT10531: PROGRAMMING IN C LAB
(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES:-
A course on "Programming in C"
COURSE DESCRIPTION:
Hands on practice in developing and executing simple programs using C Programming constructs– Conditional statements, Loops, Arrays, Strings, Functions, Structures, Pointers and Functions.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1: Demonstrate practical knowledge of using C language constructs:
- Selection and Repetition statements.
- Arrays, Strings and Functional statements.
- Derived data types, Files and Pointers

CO2: Analyze problems to develop suitable algorithmic solutions
***CO3*:** Design Solutions for specified engineering problems
***CO4*:** Use appropriate 'C' language constructs for solving engineering problems
***CO5*:** Implement and execute programs using 'C' language
CO6: Document programs and communicate effectively while conducting Professional transactions.
List of Exercises:
1. a. Let a and b are two integer variables whose values are 10 and 13 respectively. Write a program to evaluate the following arithmetic expressions.
   i) a + b   ii) a–b   iii) a * b   iv) a/b   v) a % b
   b. Write a program to evaluate the following algebraic expressions after reading necessary values from keyword.
   i) $(ax + b)/(ax - b)$ ii) $2.5 \log x + \cos 32^0 + | x^2 + y^2|$
   iii) $x^5 + 10 x^4 + 8$ and $x^3 + 4 x + 2$ iv) ae^{kt}
2. a. Mr. Gupta deposited Rs.1000 in a bank. The bank gives simple interest at the rate of 15% per annum. Write a program to determine the amount in Mr. Gupta's account at the end of 5 years. (Use the formula I = P T R / 100)
   b. A cashier has currency notes of denominations Rs.10, Rs. 50 and Rs. 100. If the amount to be withdrawn is input in hundreds, find the total number of notes of each denomination the cashier will have to give to the withdrawer.
   c. In a town, the percentage of men is 52. The percentage of total literacy is 48.If total percentage of literate men is 35 of the total population; write a program to find the total number of illiterate men and women if the population of the town is 8000.
3. a. Write a program that prints the given 3 integers in ascending order using if - else.
   b. Write a program to calculate commission for the input value of sales amount.
   Commission is calculated as per the following rules:
   i) Commission is NIL for sales amount Rs. 5000.
   ii) Commission is 2% for sales when sales amount is >Rs. 5000 and <= Rs. 10000.
   iii) Commission is 5% for sales amount >Rs. 10000.
   c. A character is entered through keyboard. Write a program to determine whether the character entered is a capital letter, a small case letter, a digit or a special symbol. The following table shows the range of ASCII values for various characters.

Characters	ASCII values
A - Z	65 - 90
a - z	97- 122
0 - 9	48 - 57
Special Symbols	0 - 47, 58 - 64, 91- 96, 123 - 127

4. a. If cost price and selling price of an item is input through the keyboard, write program to determine whether the seller has made profit or incurred loss. Also determine how much profit or loss he incurred in percentage.
   b. An insurance company calculates premium as follows:
   i. If a person's health is excellent and the person is between 25 and 35 years of age and lives in a city and is a male then premium is Rs.4 per thousand and the policy amount cannot exceed Rs.2 lakhs.
   ii. If a person satisfies all the above conditions and is female then the premium is Rs.3 per thousand and the policy amount cannot exceed Rs.1 lakh.
   iii. If a person's health is poor and the person is between 25 and 35 years of age and lives in a village and is a male then premium is Rs.6 per thousand and the policy cannot exceed Rs. 10000.
   iv. In all other cases the person is not insured.

Write a program to determine whether the person should be insured or not, his/her premium rate and maximum amount for which he/she can be insured.

5. a. Write a program, which takes two integer operands and one operator as input from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, %. Use switch statement)
   b. Write a program to find the grace marks for a student using switch. The user should enter the class obtained by the student and the number of subjects he has failed in. Use the following rules:
   i. If the student gets first class and the number of subjects failed is >3, then no grace marks are awarded. If the number of subjects failed is less than or equal to '3' then the grace is 5 marks per subject.
   ii. If the student gets second class and the number of subjects failed in is >2, then no grace marks are awarded. If the number of subjects failed in less than or equal to '3' then the grace is 4 marks per subject.
   iii. If the student gets third class and the number of subjects failed in is >1, then no grace marks are awarded. If the number of subjects failed in is equal to '1' then the grace is 5 marks per subject.
6. a. Write a program to find the sum of individual digits of a positive integer.
   b. A Fibonacci sequence is defined as follows:
   The first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a program to generate the first N terms of the sequence.
   Write a program to generate all the prime numbers between 1 and N, where N is a value supplied by the user.
7. a. Write a program to find the largest and smallest number in a given list of integers.
   b. Write a program to perform the following:
   i. Addition of two matrices.
   ii. Multiplication of two matrices.
8. a. Write a program that uses functions to perform the following operations:
   i. To insert a sub-string in main string at a specified position.
   ii. To delete N characters from a given string from a specified position.
   b. Write a program to determine whether the given string is palindrome or not.
   c. Write a program to display the position or index in the main string S where the sub string T begins. Display -1 if S does not contain T.
   d. Write a program to count the number of lines, words and characters in a given text.
9. a. Write a program to read list of student names and perform the following operations using functions.
   i. to print list of names
   ii. to sort them in ascending order
   iii. to print the list after sorting.
   b. Write a menu driven program to read list of student names and perform the following operations using array of character pointers.
   i. to insert a student name
   ii. to delete a name
   iii. to print the name
10. Write a program that uses functions to perform the following operations:
   i. Reading a complex number
   ii. Writing a complex number
   iii. Addition of two complex numbers
   iv. Multiplication of two complex numbers
   (**Note:** Represent complex number using a structure.)
11. a. Write a program to accept the elements of the structure as:
   Employee-name,Basic pay Display the same structure along with the DA, CCA and Gross salary for 5 employees.
   Note: DA=51% of Basic pay, CCA=Rs.100.consolidated.
   b. Define a structure to store employee's data with the following specifications:
   Employee-Number, Employee-Name, Basic pay, Date of Joining
   i. Write a function to store 10 employee details.
   ii. Write a function to implement the following rules while revising the basic pay.
   If Basic pay<=Rs.5000 then increase it by 15%.
   If Basic pay> Rs.5000 and <=Rs.25000 then it increase by 10%.
   If Basic pay>Rs.25000 then there is no change in basic pay.
   Write a function to print the details of employees who have completed 20 years of service from the date of joining.
12. a. Write a program which copies one 'text file' to another 'text file'.
   b. Write a program to reverse the first N characters of a given text file.

Note: The file name and N are specified through command line.

13. Write a program to print the output by giving the Customer_ID as an input.

REFERENCE BOOKS:

1. Byron Gottfried and Jitender Kumar C, "Programming with C," Third Edition, McGraw Hill Education(India) Pvt. ltd, New Delhi, 2016.

2. Pradip Dey and Manas Ghosh, "Programming in C," Second Edition, Oxford University Press, New Delhi, 2007.

I B.Tech. - II Semester

16BT1BS02: ENGINEERING PHYSICS

(Common to CSE,CSSE,IT,CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate / senior secondary Physics

COURSE DESCRIPTION:

Lasers; optical fibers; principles of quantum mechanics; band theory of solids; semiconductors; dielectric properties of materials; acoustics of buildings; superconductors; crystallography and nanomaterials.

COURSE OUTCOMES:

After completion of the course, a successful student will be able to:

CO1: Acquire basic knowledge of lasers, optical fibers, quantum mechanics, dielectrics, semiconductors, and superconductors, acoustic of buildings, crystallography and nanomaterials.

CO2: Analyze the construction and working of various laser systems, semiconductor devices, various types of optical fibers and its communication system and nano materials properties.

CO3: Gain skills in designing lasers, optical fiber cable, semiconductor devices, acoustically good halls and nanomaterials.

CO4: Develop problem solving skills in engineering context.

CO5: Use relevant techniques for assessing ball milling, pulsed laser deposition, p-n junction and Laser.

DETAILED SYLLABUS:

UNIT I – LASERS AND FIBER OPTICS (11periods)

Lasers: Introduction, characteristics of lasers, spontaneous and stimulated emission of radiation, Einstein's coefficients – condition for amplification, population inversion, Nd:YAG laser, Helium-Neon laser, semiconductor laser and applications of lasers.

Fiber optics: Introduction, principle of optical fiber, acceptance angle, acceptance cone and numerical aperture, classification of optical fibers, optical fiber communication system and applications of optical fibers.

UNIT II–PRINCIPLES OF QUANTUM MECHANICS AND BAND THEORY OF SOLIDS (07 p*eriods*)

Principles of Quantum Mechanics: Introduction, de-Broglie's hypothesis, Schrödinger's one dimensional wave equation (time independent), significance of wave function, particle in a one dimensional potential box, Fermi-Dirac distribution and effect of temperature (qualitative treatment).

Band Theory of Solids: Electron in a periodic potential, Kronig-Penney model (qualitative treatment), origin of energy bands formation in solids, distinction between conductors, semiconductors and insulators based on band theory.

UNIT III – SEMICONDUCTORS AND DIELECTRIC PROPERTIES OF MATERIALS (13 periods)

Semiconductors: Introduction, types of semiconductors, intrinsic carrier concentration, electrical conductivity in semiconductors, drift and diffusion currents, Einstein's relation, Hall effect and its applications, direct and indirect band gap semiconductors, p-n junction, energy band diagram of p-n diode, LED, photo diode and Solar cell.

Dielectric Properties of Materials: Introduction, dielectric constant, electronic, ionic and orientation polarizations (qualitative treatment), local field, frequency dependence of polarizability (qualitative treatment), ferroelectricity.

UNIT IV – ACOUSTICS OF BUILDINGS AND SUPERCONDUCTIVITY (07 periods)

Acoustics of Buildings: Introduction, basic requirement of acoustically good hall, reverberation and time of reverberation, Sabine's formula for reverberation time (qualitative treatment), absorption coefficient of sound and its measurement, factors affecting the architectural acoustics and their remedies.

Superconductivity: Introduction, General properties - Meissner effect, penetration depth, Type-I and Type-II superconductors, flux quantization, Josephson effects, BCS theory (qualitative treatment), applications of superconductors.

UNIT V – CRYSTALLOGRAPHY AND NANOMATERIALS (07 p*eriods*)

Crystallography: Introduction, crystal planes, crystal directions and Miller indices, separation between successive (hkl) planes, X-ray diffraction by crystal planes, Bragg's law- powder method.

Nanomaterials: Introduction, principles of nanomaterials, properties of nanomaterials, synthesis of nanomaterials by ball milling and pulsed laser deposition and applications of nanomaterials.

Total Periods: 45

TEXT BOOK:

1. P. K. Palaniswamy, ***Engineering Physics***, Scitech Publications India Private Limited, 2nd Edition, 2009

REFERENCE BOOKS:

1. Dr. S. Mani Naidu, ***Engineering Physics***, Pearson Education, 1st Edition, 2013.
2. M.N. Avadhanulu,P.G.Kshirsagar, ***A textbook of Engineering Physics***, S.Chand & Company Ltd. Revised edition 2014.
3. K.Thyagarajan, ***Engineering Physics-I***, McGraw-Hill Education (India) Pvt.Ltd. 2015

I B. Tech. - II Semester

16BT2BS01: TRANSFORMATION TECHNIQUES AND PARTIAL DIFFERENTIAL EQUATIONS

(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITE: Intermediate /Senior secondary mathematics

COURSE DESCRIPTION: Fourier series; Fourier integrals and transforms; Laplace transforms; z – transforms; partial differential equations.

COURSE OUTCOMES:

After completion of the course a successful student is able to

CO1: Acquire basic knowledge in
- (a) Fourier series and Fourier transforms
- (b) Fourier integrals
- (c) Laplace transforms and their applications
- (d) z- transforms and their applications
- (e) solving partial differential equations

CO2: Develop skills in analyzing the
- (a) Properties of Fourier series for a given function
- (b) Partial differential equations through different evaluation methods
- (c) Difference equations through z – transforms
- (d) Engineering systems and processes involving wave forms and heat transfer

CO3: Develop skills in designing mathematical models for
- (a) Problems involving heat transfer and wave forms
- (b) Engineering concepts involving, Fourier transforms, Fourier integrals, Laplace transforms, z-transforms and difference equations

CO4: Develop analytical skills in solving the problems involving
- (a) Fourier series and Fourier transforms
- (b) Laplace transforms
- (c) Z-transforms and difference equations
- (d) Heat transfer and wave motion

CO5: Use relevant transformation techniques for
- (a) Obtaining Fourier transforms for different types of functions
- (b) Laplace transforms
- (c) Z- transforms
- (d) Partial differential equations

DETAILED SYLLABUS

UNIT- I : FOURIER SERIES (7 periods)

Fourier series: Determination of Fourier coefficients, convergence of Fourier series (Dirichlet's conditions), Fourier series of even and odd functions, Half-range Fourier sine and cosine expansions.

UNIT- II: FOURIER INTEGRALS AND FOURIER TRANSFORMS (8 periods)

Fourier integral theorem (statement only), Fourier sine and cosine integrals, Fourier transform, Fourier sine and cosine transforms –properties, Inverse transform and finite Fourier transforms.

UNIT-III: LAPLACE TRANSFORMS (12 periods)

Laplace transforms of standard functions. Properties of Laplace transforms. First and second shifting Theorems. Laplace transforms of derivatives and integrals. Inverse transforms. Convolution theorem (without proof), inverse Laplace transforms by convolution theorem. Laplace transform of periodic functions, Applications of Laplace transforms to ordinary differential equations of first and second order with constant coefficients.

UNIT-IV: Z- TRANSFORMS (9 periods)

Z – transforms, inverse Z– transforms, damping rule, shifting rule, initial and final value theorems. Convolution theorem (without proof), solution of difference equations by Z– transforms.

UNIT – V: PARTIAL DIFFERENTIAL EQUATIONS (9 periods)

Formation of Partial differential equations – Solutions of first order linear equations by method of grouping. First and second order equations by method of separation of variables – Solutions of one dimensional Wave equation, Heat equation. **Total no. of periods: 45**

TEXT BOOKS:

1. T.K.V. Iyengar, B. Krishna Gandhi,S.Ranganadham and M.V.S.S.N. Prasad,***Engineering Mathematics, vol-1***, S. Chand & Company 13/e,2014.
2. T.K.V. Iyenger, B. Krishna Gandhi, S.Ranganadham and M.V.S.S.N.Prasad, ***Mathematical Methods,***S.Chand and Company, 8/e,2013.

REFERENCE BOOKS:

1. Grewal, B.S., ***Higher Engineering Mathematics***,Khanna publishers, Delhi, 42/e,2012.
2. Kreyszig, E., ***Advanced Engineering Mathematics***,John Wiley and Sons, Inc.,9/e,2013.

I B.Tech. - II Semester

16BT20441: BASIC ELECTRONIC DEVICES AND CIRCUITS

(Common to CSE, CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: A course on Engineering Physics.

COURSE DESCRIPTION:

Characteristics of general and special purpose electronic devices; Rectifiers; Biasing of BJT; FET, Feedback Amplifiers, Oscillator.

COURSE OUTCOMES: On successful completion of this course the students will be able to

CO1: Gain in-depth knowledge in

- *p-n* junction diode and its characteristics
- Zener diode and its characteristics
- Rectifiers and Filters
- Characteristics of BJT, FET, MOSFET and special purpose electronic devices.
- FET amplifiers
- Feedback amplifiers and Oscillators

CO2: Analyze numerical and analytical problems in

- Rectifiers using Filters
- Transistor biasing circuits
- FET biasing circuits and amplifiers
- Feedback amplifiers and oscillators

CO3: Design electronic circuits such as

- Rectifiers with and without filters
- BJT and FET biasing circuits
- FET amplifiers
- Feedback amplifiers and oscillators

CO4: Solve engineering problems and arrive at solutions pertaining to electronic circuits.

CO5: Select appropriate technique for transistor biasing.

DETAILED SYLLABUS

UNIT-I: *P-N JUNCTION DIODE AND RECTIFIERS* **(10 Periods)**

P-N JUNCTION DIODE

P-N Junction Diode Equation, Volt-Ampere (V-I) Characteristics, Temperature Dependence of V-I Characteristics, Ideal Versus Practical, Static and Dynamic Resistances, Diode Equivalent circuits, Junction capacitances, Break down mechanisms in semiconductor Diodes, Zener Diode Characteristics.

RECTIFIERS

Halfwave rectifier and Fullwave rectifiers (Qualitative and quantitative analysis), Harmonic components in a rectifier circuit, Inductor filter, Capacitor filter, L - section filter, ð - section filter, Problems on rectifier circuits.

UNIT-II: *BIPOLAR JUNCTION TRANSISTOR AND BIASING* **(11 Periods)**

CHARACTERISTICS:

Transistor construction, BJT Operation, Transistor as an amplifier, Transistor currents and their relations, Input and Output Characteristics of a Transistor in Common Emitter, Common Base and Common Collector Configurations, BJT specifications, transistor hybrid model for CE configuration – analytical expressions for transistor characteristics.

BIASING:

Transistor biasing, Operating Point, DC and AC Load Lines, Importance of Biasing, Fixed Bias, Emitter Feedback Bias, Collector to Emitter Feedback Bias, Voltage Divider Bias.

UNIT-III: *FIELD EFFECT TRANSISTOR* **(10 Periods)**

Construction, Principle of Operation and Characteristics of JFET and MOSFET (Enhancement & Depletion), Biasing of FET, Small Signal Model of JFET & MOSFET. Common Source and Common Drain Amplifiers using FET, Generalized FET Amplifier, FET as Voltage Variable Resistor, Comparison between BJT and FET.

UNIT-IV: *FEEDBACK AMPLIFIERS AND OSCILLATORS* **(8 Periods)**

Feedback Concepts, Types of Feedback Circuits (block diagram representation), General characteristics of negative feedback amplifier, Effect of Feedback on Amplifier characteristics. Barkhausen criterion, Hartley & Colpitts oscillators, Phase Shift Oscillators and Crystal Oscillator.

UNIT-V: *SPECIAL PURPOSE ELECTRONIC DEVICES* **(6 Periods)**

Principle of Operation and Characteristics of Tunnel Diode, Uni-Junction Transistor (UJT), Varactor Diode, Silicon Control Rectifier (SCR). Principle of operation of Schottky Barrier Diode.

Total Periods: 45

TEXT BOOKS:

1. J. Millman, Christos C. Halkias and Satyabrata Jit, *Electronic Devices and Circuits,* 3rd Edition, TMH, 2010.

REFERENCE BOOKS:

1. R.L. Boylestad and Louis Nashelsky, *Electronic Devices and Circuits,* 10th Edition, PHI, 2009.
2. S. Salivahana, N. Suresh Kumar, *Electronic Devices and Circuits*, 3rd Edition, Mc-Graw Hill, 2013.
3. David A. Bell, *Electronic Devices and Circuits,* 5th Edition, Oxford University press, 2014.

I B.Tech. - II Semester

16BT21201: **OBJECT ORIENTED PROGRAMMING THROUGH C++**

(Common to IT, CSE and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	4	1	-	4

PREREQUISITES: A Course on "Programming in C".

COURSE DESCRIPTION:
Introduction to Object Oriented concepts and Fundamental Concepts of C^{++}; Decision Making Statements, Looping Statements and Functions; Arrays, Pointers & References and Strings; Classes & Objects and Overloading Operators; Composition & Inheritance, Templates, Iterators & Generics and File Handling;

COURSE OUTCOMES:
On successful completion of this course, the students will be able to:

- **CO1:** Demonstrate knowledge on object oriented programming concepts - Object, Class, Inheritance, Polymorphism, Encapsulation, Abstraction and Message passing.
- **CO2:** Identify object oriented concepts for code reusability and optimization.
- **CO3:** Design and develop solutions for given specifications.
- **CO4:** Demonstrate problem solving skills to provide software solutions to real world problems.
- **CO5:** Develop C^{++} programming to provide solutions to complex engineering problems using object oriented concepts.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION AND FUNDAMENTAL CONCEPTS (Periods: 10)

An introduction to object technology: Objects and methods, Object: A practical example, Classes, Declaring classes and objects.

Key Object Orientation concepts and Elementary C++ programming: Abstraction, Encapsulation, Aggregation/composition, Inheritance, Some simple programs, The output operator, Characters and literals, Variables and their declarations, Program tokens, Initializing variables, Objects, variables and constants, The input operator.

Fundamental types: Numeric data types, The Boolean types, Enumeration types, Character types, Integer types, Arithmetic operators, The increment and decrement operators, composite Assignment operators, Floating –point types, Type conversions, Numeric overflow, Round-off error, The format for floating –point values, Scope.

UNIT-II: DECISION MAKING STATEMENTS, LOOPING STATEMENTS AND FUNCTIONS (Periods:10)

Decision making statements: The if statement, The if-else statement, Keywords, Comparison operators, Statement blocks, Compound Conditions, Short- circuiting, Boolean expressions, Nested selection statements, The else-if statement, The switch statement, The conditional expression operator.

Looping Statements: The while statements, Terminating a loop, the do-while statement, the for statement, the break statement, the continue statement, the goto statement, Generating pseudo-random numbers

Functions: Introduction, Standard c++ library functions, User-defined functions, Test drivers, function declarations and definitions, Local variables and functions, void functions, Boolean functions, I/O functions, passing by reference, passing by constant reference, Inline functions, Scope, Overloading, The main () function, Default arguments

UNIT-III: ARRAYS, POINTERS & REFERENCES AND STRINGS (Periods: 12)

Arrays: Introduction, processing arrays, initializing an array, Array index out of bounds, passing an array to a function, the linear search algorithm, the bubble sort algorithm, the binary search algorithm, Using arrays with enumeration types, Type definitions, Multidimensional arrays.

Pointers and References: The reference operator, References, Pointers, the dereference operator, Derived types, Objects and lvalues, Returning a reference.

C++ Strings: Introduction, working with strings in C++, String manipulation, Strings and arrays, miscellaneous string functions, String streams

UNIT-IV: CLASSES & OBJECTS AND OVERLOADING OPERATORS (Periods: 12)

Classes and objects: Introduction, Class declarations, Constructors, Constructor initialization lists, Access functions, Private member functions, The copy constructor, The class destructor, Constant Objects, Structures, Pointers to object, Static data members, static function members, predefined classes, Data hiding and encapsulation, Exception handling

Overloading Operators: Introduction, Overloading the assignment operator, The this operator, Overloading Arithmetic operator, Overloading the arithmetic assignment operator, Overloading the relational patterns, Overloading the stream operators, Conversion operators, Overloading the increment and decrement operators, Overloading the subscript operator

UNIT-V: COMPOSITION & INHERITANCE, TEMPLATES, ITERATORS & GENERICS AND FILE HANDLING (Periods: 11)

Composition and inheritance: Introduction, Composition, Inheritance, protected class members, Overriding and dominating inherited members, private access versus protected access, virtual functions and polymorphism, virtual destructors, Virtual functions, pure virtual functions, Abstract classes, object-oriented programming.

Templates, iterators and Generics: Introduction, Function templates, Class templates, Container classes, Subclass templates, passing template classes to template parameters, Iterator classes, Generic programming **C++ File Handling:** File I/O **(Total Periods: 55)**

TEXT BOOKS:

1. John R Hubbard, *Programming with C^{++}*, 3rd Edition, Tata McGraw-Hill, 2010.
2. P. B. Mahapatra, "Thinking in C^{++}", 1st Edition, Galgotia Publications Pvt. Ltd, 2005.

REFERENCE BOOKS:

1. Sourav Sahay, Object Oriented Programming with C^{++}, 2nd Edition, Oxford University Press, 2012.

I B.Tech. - II Semester

16BT21501: **DIGITAL LOGIC DESIGN**

(Common to CSE, CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -NIL-

COURSE DESCRIPTION: Introduction to number systems; logic gates; Boolean Algebra; simplification of Boolean functions; Design of combinational circuits; Design of sequential circuits, Memory and Programmable Logic

COURSE OUTCOMES:

On Successful completion of this course student will be able to:

CO1. Demonstrate knowledge on Boolean algebra, Minimization of Boolean functions using Map Reduce method.

CO2. Identify appropriate simplification techniques for Boolean functions.

CO3. Design combinational and sequential logic circuits, memory and programmable logic for digital systems.

CO4. Select and Apply Boolean algebra and gate level minimization techniques for designing combinational and sequential logic circuits.

CO5. Learn independently new concepts, new techniques and advanced subject knowledge in the area of combinational and sequential logic circuits.

DETAILED SYLLABUS:

UNIT I – BINARY SYSTEMS AND BOOLEAN ALGEBRA (10 periods)

Digital Systems, Binary Numbers, Number base conversions, Octal and Hexadecimal Numbers, Signed binary numbers, other binary codes, complements. Boolean Algebra, Boolean functions, Canonical and standard forms, Digital logic gates

UNIT II – GATE LEVEL MINIMIZATION (9 periods)

The K-map method - Four-variable map, Five-Variable map, product of sums and sum of products simplification, Don't-care conditions, NAND and NOR implementations, other Two-level implementations, Exclusive – OR function

UNIT III – COMBINATIONAL LOGIC (9 p*eriods*)

Combinational Circuits, Analysis procedure, Design procedure, Binary Adder-Subtractor, BCD Adder, Carry- Look- ahead adder, Binary multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers, De-Multiplexers.

UNIT IV – SEQUENTIAL LOGIC (9 periods)

Latches, Flip-Flops, Analysis of clocked sequential circuits, Design of synchronous sequential circuits, registers, shift registers, Ripple counters, Synchronous counters, Ring Counter and Johnson Counter.

UNIT V–MEMORY AND PROGRAMMABLE LOGIC (8 p*eriods*)

Random-Access Memory, Memory Decoding, Error Detection and Correction, Read-only memory, Programmable logic Array, programmable Array logic, Sequential Programmable Devices.

Total Periods: *45*

TEXT BOOK:

1. M. Morris Mano, "Digital Design", Third Edition, Pearson Education/PHI, 1999.

REFERENCE BOOKS:

1. David J Comer, "Digital Logic and State Machine Design", Third Edition, Oxford University Press, 2012.
2. Charles H.Roth Jr, "Fundamentals of Logic Design", Fifth edition, Cengage Learning, 2008.
3. A. Anand Kumar, "Switching Theory and Logic Design", Prentice-Hall of India Pvt. Limited, 2010.

I B. Tech. - II Semester

16BT1BS32: **ENGINEERING PHYSICS LAB**

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Intermediate / senior secondary Physics.

COURSE DESCRIPTION:

Characteristics of p-n junction diode, Photodiode, LED, and semiconductor laser diode. Experimental determination of carrier concentration and energy gap of a semiconductor material, wave length of a laser source, size of fine particle, numerical aperture and acceptance angle of optical fiber. Determination of frequency of electrically vibrating tuning fork and A.C source using A.C sonometer, magnetic field along axial line of a current carrying coil and rigidity modulus of material of a wire using torsional pendulum.

COURSE OUTCOMES:

After completion of the course, a successful student will be able to:

CO1: Acquire basic knowledge about semiconductor materials, magnetic materials and lasers.

CO2: Acquire analytical skills in the estimation of carrier concentration of semiconductor materials and characterization of p-n junction.

CO3: Develop skills in designing electronic circuits using semiconductor components.

CO4: Acquire skills to use instrumental techniques in A.C sonometer and Melde's experiment.

CO5: Apply diffraction techniques for determination of size of tiny particles and wave length of lasers.

ENGINEERING PHYSICS LAB

Conduct a minimum of any **Ten** of the following experiments.

1. Determination of wavelength of a laser source using Diffraction Grating.
2. Determination of particle size by using a laser source.
3. Determination of Numerical aperture and acceptance angle of an optical fiber.
4. Melde's experiment - transverse & longitudinal modes.
5. Magnetic field along the axis of a current carrying coil- Stewart and Gee's method.
6. Calculation of A.C frequency using sonometer.
7. I-V Characteristics of a p-n Junction diode.
8. Energy gap of a material of a p-n Junction.
9. Characteristics of LED source.
10. Characteristics of Photo diode.
11. Hall Effect.

12. Determination of rigidity modulus of the material of the wire using torsional pendulum.

I B.Tech. - II Semester
16BT20451: **ANALOG AND DIGITAL ELECTRONICS LAB**

(Common to CSE, CSSE & IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Courses on "Basic Electronic Devices & Circuits and Digital Logic Design"

COURSE DESCRIPTION: Identification and testing of active and passive components; RPS, DMM, Function Generator, CRO; Diode characteristics; Rectifiers; BJT and FET characteristics; UJT and SCR characteristics; BJT Amplifiers; Realization of FFs, Combinational Circuits, sequential Circuits; Demonstration on VHDL Programme.

COURSE OUTCOMES: On successful completion of this course, the student will be able to:

CO1. Demonstrate knowledge in different electronic devices, analog and digital circuits

CO2. Analyze the characteristics of different electronic devices and circuits like
- Diodes p-n Junction Diodes, Zener Diodes, SCR
- Transistors-BJT,FET,UJT
- Flip Flops-JK FF, D FF
- Combinational Circuits-HA, FA
- Sequential Circuits -Counters

CO3. Design electronic circuits like FET Amplifiers, Feedback amplifiers, Oscillators, Combinational Circuits and Sequential Circuits.

CO4. Solve engineering problems by proposing potential solutions through Design of better electronic circuits.

CO5. Model an electronic circuit which fulfil the needs of the society.

CO6: Function effectively as an individual and as a member in a group

CO7: Communicate effectively in verbal and written form.

DETAILED SYLLABUS:

PART A

ELECTRONIC WORKSHOP PRACTICE (Only for Viva-Voce)

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards. Identification, Specifications and Testing of Active Devices: Diodes, BJTs, Low-power JFETs, MOSFETs, LEDs, LCDs, SCR, UJT, Linear and Digital ICs.

PART B

ANALOG DEVICES AND CIRCUITS (Minimum seven experiments to be conducted)

1. p-n Junction and Zener diodes characteristics
2. Ripple Factor and Load Regulations of Rectifier with and without filters (Full wave or Half wave)
3. Input and Output characteristics of Transistor in CE configuration
4. Drain and Transfer Characteristics of JFET
5. Gain and Frequency response of FET Amplifier
6. Gain and Frequency response of Feedback Amplifier (Voltage series or current series)
7. Frequency of oscillations of Hartley and Colpitts Oscillator
8. UJT relaxation oscillator
9. SCR characteristics

PART C

DIGITAL CIRCUITS

Realization of

1. Flip Flops using Logic Gates
2. Two Problems on Combinational Circuits
3. Asynchronous Counter
4. Synchronous Counter

Demonstration of

VHDL Programme

I B. Tech. - II Semester

16BT20531: **Workshop in Computer Science**

(Computer Science and Engineering)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: ***NIL***

COURSE DESCRIPTION:

Hands on practice sessions on PC hardware, Internet, World Wide Web, MS-Word, Excel, Power Point, Publisher, MS Access and MS NetMeeting; Demonstration on installation of system software - Linux OS and device drivers; protecting personal computer from viruses and other cyber attacks.

COURSE OUTCOMES:

After the completion of the course the student will be able to:

CO1. Gain Knowledge on:
- Identification of functional parts of PC
- Internet and World Wide Web.
- Computer security issues and preventive measures.

CO2. Design documents and presentations effectively.

CO3. Apply modern tools to develop IT based applications and acquire skills in PC maintenance and Office automation tools.

CO4: Develop effective professional communication through IT Tools.

CO5: Acquire attitude for lifelong learning of advances in computer science.

LIST OF EXERCISES:

a) PC HARDWARE

Week 1: Identify the peripherals of a personal computer, components in a Central Processing Unit (CPU) and its functions, block diagram of CPU along with the configuration of each peripheral.

Week 2: Introduction to LINUX OS, Installation of LINUX OS, Basic DOS commands – mkdir, cd, cls, del, copy, attrib, date, path, type, format, exit. Basic commands in LINUX - cat, ls, pwd, rm, rmdir, cd, cp, mv, who, date, cal, clear, man, wc.

b) MS-OFFICE:

MS Word

Week 3: Introduction to MS-Word, Importance of Word as Word Processor, Overview of toolbars, Saving, Accessing files, Using help and resources. Create a word document using the features: Formatting fonts, Drop cap, Applying text effects, Using character spacing, Borders and shading, Inserting headers and footers, Using date and time option.

Week 4: Create a word document in MS-Word using the features: Inserting tables, Bullets and numbering, changing text direction, Hyperlink, Images from files and Clipart, Drawing toolbar and Word art and create an invitation using Mail Merge in MS-Word

MS POWER POINT:

Week 5: Introduction to MS-Power Point, Utilities, Overview of toolbars, PPT orientation, slide layouts, Types of views. Create a Power Point Presentation using the features: Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows.

Week 6: Create a Power Point Presentation using the features: Auto content wizard, Hyperlinks, Inserting images, Clip art, Audio, Video, Custom animation, Slide hiding, Tables and Charts.

MS EXCEL:

Week 7: Introduction to MS-Excel as a Spreadsheet tool, Overview of toolbars, accessing, Saving excel files, Using help and resources. Create a spreadsheet using the features: Gridlines, Format cells, Summation, Auto fill, Formatting text, Formulae in Excel Charts.

Week 8: Create a spreadsheet using the features: Split cells, Sorting, Conditional formatting, Freeze panes, Pivot tables, Data validation.

MS PUBLISHER & WORLD WIDE WEB

Week 9: Introduction to MS-Publisher, Overview of toolbars, Saving files, Templates, Layouts.
Create a website using the features: Home page, About us, Department, Contact page.

MS ACCESS:

Week 10: Introduction to MS Access, Design a Database, Build a Database, Work with Forms, Sort, Retrieve, Analyze Data and Manage an Access Database.

MS NETMEETING:

Week 11: Introduction to MS NetMeeting, Hosting a meeting, Remove a caller from the meeting, Chat Overview, Whiteboard Overview, Sharing Programs Overview, Sending a file, Placing a call, Accept or Reject a call.

INTERNET & COMPUTER SECURITY

Week 12: Search Engines and Cyber Hygiene: Types of search engines and how to use search engines, Awareness of various threats on Internet, Types of attacks and how to overcome, Installation of antivirus software.

TEXT BOOK:

1. Vikas Gupta, "Comdex Information Technology Course Tool Kit," WILEY Dream tech Press, New Delhi, 2012.

REFERENCE BOOKS:

1. Steve Lambert, M.Dow Lambert III and Joan Preppernau "Step by Step Microsoft Office Access 2007" , Microsoft Press, 2007.
2. ITL Education, "Introduction to Information Technology", 2nd Edition, Pearson Education, New Delhi, 2005.

I B.Tech - II semester

16BT21232: OBJECT ORIENTED PROGRAMMING LAB

(Common to IT, CSE and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: A Course on "OOPS through C++".

COURSE DESCRIPTION:

Hands-on experience on creating Virtual machines on Windows and Linux platforms, Development of Service based web applications & their deployment and Mobile app development.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

CO1: Demonstrate practical knowledge on Object oriented programming concepts - Object, Class, Inheritance, Polymorphism, encapsulation, Abstraction, message passing.
CO2: Apply object oriented programming concepts to develop real world applications.
CO3: Demonstrate Problem solving skills using basic and advanced concepts of C++.
CO4: Work individually and in teams collaboratively in implementing the applications.
CO5: Demonstrate communication skills both oral and written for preparing and presenting reports

LIST OF EXERCISES:

1) A. Write a C++ program that takes length as input in feet and inches. The program should then convert the lengths in centimeters and display it on screen. Assume that the given lengths in feet and inches are integers.
B. Write a C++ program to find the sum for the given variables using function with default arguments.
2) Implement the Number Guessing Game in C++ with the given instructions. In this game the computer chooses a random number between 1 and 100, and the player tries to guess the number in as few attempts as possible. Each time the player enters a guess, the computer tells him whether the guess is too high, too low, or right. Once the player guesses the number, the game is over.
3) Write a program to perform arithmetic operations on two numbers. The program must be menu driven, allowing to select the operation (+, -, *, or /) and input the numbers. Furthermore, the program must consist of following functions:
    i) Function showChoice: This function shows the options and must explain how to enter data.
    ii) Function add: This function accepts two number as arguments and returns sum.
    iii) Function subtract: This function accepts two number as arguments and returns their difference.
    iv) Function multiply: This function accepts two number as arguments and returns product.
    v) Function divide: This function accepts two number as arguments and returns quotient.
4) Write a menu driven C++ program with following option
    a. Accept elements of an array
    b. Display elements of an array
    c.Sort the array using bubble sort method Write C++ functions for all options. The functions should have two parameters name of the array and number of elements in the array.
5) X. Y, Z are arrays of integers of size M, N, and M + N respectively. The numbers in array X and Y appear in descending order. Write a user-defined function in C++ to produce third array Z by merging arrays X and Y in descending order.
6) A. Write a program to enter any number and find its factorial using constructor.
    B. Write a program to generate a Fibonacci series using copy constructor.
7) Write a program to perform addition of two complex numbers using constructor overloading. The first constructor which takes no argument is used to create objects which are not initialized, second which takes one argument is used to initialize real and imaginary parts to equal values and third which takes two argument is used to initialized real and imaginary to two different values.
8) A. Write a program to overload unary increment (++) operator.
    B. Write a program to overload binary + operator.
9) A. Define a class TEST in C++ with following description:

Private Members
TestCode of type integer
Description of type string
NoCandidate of type integer
CenterReqd (number of centers required) of type integer
A member function CALCNTR() to calculate and return the number of centers as (NoCandidates/100+1)
Public Members
- A function SCHEDULE() to allow user to enter values for TestCode, Description, NoCandidate & call function CALCNTR() to calculate the number of Centres - A function DISPTEST() to allow user to view the content of all the data members
b. Define a class REPORT with the following specification:
Private members :
adno 4 digit admission number
name 20 characters
marks an array of 5 floating point values
average average marks obtained
GETAVG() a function to compute the average obtained n five subject
Public members:
READINFO() function to accept values for adno, name, marks. Invoke the function GETAVG()
DISPLAYINFO() function to display all data members of report on the screen.You should give function definitions.

10) A. Create a base class basic_info with data members name ,rollno, gender and two member functions getdata and display. Derive a class physical fit from basic_info which has data members height and weight and member functions getdata and display. Display all the information using object of derived class.
B. Create a class called LIST with two pure virtual function store() and retrieve().To store a value call store and to retrieve call retrieve function. Derive two classes stack and queue from it and override store and retrieve.
11) A. Write a program to define the function template for swapping two items of the various data types such as integer, float, and characters.
B. Write a program to define the class template for calculating the square of given numbers with different data types.
12) A. Write a C++ program to write number 1 to 100 in a data file NOTES.TXT.
B. Write a program to read a set of lines from the keyboard and to store it on a specified file.

Any one of the following Mini Projects are to be implemented by a group of 4 to 5 students:

1) **Mini Project : Banking System**
Develop an application on BANKING SYSTEM which has account class with data members like account number, name, deposit, withdraw amount and type of account. Customer data is stored in a binary file. A customer can deposit and withdraw amount in his account. Must support the features of creation, modifying and deletion account any time.
2) **Mini Project : Library Management System**
Develop an application on LIBRARY MANAGEMENT SYSTEM which has book and student class with data members like book no, bookname, authorname. Books records is stored in a binary file. A student can issue book and deposit it within 15 days. Student is allowed to issue only one book. Student Records are stored in binary file. Administrator can add, modify or delete record.
3) **Mini Project : Supermarket Billing System**
Develop a simple console application for SUPERMARKET BILLING SYSTEM which has product class with data members like product no, product name, price, quantity, tax, discount. Product details is stored in a binary file. A customer can purchase product and his invoice generated. Administrator can create, modify, view and delete product record.

REFERENCE BOOKS:
1. John R Hubbard, Programming with C++, 3rd Edition, Tata McGraw-Hill, 2010.
2. Sourav Sahay, Object Oriented Programming with C++, 2nd Edition, Oxford University Press, 2012.

II B. Tech. I-Semester

(16BT3BS01) PROBABILITY DISTRIBUTIONS AND STATISTICAL METHODS

(Common to CE, ME, CSE, and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITES:
Intermediate/senior secondary mathematics

COURSE DESCRIPTION:
Random variables; mathematical expectations; probability distributions; correlation and regressions; statistical quality control; sampling distributions; tests for small and large samples and their significances.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1: Acquire basic knowledge in
- probability distributions, correlation and regressions
- statistical quality control and testing of hypotheses
- Simple linear regression
- Tests of significance for small and large samples

CO2: Develop skills for analyzing the data with
- mathematical expectations for realistic results
- probability distributions for practical situations.
- control charts of statistical quality control
- correlation and regression concepts
- suitable tests of significance for practical situations.

CO3: Develop skills in designing
- probability distributions
- limitations of statistical quality control
- control charts,
- X, R, np, and c charts

CO4: Develop analytical skills for solving problems involving
- Probability distributions, means, variances and standard deviations
- Statistical techniques employed for quality
- Sampling techniques for decision making
- Tests of significances for small and large samples

CO5: Use relevant probability and statistical techniques for
- Mathematical expectations of desired results
- Fitting probability distributions for experimental data.
- Quality control and testing of hypothesis.

DETAILED SYLLABUS

UNIT-I: RANDOM VARIABLE AND MATHEMATICAL EXPECTATIONS (9 periods)
Random Variables: Discrete and Continuous random variables, Distribution function of random variable, Properties, Probability mass function, Probability density function, Mathematical expectation, Properties of Mathematical expectation, Mean and Variance.

UNIT-II: PROBABILITY DISTRIBUTIONS (9 periods)
Discrete Distributions: Binomial and Poisson Distributions, Mean, variance and standard deviations.
Continuous Distributions: Normal Distribution, Mean, Variance and properties.

UNIT-III: CORRELATION, REGRESSION AND STATISTICAL QUALITY CONTROL (9 periods)
Definition of correlation, correlation coefficient, Rank correlation. Simple linear regression, regression lines and properties. Introduction, advantages and limitations of statistical quality control, Control charts, specification limits, , R, np and c charts.

UNIT-IV: SAMPLING DISTRIBUTIONS AND TEST OF SIGNIFICANCE FOR LARGE SAMPLES (9 periods)
Population and Sample, Parameter and Statistic, Sampling Distribution of Statistic, Standard Error of Statistic, Null and Alternative Hypothesis, Type I and II errors, Level of Significance, Critical region, Degrees of freedom. Tests of significance for proportions and means.

UNIT-V: TEST OF SIGNIFICANCE FOR SMALL SAMPLES (9 periods)
Student's t-test: single mean, difference of means, F-test for equality of population variance, Chi-Square Test for Goodness of fit, contingency table, Chi-Square Test for Independence of Attributes.

Total Periods: 45

TEXT BOOKS:
1. T.K.V. Iyengar, B. Krishna Gandhi ,S.Ranganatham and M.V.S.S.N. Prasad, *Probability and Statistics,* S. Chand & Company, 4/e,2013.
2. S.P.Gupta, *Statistical Methods,* Sultan and Chand, New Delhi, 28/e, 2005

REFERENCE BOOKS:

1. S.C.Gupta and V.K.Kapoor , *Fundamentals of Applied Statistics,* Sultan and Chand,New Delhi.,1 ed, 2004.
2. Shahnaz Bathul, *A text book of Probability and Statistics,* Ridge Publications,2 ed,2007.

II B. Tech. I-Semester

(16BT30501) COMPUTER ORGANIZATION

(Common to CSE, IT, and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:

A Course on "Digital Logic Design"

COURSE DESCRIPTION:

Basic structure and operation of a digital computer; Organization and functional principles of the arithmetic and logic unit, control unit, memory unit and I/O unit; Concepts of pipelining and parallel processing techniques;

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:

- Computer Arithmetic units
- Register Transfer and Computer Instructions
- Design of Control Unit
- Input Output Organization and Memory system
- Pipelining and Multiprocessing.

CO2. Analyze the functional units of a digital computer.

CO3. Design the functional modules in a digital computer - Arithmetic Units, Memory and I/O.

CO4. Investigate the performance of memory, I/O, and pipelined processors.

CO5. Select appropriate techniques of I/O, Pipelining and Multiprocessing to solve computing problems.

CO6. Apply contextual knowledge of computer systems development to societal applications.

DETAILED SYLLABUS:

UNIT-I: REGISTER TRANSFER & MICROOPERATIONS AND COMPUTER ARITHMETIC (9 periods)

Register Transfer And Micro operations: Register transfer, Bus and memory transfers, Arithmetic micro operations, Logic micro operations, Shift micro operations, Arithmetic logic shift unit.

Computer Arithmetic: Fixed point representation, Floating point representation, Addition and subtraction, Binary multiplication algorithms, Binary division algorithms.

UNIT-II:BASIC COMPUTER ORGANIZATION & DESIGN AND MICRO PROGRAMMED CONTROL(9periods)

Basic Computer Organization and Design: Instruction codes, Computer registers, Computer instructions, Instruction formats, Addressing modes, Timing and control, Instruction cycle, Memory reference instructions, Input - Output and Interrupt.

Micro Programmed Control: Control memory, Address sequencing, Design of control unit, Hardwired control, Micro programmed control.

UNIT-III: INPUT-OUTPUT ORGANIZATION (8 periods)

Peripheral devices, Input-Output interface, Modes of transfer, Priority interrupt, Direct Memory Access, Input-Output Processor (IOP).

UNIT-IV: THE MEMORY SYSTEM (10 periods)

Semiconductor RAM memories – Internal organization, Static memories, Synchronous and Asynchronous DRAMs, Structure of larger memories; Read-Only memories, Cache memories – Mapping functions; Secondary Storage – Magnetic Disks, Optical Disks.

UNIT-V: PIPELINE & VECTOR PROCESSING AND MULTIPROCESSORS (9 periods)

Pipeline and Vector Processing: Parallel processing, Pipelining, Arithmetic pipeline, Instruction pipeline, Vector processing, Array processors.

Multiprocessors: Characteristics of multiprocessors, Interconnection structures, Inter-processor arbitration, Inter-processor communication and synchronization.

Total Periods: 45

TEXT BOOKS:

1. Morris Mano, *Computer System Architecture,* Pearson Education, Third Edition, 2007.
2. Carl V. Hamacher, Zvonko G. Vranesic and Safwat G. Zaky, *Computer Organization,* McGraw-Hill, Fifth Edition, 2002.

REFERENCE BOOKS:

1. William Stallings, *Computer Organization and Architecture: Designing For Performance,* Pearson Education, Seventh Edition, 2007.
2. John P. Hayes, *Computer Architecture and Organization,* McGraw-Hill. Third Edition.

II B. Tech. – I Semester

(16BT30502) DATA STRUCTURES

(Common to CSE, IT, and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:
A Course on "Programming in C"

COURSE DESCRIPTION:
Linked Lists; Type of lists; Operations and Applications; Stacks and Queues; Operations and Applications; Trees, Search trees and Heaps; Multiway Trees and Graphs; Searching and Hashing.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on
- Principles of Data Structures.
- Linear and Non-linear Data Structures.
- Sorting and hashing techniques.

CO2. Analyze and Identify suitable data structure for computational problem solving
CO3. Design solutions for complex engineering problems using linear and non-linear data structures.
CO4. Develop solutions for Complex computational problems by conducting explorative analysis.
CO5. Apply appropriate data structure to provide solutions for real time problems by using C Language.
CO6. Apply contextual knowledge of data structures to design applications for societal applications like payroll systems, web applications, banking and financial systems.

DETAILED SYLLABUS:

UNIT-I: LINKED LISTS (8 periods)
Pointers, Operations, Linked List definition, Single Linked Lists, Circular Linked List, Doubly Linked List, Circular Doubly Linked List, Application of Linked Lists.

UNIT-II: STACKS AND QUEUES (8 periods)
Stacks: Stack operations, Stack Linked List, Implementation, Stack applications.
Queues: Queue operations, Queue Linked List design, Queue applications.

UNIT-III: TREES, SEARCH TREES AND HEAPS (10 periods)
Trees: Tree concepts, Binary Trees.
Binary Search Trees (BST): Basic concepts, BST operations, BST applications.
AVL Search Trees: Basic concepts, AVL Tree implementations.
Heaps: Basic concepts, Heap implementation, Heap applications.

UNIT-IV: MULTIWAY TREES AND GRAPHS (10 periods)
Multiway Trees: B-Trees, Simplified B-Trees, B-Tree variations.
Graphs: Basic concepts, Operations, Graph storage structures, Graph algorithms - Create graph, Insert vertex, Delete vertex, Retrieve vertex, Depth-first traversal, Breadth-first traversal**.**

UNIT-V: SORTING AND HASHING (09 periods)
Internal Sorting: Quick Sort, Shell Sort, Merge Sort, Heap Sort.
External Sorting: Introduction, External storage device and sorting with tapes, Balanced Merge.
Hashing: Introduction, Hash Table structure, Hash functions, Linear Open Addressing, Chaining, Applications.

Total Periods: 45

TEXT BOOKS:
1. Richard Gileberg and Behrouz A. Forouzan, *Data Structures: A Pseudocode Approach with C,* Cengage Learning, Second Edition, 2007.
2. G.A.V. Pai, "Data Structures and Algorithms", Tata McGraw Hill, Second Edition, 2009.

REFERENCE BOOKS:

1. Debasis Samanta, *Classic Data Structures,* PHI Learning, Second Edition, 2009.
2. Aaron M. Tenenbaum, Yedidyah Langsam, and Moshe J. Augenstein, *Data Structures Using C,* Pearson Education, 2005.

II B. Tech. - I Semester

(16BT31201) DISCRETE MATHEMATICAL STRUCTURES

(Common to CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Multivariable Calculus and Differential Equations".

COURSE DESCRIPTION:

Mathematical Logic; Predicates; Functions and Relations; Algebra Structures; Mathematical Reasoning; Recurrence Relations; Graphs; Graph Theory and its Applications.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on mathematical logic, algebraic structures, relations, recurrence relations and mathematical reasoning.

CO2. Analyze and prove given statement by contradiction and automatic theorem.

CO3. Design network applications using Prim's and Kruskal's algorithms.

CO4. Solve tree traversal problems using Graph Theory.

CO5. Apply permutation, combinations, counting principle, Lagrange's theorem and graph theory in solving real-time problems.

DETAILED SYLLABUS:

UNIT–I: MATHEMATICAL LOGIC AND PREDICATES (9 Periods)

Mathematical Logic: Statements and notations, Connectives, Well formed formulae, Truth tables, Tautology, Equivalence of formulae, Normal forms.

Predicates: Predicate calculus, Free and bound variables, Rules of inference, Consistency, Proof of contradiction and automatic theorem proving.

UNIT-II: FUNCTIONS AND RELATIONS (8 Periods)

Relations: Properties of binary relations, Equivalence relations, Compatibility relations, Partial ordering relations, Hasse diagram and related applications.

Functions: Inverse functions, Composition of functions, Recursive functions, Lattice and its properties.

UNIT-III: ALGEBRAIC STRUCTURES (8 Periods)

Algebraic System: Examples and general properties, Semi groups and monoids, Groups, Subgroups, Homomorphism and isomorphism, Lagrange's theorem.

UNIT-IV: MATHEMATICAL REASONING AND RECURRENCE RELATIONS (10 Periods)

Mathematical Reasoning: Methods of proof, Mathematical induction, Basics of counting, The inclusion- exclusion principle, The pigeon hole principle, Permutations and combinations, Generalized permutations and combinations.

Recurrence Relations: Generating functions of sequences, Calculating coefficients of generating function, Recurrence relation, Solving recurrence relations by substitution and Generating functions, Methods of characteristic roots, Solutions of inhomogeneous recurrence relation.

UNIT-V: GRAPH THEORY AND ITS APPLICATIONS (10 Periods)

Graphs: Introduction to graphs, Types of graphs, Graph basic terminology and special types of simple graphs, Representation of graphs and graph isomorphism, Euler paths and circuits, Hamiltonian paths and circuits, Planar graphs, Euler's formula and graph coloring, 4-color theorem.

Trees: Introduction to trees, Properties of trees, Applications of trees, Spanning trees, Counting trees, Depth-first search, Breadth-first search, Minimum spanning trees, Kruskal's algorithm and prim's algorithm.

Total Periods: 45

TEXT BOOKS:

1. J.P. Trembly and R. Manohar, *Discrete Mathematical Structures with Applications to Computer Science,* Tata McGraw Hill, Thirty Seventh Edition, 2008.
2. R. K. Bisht and H. S. Dhami, *Discrete Mathematics,* Oxford Higher Education, 2015.

REFERENCE BOOKS:

1. Joe L.Mott and Abraham Kandel, *Discrete Mathematics for Computer Scientists and Mathematicians,* Prentice Hall of India Private Limited, Second Edition, 2004.

2. Ralph P. Grimaldi and B.V.Ramana, *Discrete and Combinatorial Mathematics- an Applied Introduction*, Pearson Education, Fifth Edition, 2006.
3. Kenneth H. Rosen, *Discrete Mathematics and its Applications*, Tata McGraw Hill, Sixth Edition, 2007.

II B. Tech. – I Semester
(16BT30503) PYTHON PROGRAMMING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:
A Course on "Object Oriented Programming through C++"

COURSE DESCRIPTION:
Data types and Expressions; Control Statements; Strings; Text Files; Lists; Dictionaries; Functions; Objects and their use; Exception Handling; Design with Classes; Graphical User Interface;

COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge in:
- Data Types, Variables, Expressions
- Control statements, Strings and Text files.
- Lists, Dictionaries and Functions.
- Objects and Design with classes
- Exception Handling and GUI

CO2. Analyze complex computational problems.
CO3. Design solutions for real life computational problems
CO4. Solve complex problems using python scripting constructs.
CO5. Implement python scripts using Integrated Development Environment.
CO6. Apply Python programming knowledge to solve problems related to societal applications like Medical and Weather Forecasting.

DETAILED SYLLABUS:
UNIT- I: INTRODUCTION, DATA TYPES AND EXPRESSIONS (8 periods)
Introduction: Computer science, Computer algorithms, Computer software, The Python programming language, First program in Python.
Data Types and Expressions: Literals, Variables and Identifiers, Operators, Expressions and Data types.
UNIT- II: CONTROL STRUCTURES, LISTS, DICTIONARIES AND SETS (8 periods)
Control Structures: Control structures, Boolean expressions, Selection control and Iterative control.
Lists: List structures, Lists in Python, Iterations over lists, Assigning and copying lists, List comprehensions.
Dictionaries, Tuples and Sets: Dictionary types in Python, Implementation of Dictionary, Tuples, Set data type - the Set data type in Python, Implementation of sets.
UNIT-III: DESIGN WITH FUNCTIONS, STRINGS AND TEXT FILES (9 periods)
Program routines, Functions, Recursion-Recursive functions, Recursive problem solving, Iteration Vs Recursion, A case study of Towers of Hanoi using recursion; Using text files, String processing, Exception handling, A Case study on cigarette Use/Lung cancer Correlation program.
UNIT-IV: OBJECTS AND THEIR USE, OBJECT ORIENTED PROGRAMMING (9 periods)
Objects and Their Use: Software objects, Turtle graphics- Creating a turtle graphics window, The default turtle, Fundamental turtle attributes and behavior, Additional turtle attributes, Creating multiple turtles.
Object Oriented Programming: Encapsulation, Inheritance, and Polymorphism.
UNIT-V: GUI PROGRAMMING (11 periods)
Tkinter Overview - tkinter pragmatics, Documentation, Extensions, structure; tkinter coding alternatives, adding buttons and callbacks-lambda, bound method, callable class object, Binding events; adding multiple widgets, Reusable GUI Components with classes, Dialogs, Entry, check buttons and Radio buttons, Scales, Menus.

Total Periods: 45

TEXT BOOKS:
1. Charles Dierbach, *Introduction to Computer Science using Python: A Computational Problem-Solving Focus*, Wiley India Edition, 2016.
2. Mark Lutz, "Programming Python," O'Reilly Publications, Fourth Edition, 2011.

REFERENCE BOOK:
1. Kenneth Lambert and B.L. Juneja, *Fundamentals of Python,* Cengage Learning, Third Edition, 2012.

II B. Tech. - I Semester
(16BT31501) OPERATING SYSTEMS
(Common to CSE, IT, and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —

COURSE DESCRIPTION:
Operating systems operations, scheduling; Critical section problem, deadlocks; Paging, segmentation; File Concept, Disk scheduling; I/O interface; concepts of protection.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on Operating system operations, services, file management, disk management, I/O management and protection.
CO2. Identify the functionality involved in process management concepts like scheduling and synchronization.
CO3. Design models for handling deadlock and perform memory management.
CO4. Synthesize and apply programming API's to perform Process management.
CO5. Use appropriate protection tools to provide access control to Operating system users.

DETAILED SYLLABUS:

UNIT-I: OPERATING SYSTEMS OVERVIEW AND PROCESS MANAGEMENT (08 periods)
Operating systems, operations, Distributed systems, Special purpose systems, Operating systems services, Systems calls, Operating system structure.

Process Management: Process scheduling, Process Control Block, Inter process communication, Signals, Forks, Multithreading models, Threading issues, Scheduling criteria, Scheduling algorithms, Multilevel queue, Multilevel feedback queue.

UNIT-II: SYNCHRONIZATION AND DEADLOCKS (10 periods)
Synchronization: The critical-section problem, Peterson's Solution, Synchronization hardware, Semaphores, Classic problems of synchronization, Monitors.

Deadlocks: System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock detection, Deadlock avoidance, Deadlock recovery.

UNIT-III: MEMORY MANAGEMENT (09 periods)
Memory-Management Strategies: Swapping, Contiguous memory allocation, Paging, Structure of the page table, Segmentation.

Virtual Memory Management: Demand paging, Copy-on-Write, Page replacement Algorithms, Thrashing.

UNIT-IV: STORAGE MANAGEMENT (10 periods)
File System: File Concept, Access methods, Directory structure, File system structure, i-node, File Descriptors, File system implementation, Directory implementation, Allocation methods.

Secondary Storage Structure: Disk structure, Disk attachment, Disk scheduling, Swap-space management, Stable-storage implementation, Tertiary storage structure.

UNIT-V: I/O SYSTEMS AND PROTECTION (08 periods)
I/O Systems: I/O Hardware, Application I/O interface, Kernel I/O subsystem.

Protection: Goals of protection, Principles of protection, Domain of protection, Access matrix, Implementation of access matrix, Access control, Revocation of access rights.

Total Periods: 45

TEXT BOOK:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, *Operating System Principles,* Wiley India Edition, 7th edition, 2011.

REFERENCE BOOKS:

1. William Stallings, *Operating Systems, Internals and Design Principles,* Pearson Education, 7th edition, 2013.
2. Andrew S. Tanenbaum, *Modern Operating Systems*, PHI, 3rd edition, 2009.

II B. Tech. – I Semester
(16BT30531) **DATA STRUCTURES LAB**
(Common to CSE, IT, and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES:
A Course on "Data Structures"

COURSE DESCRIPTION:
Hands on practice on Linked Lists; Type of lists; Stacks and Queues; Trees and Search trees; Graphs; Searching and Hashing.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate practical knowledge on Stacks, Queues, Linked lists, Trees Sorting and Hashing Techniques.
CO2. Analyze suitable data structure to solve real world computing problems.
CO3. Design solutions for complex computational problems using linear and non-linear data structures.
CO4. Solve for Complex computational problems by conducting explorative analysis.
CO5. Use C language for implementing linear and non-linear data structures.
CO6. Apply contextual knowledge of data structures to design applications for societal requirements.
CO7. Communicate effectively using data structures with engineering community, being able to comprehend and write effective programs and Prepare Reports.

LIST OF EXERCISES:
1. Write program to implement the following data structures:
   (a) Single Linked List
   (b) Double Linked List
   (c) Circular Linked List
2. Write a program to implement Stack and Queue using Linked List.
3. Write a program to evaluate a given postfix expression using Stack.
4. Write a program to convert a given infix expression to postfix form using Stack.
5. Write a program to implement
   (a) Stack using two Queues
   (b) Queue using two Stacks
6. Write a program to implement In-order, pre-order, post-order tree traversal of Binary Trees.
7. Write a program to perform operations on a Binary Search Tree (BST).
8. Write programs for implementation of graph traversals by applying:
   (a) Breadth First Search
   (b) Depth First Search
9. Implement the following sorting algorithms:
   (a) Merge Sort
   (b) Heap Sort
   (c) Quick Sort
10. Write a program to implement hashing with
    (a) Separate Chaining Method
    (b) Open Addressing Method

REFERENCE BOOKS:

1. Richard Gilberg and Behrouz A. Forouzan, *Data Structures: A Pseudocode Approach with C,* Cengage Learning, Second Edition, 2007.
2. G.A.V. Pai, *Data Structures and Algorithms*, Tata McGraw Hill, Second Edition, 2009.

II B. Tech. – I Semester

(16BT30532) **PYTHON PROGRAMMING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES:
A Course on "Python Programming"

COURSE DESCRIPTION:
Hands on practice – Scripting using Python Programming constructs; Conditional statements; Loops; Text Files; Lists; Dictionaries; Strings; Functions; GUI.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Demonstrate practical knowledge of using python scripting constructs:
- Selection and Repetition statements.
- Lists, Dictionaries, Strings and Functions.
- Text Files and GUI.

CO2. Analyze the complexity of computer hardware.
CO3. Design solutions for specified computational problems using Object Oriented Programming concepts
CO4. Use appropriate python scripts and functions for solving complex problems.
CO5. Create window based applications using tkinter package
CO6. Apply contextual knowledge to computational problems related to societal applications like Medical and Weather Forecasting.
CO7. Work effectively to contribute individually to solve real world problems.
CO8. Communicate effectively in both oral and written to develop Python scripts.

LIST OF EXERCISES:

1. a. Write a python script to display a simple message
   b. Write a python script to perform basic arithmetic operations on two values which are accepted from the user.
2. a. Write a python script to calculate the factorial of a given number.
   b. Write a python script to calculate sum of individual digits of a given number.
   c. Write a python script to display the prime number series up to the given N Value.
3. a. Write a python script to find the largest number among three numbers and display them in ascending order using if-else construct.
   b. Write a python script to create a simple text file, write the contents into the created file and display the same on to the console screen.
4. Write a python script to remove all the occurrences of a given character from a text file, copy the resultant text into another text file. Find the total occurrences of the eliminated characters and display the count along with the contents of the text file on to the console.
5. a. Write a python script to display Fibonacci sequence of numbers using while loop, for loop and do-while loop constructs.
   b. Write a python script to demonstrate string methods.
6. a. Write a python script to create a list and add number of user-defined values to the list and display the same on to the console screen.
   b. Write a python script to perform the following operations on Lists:
   (i) Matrix Addition. (ii) Matrix Multiplication.
7. a. Write a python script to search a key element in the given list of elements.
   b. Write a python script to arrange the given list of elements in ascending or descending order.
8. a. Write a python script to find GCD of two numbers using recursive and non recursive functions.
   b. Write a python script to convert the following using functions:
   (i) Fahrenheit to Celsius temperature. (ii) Celsius to Fahrenheit temperature.
9. a. Write a python script to draw a square using set position method in absolute positioning.
   b. Write a python script to draw a triangle using left, right and Forward methods in relative positioning.
   c. Write a python script using penup and pendown methods to draw "W" character using turtle graphics.
   d. Write a python script to create your own polygon shape and create an interesting design with it.
10. a. Write a GUI Script for creating text label in a window.
   b. Write a Python Script to create a command button. When the button is clicked the event should be handled and the message on the window should change from "Hello" to "Good Bye".
11. a. Write a python script to demonstrate the Exception Handling.
b. Write a Python script to demonstrate the Mouse and Key Event handling.
c. Write a python script to demonstrate menu-driven applications
12. By forming a group of 3 to 4 members develop a mini-project for Horse Race Simulation with the help of GUI programming and tkinter package.

REFERENCE BOOKS:

1 Charles Dierbach, *Introduction to Computer Science using Python: A Computational Problem-Solving Focus,* Wiley India Edition, 2016.
2. Mark Lutz, *Programming Python,* O'Reilly Publications, Fourth Edition, 2011.

II B. Tech. - I Semester

(16BT31531) OPERATING SYSTEMS LAB

(Common to CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITE: A Course on "Operating Systems"

COURSE DESCRIPTION: Hands on practice in simulating algorithms for CPU Scheduling, Memory Management, I/O Management, Deadlock Handling mechanisms; Implementing Synchronization problems; practice on UNIX commands.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge of the following algorithms to solve problems:

- CPU Scheduling
- Memory Management
- I/O Management

CO2. Formulate and analyze solutions to problems pertaining to Memory and I/O.

CO3. Designing models for deadlock handling mechanisms.

CO4. Develop skills in basic UNIX commands.

CO5. Use appropriate APIs' available in modern operating systems (such as threads, system calls, semaphores, etc…) for software development.

CO6. Communicate effectively on complex operating system problems with implication to User-friendliness.

CO7. Develop and demonstrate user defined libraries to communicate with the kernel for effective implementation of projects across multidisciplinary environments.

LIST OF EXERCISES:

1. Write a program to implement the following system calls:
   a) fork b) exec c) getpid d) wait
2. a. Write a program to demonstrate File Permissions.
   b. Write a program to implement named and unnamed pipes.
3. Implement the following CPU Scheduling Algorithms:
   a) FCFS b) SJF (Preemptive) c) Round Robin d) Priority.
   Use the following set of processes, compare the performance of above scheduling policies

Process Name	Arrival Time	Processing Time	Priorities
A	0	3	2
B	1	5	4
C	3	2	1
D	9	5	5
E	12	5	3

4. Implement the following synchronization problems:
   a) Producer Consumer Problem b) Dining Philosopher's Problem.
5. Implement Banker's Algorithm for Deadlock Avoidance and Detection. Find the safe sequence. If Max. request of any one process is changed, detect whether deadlock is occurred or not. Consider number of resources are three and Jobs are five as shown in the figure:

Process	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P0	0	1	0	7	5	3	3	3	2
P1	2	0	0	3	2	2			
P2	3	0	2	9	0	2			
P3	2	1	1	2	2	2			
P4	0	0	2	4	3	3			

6. Implement the following Algorithms:
   a) First Fit b) Best Fit c) Worst Fit
7. Implement multiprogramming with fixed number of tasks and variable number of tasks. The size of the memory is 1000K. Operating system size is 200K. Number of processes are P1, P2, P3 with sizes 150K, 100K and 70K.
8. Implement the following Page Replacement Algorithms:
   a) FIFO b) LFU c) LRU d) Optimal

Consider number of frames are three and Reference string is: 2 3 2 1 5 2 4 5 3 2 4 2 4 5

9. Develop user-defined libraries to implement input-output functionalities.

`II B. Tech - II semester

(16BT3HS01) ENVIRONMENTAL STUDIES

(Common to CE, ME,CSE, IT, and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: A Course on "Engineering Chemistry"

COURSE DESCRIPTION:

Multidisciplinary nature of environment; Natural resources; Ecosystems; Biodiversity; Environment pollution and control; Social issues and environment; Human population and environment; Field studies.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Acquire knowledge on nature of environment, natural resources, ecosystems, biodiversity, environmental pollution and control, social issues and human population.

CO2. Analyze natural resources, ecosystems, biodiversity, environmental pollution and control, social issues and human population.

CO3. Develop strategies for environmental pollution control and natural resource management.

CO4. Solve environmental problems through proper analysis and interpretation of environmental data.

CO5. Choose appropriate techniques in environmental pollution control and natural resource management.

CO6. Understand the impact of social issues and population on environment.

CO7. Provide solutions to individuals, industries and government for environmental sustainable development.

CO8. Follow environmental protection laws for sustainable development.

CO9. Communicate effectively on environmental issues in the form reports.

DETAILED SYLLABUS:

UNIT-I: MULTIDISCIPLINARY NATURE OF ENVIRONMENT AND NATURAL RESOURCES (11 periods)

Multidisciplinary Nature of Environment: Multidisciplinary nature of environment, Segments of environment - Lithosphere, Hydrosphere, Atmosphere, Biosphere; Need for public awareness.

Natural Resources: Renewable and non-renewable resources and associated problems - (a) Forest resources: Use and over exploitation, Deforestation-causes, effects and remedies, Case studies, (b) Water resources: Use and over utilization of surface and groundwater, Conflicts over water, Benefits and problems of large dams, Case studies, (c) Mineral resources: Mining, Adverse effects, Case studies, (d) Food resources: World food problems, Changes caused by agriculture and overgrazing, Effects of modern agriculture, Water logging and salinity, Case studies, (e) Energy resources: Growing needs, Renewable energy resources – Solar, Wind, Hydropower, Hydrogen fuel; Non-renewable energy resources - Coal, Natural gas, Nuclear energy, Role of an individual in conservation of natural resource and equitable use of resources for sustainable lifestyles.

UNIT-II: ECOSYSTEMS AND BIODIVERSITY (10 periods)

Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem - Producers, Consumers, Decomposers; Food chains, Food webs, Ecological pyramids – Types; Characteristic features, Structure and functions of forest ecosystem, Desert ecosystem, Aquatic ecosystem, Energy flow in the ecosystem, Ecological succession.

Biodiversity: Concept and value of biodiversity, Role of biodiversity in addressing new millennium challenges, Hot spots of biodiversity, Threats to biodiversity, Man-wild life conflicts, Endemic, Endangered and extinct species of India, Conservation of biodiversity – In-situ and ex-situ.

UNIT-III: ENVIRONMETAL POLLUTION AND CONTROL (8 periods)

Causes, Adverse effects and control measures of pollution - Air pollution, Water pollution, Soil pollution, Noise pollution, Thermal pollution, Nuclear pollution; Solid waste management – Causes, Effects and control measures of urban and industrial wastes; Hazards and disaster management – Floods, Earthquakes, Tsunamis, Case studies.

UNIT-IV: SOCIAL ISSUES AND THE ENVIRONMENT (8 periods)

Sustainable development, Urban problems related to energy, Environmental ethics – Issues, Solutions; Global warming, Acid rain, Ozone layer depletion, Nuclear accidents and case studies, Wasteland reclamation, Consumerism and waste products, Concept of green technologies, Environment protection act, Air act, Water act, Wildlife protection act, Forest conservation act, Issues involved in enforcement of environmental legislation, Public environmental awareness.

UNIT-V: HUMAN POPULATION AND THE ENVIRONMENT (8 periods)

Population growth, Population characteristics and variation among nations, Population explosion, Family welfare programme, Environment and human health, Human rights, Value education, HIV/AIDS, Women and child welfare, Role of information technology in environment and human health, Case studies,

FieldWork/Assignment/Seminar: Environmental assets Pond / Forest /Grassland / Hill / Mountain / Environment impact assessment procedures for local environmental issues.

TEXT BOOKS: **Total periods: 45**

1. A. Kaushik and C. P. Kaushik, *Environmental Studies*, New Age International (P) Ltd Publications, 4th Edition, 2014.
2. Erach Barucha, *Environmental Studies*, Orient Blackswan, 2nd Edition, 2013.

REFERENCE BOOKS:

1. R. Rajagopalan, *Environmental Studies*, Oxford University Press, 2nd Edition, 2011.
2. Benny Joseph, *Environmental Studies*, Tata McGraw- Hill, 2nd Edition, 2009.

3. B. S. Chauhan, *Environmental Studies*, University Science Press, 2008.
4. M. Anji Reddy, *Text Book of Environmental Sciences and Technology*, BS Publications, 2007.

II B. Tech. – II Semester
(16BT40501) COMPUTER GRAPHICS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:
Courses on "Matrices and Numerical Methods" and "Programming in C"

COURSE DESCRIPTION:
Introduction to Computer Graphics; Output Primitives; 2-D Geometric Transformations and Viewing; 3-D Geometric Transformations and Viewing; 3-D Object Representation; Visible Surface Detection Methods and Rendering Methods.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on
- Graphical interactive devices
- Viewing transformations
- 2-D & 3-D object representations and
- Surface detection methods

CO2. Analyze Transformations and Clipping algorithms for 2-D and 3-D objects.
CO3. Design algorithms to generate points, lines, and polygons for 2-D and 3-D objects.
CO4. Develop innovative methods and techniques for 2-D and 3-D modeling.
CO5. Apply appropriate techniques and tools for surface detection and rendering methods.
CO6. Use contextual knowledge to develop interactive user interfaces and animations related to societal applications.

DETAILED SYLLABUS:
UNIT-I: INTRODUCTION AND OUTPUT PRIMITIVES (10 Periods)
Overview of Graphics Systems: Video display devices, Raster-scan systems, Random-scan systems, Graphics monitors and workstations, Input devices.
Output Primitives: Points and lines, Line-drawing algorithms, Midpoint circle algorithm, Midpoint ellipse algorithm.
UNIT-II: FILLED AREA PRIMITIVES AND 2-D GEOMETRIC TRANSFORMATIONS (9 Periods)
Filled Area Primitives: Scan-line polygon fill algorithm, Boundary-fill algorithm and Flood-fill algorithm.
2-D Geometric Transformations: Transformations – translation, scaling, rotation, reflection and shear; Homogeneous coordinates, Composite transformations, Transformations between coordinate systems.
UNIT - III: 2-D VIEWING AND 3-D OBJECT REPRESENTATIONS (9 Periods)
2-D Viewing: The viewing pipeline, Viewing coordinate reference frame, Window-to-viewport coordinate transformation, Viewing functions, Cohen-Sutherland line clipping algorithm, Sutherland-Hodgeman polygon clipping algorithm.
3-D Object Representations: Polygon surfaces, Quadric surfaces, Spline representations, Hermite curve, Bezier curves and surfaces, B-Spline curves and surfaces.
UNIT-IV: 3-D GEOMETRIC TRANSFORMATIONS AND VIEWING (9 Periods)
3-D Transformations: Translation, Rotation, Scaling, Reflection and Shear.
3-D Viewing: Viewing pipeline, Viewing coordinates, Projections and Clipping.
UNIT-V: VISIBLE-SURFACE DETECTION AND SURFACE-RENDERING METHODS (8 Periods)
Surface Detection Methods: Classification, Back-face detection, Depth-buffer, Scan-line, Depth-sorting, BSP-tree, Area-subdivision and Octree methods.
Surface-Rendering methods: Gouraud shading, Phong shading. **Total Periods: 45**

TEXT BOOK:
1. Donald Hearn and M.Pauline Baker, *Computer Graphics C version,* Pearson Education, Second Edition, 2006.

REFERENCE BOOKS:
1. Steven Harrington, *Computer Graphics: A Programming Approach*, McGraw-Hill, Second Edition, 1987.

2. William M. Newman and Robert F. Sproull, *Principles of Interactive Computer Graphics*, McGraw-Hill, Second Edition, 2005.

II B. Tech. – II Semester

(16BT40502) DATABASE MANAGEMENT SYSTEMS

(Common to CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION:

Database Systems; Database Design; Relational Model; SQL Queries, Constraints and Triggers; Schema Refinement and Normal Forms; Transaction Management; Concurrency Control; Overview of Storage and Indexing.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on
- Data models and Database Languages
- Database design
- Normal forms
- Storage and Indexing

CO2. Analyze databases using normal forms to provide solutions for real time applications.

CO3. Design solutions for database problems using database design, views design and framing queries.

CO4. Use database techniques for designing databases, managing databases and its security.

CO5. Select SQL, Hash based Indexing and Tree based Indexing to manage data in databases.

CO6. Apply contextual knowledge to develop database applications related to societal applications like Information Retrieval Systems, Banking and Financial systems.

DETAILED SYLLABUS:

UNIT- I: INTRODUCTION TO DATABASE SYSTEMS AND DATABASE DESIGN (9 periods)

Database Systems: Database system applications, Purpose of database systems, View of data-Data abstraction, Instances and Schemas, Data models; Database languages - DDL, DML; Database architecture, Database users and administrators.

Database Design: ER diagrams, Beyond ER design, Entities, Attributes and entity sets, Relationships and relationship sets, Additional features of ER model, Conceptual design with ER model.

UNIT-II: THE RELATIONAL MODEL AND RELATIONAL ALGEBRA AND CALCULUS (8 periods)

Relational Model: Integrity constraints over relations, Enforcing integrity constraints, Querying relational data, Logical database design, Introduction to views, Destroying/altering tables and views.

Relational Algebra and Calculus: Preliminaries, Relational Algebra operators; Relational Calculus - Tuple and Domain Relational Calculus; Expressive power of Algebra and calculus.

UNIT-III: SQL AND SCHEMA REFINEMENT (10 periods)

SQL: Form of basic SQL query- Examples of basic SQL queries; Nested queries- Introduction to nested queries, Correlated nested queries, Set-comparison operators; Aggregate operators, NULL values-Comparison using NULL values, Logical connectives AND, OR and NOT, Impact on SQL constructs, Outer joins, Disallowing NULL values; Complex integrity constraints in SQL ,Triggers and active databases.

Schema Refinement: Problems caused by redundancy, Decompositions, Problem related to decomposition, Functional dependencies, Reasoning about FDS, Normal forms – First, second and third normal forms, BCNF; Multi valued dependencies, Fourth normal form, Join dependencies, Fifth normal form.

UNIT-IV: TRANSACTIONS AND CONCURRENCY CONTROL (9 periods)

Transactions: Transaction concept, Transaction state, Implementation of atomicity and durability, Concurrent executions, Serializability, Recoverability, Implementation of isolation, Testing for serializability.

Concurrency Control: Lock based protocols, Timestamp based protocols, Validation based protocols, Multiple granularity, Deadlock handling.

UNIT-V: STORAGE AND INDEXING (9 periods)

Storage and Indexing: Data on external storage, File organization and indexing – Clustered indexes, Primary and secondary indexes; Index data structures – Hash based indexing, Tree based indexing; Comparison of file organizations.

Tree Structured Indexing: Intuition for tree indexes, Indexed Sequential Access Method (ISAM), B+ Trees- A dynamic index structure; Search, Insert, Delete; B-Tree index files. **Total Periods: 45**

TEXT BOOKS:

1. Raghu Ramakrishnan and Johannes Gehrke, *Database Management Systems,* Tata McGraw Hill, Third Edition, 2014.
2. A. Silberschatz, H.F.Korth and S. Sudarshan, "Database System Concepts," Tata McGraw hill, Fifth Edition, 2006.

REFERENCE BOOKS:

1. Ramez Elmasri and Shamkant B. Navathe, *Database Systems,* Pearson Education, Sixth Edition, 2013.

2. Peter Rob and Carlos Coronel, *Database Systems Design, Implementation and Management*, Cengage Learing, Seventh Edition, 2009.

II B. Tech. – II Semester

(16BT41201) DESIGN AND ANALYSIS OF ALGORITHMS

(Common to CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Data Structures".

COURSE DESCRIPTION:

Introduction to Algorithms and Asymptotic Notations; Disjoint Sets and Graphs; Divide and Conquer, Greedy Method; Dynamic Programming, Back Tracking; Branch and Bound.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:

- Algorithm Complexities and Asymptotic notations.
- Algorithm Design techniques-Divide and Conquer, Greedy Method, dynamic programming, Back tracking, Branch and Bound.

CO2. Analyze the performance of algorithms with respect to Time and Space complexities.

CO3. Design the algorithms for solving real world problems.

CO4. Solve sorting and searching problems using Divide and Conquer method.

CO5. Use dynamic programming and backtracking in finding shortest paths.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO ALGORITHMS (8 Periods)

Algorithm, Algorithm Specifications-Pseudocode conventions; Performance Analysis-Space complexity, Time complexity; Asymptotic Notations - Big Oh, Omega, Theta, Little oh, and Little omega; Recurrences.

UNIT-II: DISJOINT SETS AND GRAPHS (9 Periods)

Disjoint Sets: Operations, union and find algorithms.

Graphs: Breadth first search and Traversal, Depth first search and Traversal, Introduction to spanning trees, connected components and Bi-connected components.

UNIT-III: DIVIDE AND CONQUER AND GREEDY METHOD (10 Periods)

Divide and Conquer: General method, Applications - Analysis of binary search, Quick sort, Merge sort, Strassen's matrix multiplication.

Greedy Method: General method, Applications-Job sequencing with deadlines, knapsack problem, Minimum cost spanning trees, Single source shortest paths.

UNIT-IV: DYNAMIC PROGRAMMING AND BACK TRACKING (10 Periods)

Dynamic Programming: General Method, Applications - Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem.

Back Tracking: General Method, Applications – N Queen problem, Sum of subsets problem, Graph coloring, Hamiltonian cycles.

UNIT-V: BRANCH AND BOUND TECHNIQUES (8 Periods)

General method, Applications - Travelling sales person problem, 0/ 1 knapsack problem; LC Branch and Bound solution, FIFO Branch and Bound solution. **Total Periods: 45**

TEXT BOOK:

1. Ellis Horowitz, Satraj Sahni and Rajasekharam, *Fundamentals of Computer Algorithms,* Galgotia Publications Pvt. Ltd, New Delhi, Second Edition, 2007.

REFERENCE BOOKS:

1. M. T. Goodrich and R. Tomassia, *Algorithm Design: Foundations, Analysis and Internet Examples,* John Wiley and Sons, 2002.
2. S. Sridhar, *Design and Analysis of Algorithms,* Oxford Press, 2015.
3. Harsh Bhasin, *Algorithms: Design and Analysis,* Oxford University Press, 2015.

II B. Tech. – II Semester

(16BT41202) JAVA PROGRAMMING

(Common to CSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Object Oriented Programming through C++".

COURSE DESCRIPTION: Introduction of Java, Classes and Objects; Inheritance, Packages, Interfaces; Exception handling, Multithreading; Event handling, AWT, Collection Classes; Applets, Servlets.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:
- Object Oriented Programming concepts - classes, objects, inheritance, polymorphism, encapsulation and abstraction.
- Packages, interfaces, multithreading, exception handling, event handling.

CO2. Analyze complex engineering problems using object oriented concepts.

CO3. Design and develop reusable code to provide effective solutions for real world problems using inheritance and polymorphism.

CO4. Apply AWT and Applets to create interactive Graphical User Interfaces.

CO5. Use advanced programming languages to develop web applications.

CO6. Build Java Applications suitable for societal requirements.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION (10 Periods)

Data types, Variables, Arrays, Operators, Control statements.

Classes and Objects: Concepts of Classes, Objects, Constructors, Methods, this keyword, Garbage collection, Overloading Methods and Constructors, Parameter passing, Access control, Recursion, String Class.

UNIT-II: INHERITANCE, PACKAGES AND INTERFACES (9 Periods)

Inheritance: Inheritance basics, Super keyword, Multi-level hierarchy, Abstract classes, Final keyword with inheritance.

Packages: Definition, Creating and accessing a package, Understanding CLASSPATH, Importing packages.

Interfaces: Definition, Implementing interfaces, Nested interfaces, Applying interfaces, Variables in interface and Extending interfaces.

UNIT-III: EXCEPTION HANDLING AND MULTITHREADING (8 Periods)

Exception Handling: Concepts of exception handling, Exception types, Usage of Try, Catch, Throw, Throws and Finally, Built in exceptions, Creating own exception sub classes.

Multithreading: Java thread model, Creating threads, Thread priority, Synchronizing threads, Inter-thread communication.

UNIT-IV: COLLECTION CLASSES, THE APPLET CLASS AND AWT (10 Periods)

Collection Classes: ArrayList Class, LinkedList Class, Hashset Class, LinkedHashSet Class, TreeSet Class, PriorityQueue Class, EnumSet Class.

The Applet Class: Types of applets, Applet basics, Applet architecture, Applet skeleton, Passing parameters to applets.

AWT Control Fundamentals: User interface components, Layout managers.

UNIT-V: EVENT HANDLING AND SERVLETS (8 Periods)

Delegation event model: Event classes, Event Listener Interfaces – Mouse and Key; Adapter classes.

Servlets: Life cycle of a servlet, Using Tomcat for Servlet development, Create and compile the servlet source code, Servlet API, Javax.Servlet package.

Total Periods: 45

TEXT BOOK:

1. Herbert Schildt, *Java the Complete Reference*, Oracle Press, Ninth Edition, 2014.

REFERENCE BOOK:

1. Sachin Malhotra and Saurab Choudhary, *Programming in Java,* Oxford University Press, Second Edition, 2014.

II B. Tech. – II Semester

(16BT41203) SOFTWARE ENGINEERING

(Common to CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Concepts of Software Engineering; Software Process Models; Conventional and Agile Process Models; Software Requirements Engineering Process; System Analysis; Architectural Design; User Interface Design and Re-engineering; Software Testing; Risk and Quality Management.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:
- Fundamental concepts of software engineering.
- Process models.
- Software development life cycle.

CO2. Analyze software requirements and process models required to develop a software system.

CO3. Design and develop a quality software product using design engineering principles.

CO4. Develop software product as per user and societal requirements.

CO5. Follow standards for software development and quality management.

CO6. Demonstrate skills in applying risk and quality management principles for effective management of software projects.

DETAILED SYLLABUS:

UNIT-I: SOFTWARE ENGINEERING AND SOFTWARE PROCESS (11 Periods)

A Generic View of Process: The nature of software, Software engineering- Software engineering layers; The software process, Software engineering practice, Software myths.

Process Models: A Generic process model, Incremental process models, Evolutionary Process models; The unified process, Agile Development-Agility, Agile process, Scrum, Agile modeling (AM), Agile Unified Process (AUP), The Cleanroom strategy.

UNIT-II: REQUIREMENTS ENGINEERING AND MODELING (7 Periods)

Requirements Engineering: Functional and non-functional requirements, The software requirements document, Requirements specifications, Requirements engineering processes, Requirements elicitation and analysis, Requirements validation, Requirements management.

Requirements Modeling: Data modeling concepts, Flow-oriented modeling, Case study on requirements modeling for WebApps.

UNIT-III: DESIGN ENGINEERING AND METRICS (8 Periods)

Design Engineering: Design within the context of software engineering, The Design process, Design concepts, Software architecture, Architectural styles, Architectural design.

Process and Project Metrics: Metrics in the process and project domains, Software measurement, Metrics for software quality.

UNIT-IV: SOFTWARE TESTING STRATEGIES AND APPLICATIONS (9 Periods)

Testing Strategies: A strategic approach to software testing, Strategic issues, Test strategies for conventional software, Test strategies for object oriented software, Validation testing, System testing, The art of debugging.

Testing Conventional Applications: Software testing fundamentals, Basis path testing, White box and Black box testing, Object oriented testing methods.

UNIT-V: RISK, QUALITY MANAGEMENT AND REENGINEERING (10 Periods)

Risk and Quality Management: Reactive and proactive risk strategies, Software risks, Risk Mitigation Monitoring and Management (RMMM), RMMM plan, Software quality factors, Defect amplification Model, Formal Technical Reviews (FTR), Software Quality Assurance (SQA)-Tasks, Goals and metrics; Software reliability.

Reengineering: Introduction, Business Process Reengineering (BPR), Software reengineering, Restructuring, Reverse engineering, Forward engineering. **Total Periods: 45**

TEXT BOOKS:

1. Roger S. Pressman, *Software Engineering-A Practitioner's Approach,* McGraw-Hill International Edition, Seventh Edition, 2010.
2. Ian Sommerville, *Software Engineering*, Pearson Education, Ninth Edition, 2011.

REFERENCE BOOKS:

1. K. K. Aggarwal and Yogesh Singh, *Software Engineering,* New Age International Publishers, Third Edition, 2007.

2. Shely Cashman Rosenblatt, *Systems Analysis and Design,* Thomson Publications, Sixth Edition, 2006.

II B. Tech. II Semester

(16BT40531) DATABASE MANAGEMENT SYSTEMS LAB

(Common to CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES:
A course on "Database Management Systems"

COURSE DESCRIPTION:
Hands on experience on - DDL, DML commands; Query processing using operators; Joins, Views, Single Row functions, Group Functions and SET functions; PL/SQL concepts - Basic Programs, Triggers, Functions, Cursors and Stored Procedures.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Demonstrate practical knowledge on creation and alteration of tables, insertion and Querying of data.

CO2. Analyze and evaluate the databases using SQL DML/DDL commands.

CO3. Design database schemas for the sales database, customer database and product database.

CO4. Develop solutions for database problems using stored procedures, stored functions, cursors and triggers.

CO5.Implement DDL and DML commands in SQL and PL/SQL, ORACLE to manage data in databases.

CO6.Apply contextual knowledge to develop database applications related to societal applications like Information Retrieval Systems, Banking and Financial systems.

CO7.Demonstrate communication skills, both oral and written for preparing and presenting reports on databases.

DESCRIPTION OF SALES DATABASE:
ABC is a company operating in the country with a chain of shopping centers in various cities. Everyday large numbers of items are sold in different shopping centers. The Sales database comprises of various tables like CUST, PROD, SALES_DETAIL, STATE_NAME with the following schemas.

CUSTOMERS Name	**Type**	**Remark**
CID	VARCHAR2(6)	PRIMARY KEY
CNAME	VARCHAR2(10)	
CCITY	VARCHAR2(8)	
PRODUCTS		
Name	**Type**	**Remark**
PID	VARCHAR2(6)	PRIMARY KEY
PNAME	VARCHAR2(6)	
PCOST	NUMBER(5,2)	
PROFIT	NUMBER(3)	
SALES DETAILS		
Name	**Type**	**Remark**
CID	VARCHAR2(6)	COMPOSITE PRIMARY KEY
PID	VARCHAR2(6)	COMPOSITE PRIMARY KEY
SALE	NUMBER(3)	
SALEDT	DATE	COMPOSITE PRIMARY KEY
STATES		
Name	**Type**	**Remark**
CCITY	VARCHAR2(8)	PRIMARY KEY
STATE	VARCHAR2(15)	

LIST OF EXERCISES:

1. Execute: Data Definition Language (DDL) commands

I. Create the tables in sales database.

II. View the structure of the each table.

III. Change the structure of the table like add new column, change the width of a data type, change the data type of a column, delete column from the table, rename the column name and table names.

IV. Delete all records stored in a table, but the structure of the table is retained.

V. Remove a table from the database.

2. Execute: Data Manipulation Language (DML) commands

STATES PRODUCTS

CCITY	STATE
Mysore	Karnataka
Kolkata	Westbengal
Pune	Maharashtra
Tirupathi	Andhra Pradesh
Chennai	Tamilnadu

CUSTOMERS SALES DETAILS

PID	PNAME	PCOST	PROFIT
p1	pen	100	10
p2	pencil	15.5	2
p3	pendrive	950	50
p4	DVD	35	5
p5	mouse	500.5	Null

CID	CNAME	CCITY
c1	gopal	mysore
c2	haitvik	kolkata
c3	rohan	pune
c4	rajini	chennai
c5	mohan	tirupathi
c6	sanjay	mysore
c7	samhita	Kolkata

CID	PID	SALE	SALEDT
c1	p1	10	1-Sep-16
c2	p3	20	18-Mar-17
c5	p5	30	20-Dec-16
c3	p2	45	1-Sep-16
c4	p4	15	1-Sep-16
c7	p3	22	18-Mar-17
c1	p2	23	1-Sep-16
c2	p1	33	14-Jul-17
c3	p5	14	18-Mar-17
c6	p4	10	14-Jul-17
c1	p2	5	18-Mar-17
c4	p2	50	18-Mar-17
c5	p1	20	14-Jul-17
c3	p3	9	1-Sep-16
c6	p5	10	18-Mar-17
c3	p4	8	20-Dec-16

c7	p3	6	1-Sep-16
c1	p5	9	14-Jul-17

I. Write a query to display all customers.
II. Write a query to display pname of all products.
III. Write a query to display cname and ccity of all customers.
IV. Write a query to display cname, ccity of all customers who lives in mysore.
V. Write a query to display cname and ccity of all customers who live in Kolkata or Chennai.
VI. Find the cost of pencil.
VII. Display CID as Customer_Id, CNAME as Name for all customers.
VIII. Change the name of the product p3 from 'pendrive' to 'modem'.
IX. Find the product ids in sales detail table (eliminating duplicates).
X. Remove the record from sales detail table whose sale value is 5.

3. Implement table level and Column level constraints like NOT NULL, UNIQUE, PRIMARY KEY, FOREIGN KEY, CHECK, DEFAULT.

4. Operators

I. Display the sum of pcost and profit of all products.
II. Display the column heading as "Selling Price" instead of PCOST+PROFIT.
III. Find out what percent of pcost is profit for all products.
IV. List the cids of customers who purchased products on '14-jul-2017'.
V. List only the products whose cost is more than 50.00.
VI. List all the customers who are not belongs to 'pune'.
VII. Write a query to display the pname and pcost of all the products where pcost lies between 5 and 25.
VIII. Write a query to display distinct customer id where product id is p3 or sale date is '18-mar-2017'.
IX. Write a query to display cname, ccity of those customers whose cid is in c1 or c2 or c4 or c5 (using IN operator).
X. List customers whose name starts with 'h'.
XI. Write a query to display all records of prod table in which first and third character of pname is any character and second character is 'e'.
XII. Write a query to display all cname which includes two 'a' in the name.
XIII. List the products with unknown profit.
XIV. Display the profit of products as zero if unknown.

5. Joins and Views

I. Write a query to display cname, pname, sale, saledt for all customers.
II. Write a query to display cname who have purchased Pen.
III. Write a query to display cname, pname, sale for all customers who sold after '01-sep-2016'.
IV. Write a query to display cname,ccity,state of all customers.
V. Write a query to display cname,ccity of all customers who belongs to Karnataka.
VI. Create a view on product table which includes pid, pname and pcost of products.
VII. Insert a row into the view.
VIII. Update the rows in a view.
IX. Delete the rows from view.

6. Order by, group by and having clauses.

I. Write a query to display pname of all records. Sort all records by pname. (use order by clause)
II. Write a query to display cname and ccity of all records. Sort by ccity in descending order.
III. Write a query to display saledt and total sale on the date.
IV. Write a query to display saledt and total sale on the date labeled as sale of all items.
V. Write a query to display saledt and total sale on the date sold after 01-sep-2016.
VI. Write a query to display saledt and total sale on the date labeled as sale of all items other than DVD.
VII. Write a query to display total number of customers who purchase pen.

7. Single Row Functions: Date Function, Numeric and Character Function

I. Write a query to display system date
II. Write a query to display the system date by rounding it to next month.

III. Write a query to display the system date by rounding it to next year.
IV. Write a query to display the last date of the system date.
V. Write a query to display the next date of system date which is Friday.
VI. Write a query to display sale date and date after 02 months from sale date.
VII. Write a query to display system date, sale date and months between two dates.
VIII. Write a query to display the greatest date between sale date and system date, name it as BIG, also display sale date and SYSDATE.
IX. Write a query to display the least date between sale date and system date name it as SMALL, also display sale date and SYSDATE.
X. Write a query to display the product name along with the rounded value of product cost for product name is "Pencil".
XI. Write a query to display product cost along with MOD value if divided by 5.
XII. Write a query to display cname in uppercase, lowercase, titlecase from cust table where customer name is "rohan".
XIII. Write a query to display all concatenated value of cname, ccity by converting cname into titlecase and ccity into uppercase.
XIV. Write a query to display the first 3 characters of cname.
XV. Write a query to display the position of 'm' in the cname of the customer whose name is "samhita".
XVI. Write a query to display the length of all customer names.
XVII. PAD # character in left of product cost to a total width of 5 character position.

8. Group Functions and Set Functions

I. Write a query to display the total count of customer.
II. Write a query to display the minimum cost of product.
III. Write a query to display average value of product cost rounded to 2nd decimal places.
IV. Write a query to display product name with total sale detail in descending order.
V. Write a query to display product name, sale date and total amount collected for the product.
VI Write a query to display sale date and total sale date wise which was sold after "14-jul-2016".
VII. Write a query to display the customer name who belongs to those places whose name is having 'i' or 'p'.
VIII. Write a query to display customer name who belongs to a city whose name contains characters 'c' and whose name contains character 'a'.
IX. Write a query to display the customer name who does not belong to 'pune'.

9. PL/SQL basic programs

I. Write a PL/SQL program to find largest number among three. (Hint: Use Conditional Statement)
II. Write a PL/SQL program to display the sum of numbers from 1 to N using for loop, loop…end and while…loop.

10. SQL Cursor based programs

I. Write a PL/SQL program to display the costliest and cheapest product in PROD table.
II. Write a PL/SQL program which will accept PID and display PID and its total sale value i.e. sum.

11. Functions

I. Write a function that accepts two numbers A and B and performs the following operations.
   a. Addition b. Subtraction
   c. Multiplication d. Division
II. Write a function that accepts to find the maximum PCOST in PROD table.

12. Procedures

I. Write a procedure that accepts two numbers A and B, add them and print.
II. Write procedures to demonstrate IN, IN OUT and OUT parameter.

13. Triggers

I. Develop a PL/SQL program using BEFORE and AFTER triggers.
II. Create a row level trigger for the PROD table that would fire for INSERT or PDATE or DELETE operations performed on the PROD table. This trigger will display the profit difference between the old values and new values.

REFERENCE BOOKS:

1. Satish Ansari, *Oracle Database 11g: Hands-on SQL and PL/SQL,* PHI Publishers, 2010.
2. Pranab Kumar Das Gupta, Data Base Management System; Oracle; SQL and DL/SQL, PHI Learhi, Private Limited, 2009.

II B. Tech. – II Semester

(16BT31231) JAVA PROGRAMMING LAB

(Common to CSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on "Java Programming".

COURSE DESCRIPTION: Hands on experience on Polymorphism; Inheritance and Interfaces; Exception Handling; Multithreading; Event Handling; AWT; Applets; Servlets.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on basic concepts of Java programming.
CO2. Design and develop efficient programs with multitasking ability and handle exceptions.
CO3. Demonstrate independent problem solving skills in developing interactive applications.
CO4. Apply object oriented approach to develop user friendly interface and learn how to communicate with systems over the network.
CO5. Build Java applications suitable for societal requirements.
CO6. Work effectively as an individual and as a member in team for case studies implementation.
CO7. Demonstrate communication skills, both oral and written for preparing and presenting reports.

LIST OF EXERCISES:

1.a. Write a Program to accept two integers through the command line arguments and print the sum of the two numbers.
b. Write a Program to accept a String as a Command line argument and the program should print a Welcome message.

2. Write a program that displays a menu with options 1. Add 2. Sub. Based on the options chosen, read 2 numbers and perform the relevant operation. After performing the operation, the program should ask the user if he wants to continue. If the user presses y or Y, then the program should continue displaying the menu else the program should terminate.[Use Scanner class]

3.a. Write a program to print the element of an array that has occurred highest number of time.
b. Write a program to find greatest number in a 3*3 array. The program is supposed to receive 9 integer numbers as command line arguments.

4.a. Create a class "AmountInWords" to convert the amount into words. (Consider the amount to be not more than 100000.)
b. Write a Program to count tokens- number of words and characters in a string.

5. Implement any one of the case study with the specifications given below:
   a) Create classes, objects and their properties.
   b) Add methods to classes and implement them.
   c) Refine the objects by adding constructors and local variables.
   d) Show communication between the objects by calling instance of one object from another class.
   e) Handle Exceptions and Implement relationships like inheritance.

   Case study 1: Banking Application:
   The banking application consists of five divisions. They are customer details, creating a new account, withdrawing money, loan details and depositing money. The customer details consist of customer name, address, phone number, account number. To withdraw money checks the balance in the account and then get the money. The loan details consist of loan types like home loans, car loans, education loans etc. To deposit money enter the account number and give the account to be deposited.

   Case study 2: Library Application:
   The Library Application consists of Student, faculty and book details, Issue book, and return book. The student and faculty details consist of name, ID, Branch and maximum number of books can be issued to them. The book details consist of ID, Book name and Author name. To Issue a book to members, the librarian checks the availability of book and if the book is not available, then an error message will be displayed. To return the book, the librarian verifies the validity and if the validity is expired then the fine amount message will be displayed. The student and faculty can view the book details issued to them and also can check the count of remaining books that can be taken for issue.

6. a. Write a program that correctly implements producer consumer problem using the concept of inter-thread communication.
   b. Write a program that demonstrates time slicing among equal priority threads, show that a lower priority thread's execution is deferred by the time slicing of higher-priority threads.
7. Develop an Applet that receives an integer in one text field, and computes its factorial value and returns it in another text field, when the button named "Compute" is clicked.
8. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -, *, % operations. Add a text field to display the result.
9. Create a Servlet that recognizes first time visitor to web application and responds by saying "Welcome to new user" otherwise "welcome back".

REFERENCE BOOKS:

1. Herbert Schildt, *Java the Complete Reference,* Oracle Press, Ninth Edition, 2014.
2. Sachin Malhotra and Saurab Choudhary, *Programming in Java,* Oxford University Press, Second Edition, 2014.

II B. Tech. – II Semester

(16BT4HS31) SOFT SKILLS LAB

(Common to CE, ME, CSE, IT, and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES:

English Language Laboratory in I B.Tech. or English Laboratory at Diploma Level.

COURSE DESCRIPTION:

This course covers Body Language; Assertiveness; Goal Setting; Creative Thinking; Interpersonal Skills; Team Work; Conflict Management; Etiquette; Report Writing; Group Discussions; Interviewing Skills.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1: Acquire knowledge in
- Goal Setting
- Creative Thinking
- Leadership Skills and
- Team Work

CO2: Analyse the situations and develop skills for
- Body Language
- Personality Development and
- Stress Management

CO3: Apply the techniques of soft skills in a problem situation enhanced through multimedia software

CO4: Function effectively as an individual and as a member in diverse teams

CO5: Communicate effectively in public speaking in formal and informal forums.

LIST OF EXERCISES:

1. Body Language
2. Assertiveness
3. Goal Setting
4. Creative Thinking
5. Interpersonal Skills
6. Team Work
7. Conflict Management
8. Etiquette
9. Report Writing
10. Resume Writing
11. Group Discussions
12. Interviewing Skills

REFERENCE BOOKS:

1. R. C. Sharma & Krishna Mohan, *Business Correspondence and Report Writing*, Tata McGraw-Hill Publishing Company Limited, Third Edition, New Delhi, 2012.
2. Gopalswamy Ramesh and Mahadevan Ramesh, *The Ace of Soft Skills*, Pearson, Noida, 2010.
3. Jeff Butterfeild, *Soft Skills for Everyone*, Cengage learning, Delhi, 2011.
4. Barun K. Mitra, *Personality Development and Soft Skills*, Oxford University Press, Noida, 2012.

SUGGESTED SOFTWARE:

1. ETNL Language Lab Software Version 4.0
2. GEMS – Globarena E-Mentoring System
3. Speech Solutions.
4. English Pronunciation Dictionary by Daniel Jones.
5. Learning to Speak English 8.1, The Learning Company –4 CDs.
6. Mastering English: Grammar, Punctuation and Composition.
7. English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
8. Dorling Kindersley Series of Grammar, Punctuation, Composition etc.
9. Language in Use 1, 2 & 3.
10. Cambridge Advanced Learner's Dictionary - 3rd Edition.
11. Centronix – Phonetics.

12. Let’s Talk English, Regional Institute of English South India.
13. Ultimate English Tutor.

III B. Tech. I-Semester

(16BT5HS01) MANAGEMENT SCIENCE

(Common to CSE, and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: –

COURSE DESCRIPTION:

Concepts of Management; Environmental Scanning; Concepts Related to Organization; Operations Management; Work Study; Statistical Quality Control; Inventory Management; Marketing; Human Resource Management; Project Management; Project Crashing; Entrepreneurship; Contemporary Management Practices.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1: Demonstrate the concepts of operations management, human resources management, project management and contemporary management practices in managerial context.

CO2: Identify and analyse management problems in the business organizations reaching substantiated conclusions using principles of management.

CO3: Design appropriate organization structure for meeting the needs of the organization with consideration of the employees of the organization.

CO4: Competently employ broad based analytical tools for decision making, system design, analysis and performance.

CO5: Provide solution to organizations for sustainable development.

CO6: Apply knowledge of engineering and management principles to manage the projects in multidisciplinary environments.

DETAILED SYLLABUS:

UNIT- I: INTRODUCTION TO MANAGEMENT AND ORGANIZATION (09 periods)

Concepts of management and Administration, Nature and Importance of management, Evolution of management thought, Functions of management, Contributions of F.W. Taylor and Henry Fayol to the management, Systems approach to management, Managerial skills, Elements of corporate planning process, Environmental scanning, SWOT Analysis, Social responsibilities of management.

Basic concepts related to organization, Objectives and Principles, Types of organizations- Line Organization, Line and Staff Organization, Functional Organization, Matrix Organization, Network organization.

UNIT- II: OPERATIONS MANAGEMENT (12 periods)

Plant location- Factors and Principles; Plant Layout- Principles and Types; Methods of production, Work study- Basic procedure involved in method study and work measurement; Statistical Quality Control- Factors affecting quality, Control charts for variables and attributes, Acceptance sampling; Materials management- objectives, Inventory- Types of inventory, Classical EOQ model, ABC analysis; Purchase procedure, Stores management, Marketing- Functions, Channels of distribution.

UNIT-III: HUMAN RESOURCE MANAGEMENT (HRM) (06 periods)

Nature and scope of HRM, Functions of HRM, Role of HR Manager in an organization, Job evaluation, Merit rating, Maslow's hierarchy of human needs, McGregor's theory X and theory Y, Herzberg's two-factor theory of motivation.

UNIT-IV: PROJECT MANAGEMENT (PERT/CPM) AND ENTREPRENEURSHIP (09 periods)

Network analysis - Critical path method (CPM), Program evaluation and review technique (PERT); Project cost analysis - Project crashing. Introduction to Entrepreneurship, Entrepreneurial Traits, Entrepreneur vs Manager, Role of Entrepreneurship in Economic Development, Women as an Entrepreneur.

UNIT-V: CONTEMPORARY MANAGEMENT PRACTICES (09 periods)

Basic concepts of Material Requirements Planning, Enterprise resource planning (ERP), Just In Time (JIT) system, Total Quality Management (TQM), Value Chain Analysis, Business Process Outsourcing (BPO), Globalization, Management Challenges, Supply Chain Management (SCM), Role of Information Technology in managerial decision making, Six Sigma Concept, Maintenance Strategies- Preventive, Periodic and Breakdown Maintenance.

Total Periods: 45

TEXT BOOKS:

1. O.P. Khanna, *Industrial Engineering and Management*, Dhanpat Rai and Sons, 2010.
2. Martand T.Telsang, *Industrial Engineering and Production Management*, S. Chand, 2nd Edition, 2006.

REFERENCE BOOKS:

1. Koontz and Weihrich, *Essentials of Management*, TMH, 6th Edition, New Delhi, 2007.
2. N.D. Vohra, *Quantitative Techniques in Management*, TMH, 2nd Edition, New Delhi.

III B. Tech. – I Semester

(16BT50501) COMPUTER NETWORKS

(Common to ECE, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:

Courses on "Computer Organization" and "Operating Systems"

COURSE DESCRIPTION:

Introduction to Computer Networks; The Physical Layer; The Data Link Layer; The Medium Access Control Sub layer; The Network Layer; The Transport Layer; The Application Layer.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:

- Functionalities of Various OSI and TCP/IP layers
- 3G Mobile phone networks, 802.11
- TCP,UDP and SMTP

CO2. Analyze the issues related to data link, medium access and transport layers by using channel allocation and connection management schemes.

CO3. Design and compute subnet masks and addresses for networking requirements.

CO4. Solve problems related to Flow control, Error control, congestion control and Network Routing.

CO5. Apply Network Standards - 802.3 and 802.11 for developing computer Networks.

CO6. Assess the impact of wired and wireless Networks in the context of societal applications like VoIP, Multi-user Network Games, Internet of Things.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION AND PHYSICAL LAYER (9 periods)

Introduction: Network hardware, Network software, Reference models - OSI, TCP/IP; Example networks – Internet; Wireless LANs - 802.11.

Physical Layer: Guided transmission media, Wireless transmission.

UNIT-II: DATA LINK LAYER AND MEDIUM ACCESS CONTROL SUBLAYER (10 periods)

Data Link Layer: Data link layer design issues, Error detection and correction-CRC, Hamming codes, Elementary data link protocols, Sliding window protocols.

Medium Access Control Sub layer: ALOHA, Carrier sense multiple access protocols, Collision-free protocols, Ethernet, Data link layer switching-Repeaters, Hubs, Switches, Routers, and Gateways.

UNIT-III: NETWORK LAYER (10 periods)

Network layer design issues, Routing algorithms - Shortest path, Flooding, Distance vector, Link state routing, Hierarchical, Broadcast, Multicast, Anycast; Congestion control algorithms, Network layer in the internet - The IP version 4 protocol, IP addresses, IP version 6, Internet control protocols.

UNIT-IV: TRANSPORT LAYER (9 periods)

UDP – Segment header, Remote procedure call, Real-time transport protocols; TCP**–** service model, Protocol, Segment header, Connection establishment, Connection release, Sliding window, Timer management, Congestion control.

UNIT-V: APPLICATION LAYER (7 periods)

Domain Name System (DNS)-Name space, Domain resource records, Name servers; Electronic mail-Architecture and services, User agent, Message formats, Message transfer, Final delivery; The World Wide Web- Architectural overview, HTTP.

Total Periods: 45

TEXT BOOK:

1. Andrew S. Tanenbaum and David J. Wetherall, *Computer Networks,* Pearson Education, Fifth edition, 2015.

REFERENCE BOOKS:

1. Behrouz A. Forouzan, *Data Communication and Networking,* Tata McGraw-Hill, Fourth Edition, 2010.
2. James F. Kurose and Keith W. Ross, *Computer Networking: A Top-Down Approach Featuring the Internet,* Pearson Education, Second Edition, 2012.

III B. Tech. – I Semester
(16BT50502) LINUX PROGRAMMING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:
A Course on "Operating Systems"

COURSE DESCRIPTION:
Concepts on Linux Programming; Shell Programming; Process, Signals and File System Structure; Inter process Communications and Socket Programming for Client-Server Interaction.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on
- Shell programming
- File Structure and System Calls
- Processes management and handling signals,
- IPC and Sockets

CO2. Analyze shell scripts and system calls related to Linux Environment.
CO3. Design shell scripts and system calls for specified computational problems
CO4. Use appropriate shell scripts and system calls for solving complex problems.
CO5. Provide appropriate Linux solutions for real time applications
CO6. Apply contextual knowledge to solve problems related to societal issues.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO LINUX AND LINUX ENVIRONMENT (9 Periods)
The GNU project and the Free Software Foundation, Linux distributions, Programming Linux - Linux programs, Text editors, The C Compiler; Program arguments - getopt, getopt_long. Environment variables - Use of environment variables, The environ variable, Time and Date, User information, Host information.

UNIT-II: SHELL PROGRAMMING (9 Periods)
Necessity of shell programming, Pipes and redirection - Redirecting output, Redirecting input, Pipes, The Shell as a programming language - Interactive programs, Creating a script, Making a script executable, Shell syntax – Variables, Conditions, Control structures, Functions, Commands, Command execution.

UNIT-III: FILE SYSTEM STRUCTURE AND SYSTEM CALLS (9 Periods)
Linux File Structure and Commands: File structure - Directories, Files and devices, System calls and Device drivers; Library functions - Low-level file access, write, read and open commands, Initial permissions, Other system calls for managing files; File and directory maintenance commands - chmod, chown, unlink, link, symlink, mkdir, rmdir, chdir, getcwd.
Input-Output Commands: The standard I/O library commands - fopen, fread, fwrite, fclose, fflush, fseek, fgetc, getc, and getchar, fputc, putc and putchar, fgets and gets; Formatted input and output commands - printf, fprintf, sprintf, scanf, fscanf, sscanf.

UNIT-IV: PROCESS AND SIGNALS (8 Periods)
Process structure - Process table, Viewing processes, System processes, Process scheduling; Starting new processes - Waiting for a process, Zombie processes, Input and output redirection, Threads; Signals - Sending signals, Signal sets.

UNIT-V: INTER-PROCESS COMMUNICATION AND SOCKETS (10 Periods)
Inter-Process Communication: Pipe definition, Process pipes, Sending output to popen - Passing more data, popen, implementation, The pipe call; Parent and child processes - Reading closed pipes, pipes used as standard input and output; Named pipes – FIFOs, Accessing a FIFO, Client/Server using FIFOs.
Socket Connections: Socket attributes, Creating a socket, Socket addresses, Naming a socket, Creating a socket queue, Accepting connections, Requesting connections, Closing a socket, Socket communications, Host and network byte Ordering. **Total Periods: 45**

TEXT BOOK:

1. Neil Matthew and Richard Stones*, Beginning Linux Programming,* Wiley Dreamtech, Fourth Edition, 2008.

REFERENCE BOOKS:

1. Richard Petersen, *Linux: The Complete Reference,* Tata McGraw-Hill, Sixth edition, 2007.

2. Sumitabha Das, *Your UNIX: The Ultimate Guide,* Tata McGraw-Hill, 2007.

III B. Tech. – I Semester

(16BT51202) OBJECT ORIENTED ANALYSIS AND DESIGN

(Common to CSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on "Software Engineering" and "Object Oriented Programming through C++".

COURSE DESCRIPTION: Introduction to UML, Basic structural modeling; Advanced structural modeling, Class and object diagrams; Basic behavioral modeling; Advanced behavioral modeling; Architectural modeling.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on principles of object oriented analysis and design through UML Diagrams.

CO2. Analyze user requirements and identify suitable structural and behavioral modeling components.

CO3. Design and develop UML models for real time software applications.

CO4. Solve real world problems by applying structural and behavioral modeling techniques.

CO5. Use unified modeling language in preparing blue prints for software solutions.

CO6. Design and develop UML models to solve societal problems.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO UML AND BASIC STRUCTURAL MODELING (11 Periods)

Introduction to UML: Importance of modeling, Principles of modeling, Object oriented modeling, An overview of UML, Conceptual model of the UML, Architecture, Software development life cycle.

Basic Structural Modeling: Classes-Terms and concepts, Common modeling techniques; Relationships-Modeling simple dependencies, Single inheritance and structural relationships; Common mechanisms, Diagrams.

UNIT-II: ADVANCED STRUCTURAL MODELING, CLASS AND OBJECT DIAGRAMS (7 Periods)

Advanced Structural Modeling: Advanced classes, Advanced relationships, Interfaces, Types and roles, Packages, Instances.

Class and Object Diagrams: Terms and concepts, Modeling techniques for class diagram-Modeling simple collaboration, Logical database schema, Forward and reverse engineering; Introduction to object diagrams.

UNIT-III: BASIC BEHAVIORAL MODELING (9 Periods)

Basic Behavioral Modeling-I: Interactions-Terms and concepts, Modeling a flow of control; Interaction diagrams-Terms and concepts, Modeling flows of control by time ordering and control by organization, Forward and reverse engineering.

Basic Behavioral Modeling-II: Use cases-Terms and concepts, Modeling the behavior of the element; Use case Diagrams-Terms and concepts, Modeling the context of a system, Requirement of a system, Forward and reverse engineering; Activity Diagrams-Terms and concepts, Modeling a workflow, modeling an operation, Forward and reverse engineering.

Unit –IV: ADVANCED BEHAVIORAL MODELING (7 Periods)

Events and signals-Modeling a family of signals, exceptions; State machines-Modeling the lifetime of an object; Introduction to processes and threads, Time and space-Modeling timing constraints, Distribution of objects and objects that migrate; State chart diagrams-Modeling reactive objects, Forward and reverse engineering.

Unit-V: ARCHITECTURAL MODELING (11 Periods)

Component-Terms and concepts, Modeling executables and libraries, Modeling tables, Files and documents, Modeling an API; Deployment-Modeling processors and devices, Modeling the distribution of components; Component diagrams-Modeling source code, Executable release, Physical database, Adaptable systems, Forward and reverse engineering; Deployment diagrams-Modeling an embedded systems, Client/Server system, Fully distributed systems, Forward and reverse engineering.

Case Studies: Online student course registration system for university, Hospital Management.

Total Periods: 45

TEXT BOOK:

1. Grady Booch, James Rumbaugh and Ivar Jacobson, *The Unified Modeling Language User Guide,* Pearson Education, Second Edition, 2009.

REFERENCE BOOKS:

1. Magnus Penker, Brian Lyons, David Fado and Hans-Erik Eriksson, *UML 2 Toolkit,* WILEY-Dreamtech India Pvt. Ltd., 2006.
2. Pascal Roques, *Modeling Software Systems Using UML2,* WILEY-Dreamtech India Pvt. Ltd, 2004.

III B. Tech. - I Semester

(16BT41204) THEORY OF COMPUTATION

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Discrete Mathematical Structures".

COURSE DESCRIPTION: Fundamentals of Computation; Finite State Automaton; Regular Expressions; Grammars; Push Down Automaton; Turing Machine.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on Formal languages and automata.

CO2. Analyze the classification of languages, automata's and their computing power.

CO3. Design grammars and automata (recognizers) for regular expressions and formal languages.

CO4. Solve computational problems using automata.

CO5. Apply theorems to translate automata's and identify the class of languages.

DETAILED SYLLABUS

UNIT-I: FINITE AUTOMATA (10 Periods)

Introduction to Finite automata, The central concepts of automata theory, Deterministic finite automata, Nondeterministic Finite automata, The equivalence of DFA and NDFA, Finite automata with epsilon-transitions, Conversion of epsilon-NFA to NFA and DFA, Mealy and Moore models.

UNIT-II: REGULAR EXPRESSIONS AND LANGUAGES (9 Periods)

Regular expressions, Identity rules, Finite automata and Regular expressions, Applications of regular expressions, Pumping lemma for regular languages, Applications of the pumping lemma, Closure properties of regular languages, Equivalence of two regular expressions, Equivalence of two finite automata and minimization of automata.

UNIT-III: CONTEXT-FREE GRAMMARS (9 Periods)

Context-free grammars, Parse trees, Applications of context-free grammars, Ambiguity in grammars and languages, Normal forms for context-free grammars, The pumping lemma for context-free languages.

UNIT-IV: PUSH DOWN AUTOMATA (7 Periods)

Definition of the pushdown automaton, The languages of a PDA, Equivalence of PDA's and CFG's, Deterministic pushdown automata, Chomsky hierarchy of languages, The model of linear bounded automaton.

UNIT-V: TURING MACHINES (10 Periods)

Turing machine model, Representation of turing machines, Language acceptability by turing machine, Design of turing machines, Programming techniques for turing machines, Turing machines with semi-infinite tapes, Multi stack machines and counter machines, Universal turing machines.

Total Periods: 45

TEXT BOOKS:

1. John E. Hopcroft, Rajeev Motwani and Jeffrey D Ullman, *Introduction to Automata Theory, Languages and Computation,* Pearson Education, Third Edition, 2011.
2. K.L.P. Mishra and N.Chandrasekaran, *Theory of Computer Science: Automata Languages and Computation,* PHI Learning, Third Edition, 2009.

REFERENCE BOOK:

1. John C Martin, *Introduction to Languages and the Theory of Computation,* TMH, Third Edition, 2009.

III B. Tech. – I Semester

(16BT50442) MICROPROCESSORS AND INTERFACING

(Common to CSE, IT and CSSE)
(interdisciplinary Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on 'Digital Logic Design' and 'Computer Organization'.

COURSE DESCRIPTION: INTEL 8086 & 8051- Architectures; Instruction set; Programmable Interfacing Concepts; ADC, DAC, 8255, 8257,8259 ,8279,8251, Advanced peripheral Interfacing; Applications.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1: Demonstrate knowledge in:

- Internal Hardware details of Intel 8086, 8051 & programming devices like 8255, 8257, 8259, 8279 and 8251.
- Interfacing various peripherals to build standalone systems

CO2: Analyze various peripherals and interfacing techniques.

CO3: Design application based Microcomputer system using 8086 and 8051.

CO4: Solve problems by providing microcomputer-based real time solutions.

CO5: Apply programming tools, appropriate techniques and resources to complex engineering activities for microprocessor and microcontroller based systems with understanding of limitations.

C06: Solving societal problems by applying concepts of microprocessors and microcontrollers.

DETAILED SYLLABUS:

UNIT I – INTEL 8086 ARCHITECTURE AND PROGRAMMING (09 periods)

Evolution of Microprocessors, Architecture of 8086 microprocessor, Register organization, Physical Memory Organization, Signal description of 8086, General Bus Operation Minimum and Maximum mode operation of 8086, Timing diagram, Addressing modes.

UNIT II – ASSEMBLY LANGUAGE PROGRAMMING WITH 8086 AND INTERRUPTS (11 periods)

Instruction set of 8086, Assembler directives and Operators; Interrupts and Interrupt service routines, Interrupt Cycle of 8086, Non Maskable interrupt, Maskable interrupt (INTR), Interrupt Programming, Passing Parameters to procedures, MACROS.

UNIT III–BASIC PERIPHERALS AND THEIR INTERFACING WITH 8086 (08 periods)

Semiconductor memory Interfacing, Dynamic RAM interfacing, Interfacing I/O ports, Programmable Input-Output Port (PIO) 8255, Modes of operations of 8255, Interfacing analog to digital and digital to analog converters, stepper motor interfacing.

UNIT IV – SPECIAL PURPOSE PROGRAMMABLE PERIPHERAL DEVICES (09 periods)

Programmable Interrupt Controller 8259A; The keyboard/Display Controller 8279-Architecture, Signal Description, Modes of operations; Programmable Communication Interface 8251 USART; DMA Controller 8257, DMA Transfers and Operations.

UNIT V – INTRODUCTION TO 8051 MICROCONTROLLER (09 periods)

Microprocessors Vs Microcontrollers, The 8051 Architecture: Introduction, 8051 Microcontroller Hardware, input/output pins, Ports and circuits, External Memory, Counters and Timers, Serial Data Input / Output, Interrupts; Addressing Modes, Instruction set of 8051, simple programs on arithmetic operations using 8051.

Total Periods: 46

TEXT BOOKS:

1. A.K. Ray & K.M.Bhurchandi, A*dvanced Microprocessors and Peripherals- Architecture, Programming and Interfacing,* TMH, 2002 reprint.
2. Kenneth J. Ayala, *The 8051 Microcontroller-Architecture, Programming & Applications,* 3rd Edition, Cengage learning, June 2004.

REFERENCE BOOKS:

1. Douglas V.Hall, *Microprocessors and Interfacing: Programming and Hardware*, revised 2nd Edition, TMH.

2. Yu-cheng Liu, Glenn A. Gibson, *Microcomputer systems: The 8086/8088 Family architecture, Programming and Design*, PHI, 2006.
3. Mazidi and Mazidi, *The 8051 Microcontroller and Embedded Systems,* PHI, 2000.

III B. Tech. I-Semester

(16BT50503) COMPUTER VISION

(Interdisciplinary Elective–1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:
A course on "Computer Graphics"

COURSE DESCRIPTION:
Introduction to Computer Vision; Geometric Camera Models, Light, Color, Texture; Stereopsis; Segmentation by Clustering, Classification; Detection of Objects; Object Recognition and Information Retrieval.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on geometric camera models, light, color, texture, stereopsis, segmentation, and classification, detection of objects, object recognition and information retrieval procedures.
CO2. Analyze the digital image by Texture and Stereopsis methods.
CO3. Design solutions for image analysis problems by segmentation and classification techniques.
CO4. Develop novel techniques and efficient algorithms for image synthesis.
CO5. Apply clustering, classification, object recognition and information retrieval techniques for image analysis.
CO6. Use Contextual knowledge to solve problems related to societal issues.

DETAILED SYLLABUS:

UNIT-I: GEOMETRIC CAMERA MODELS, LIGHT AND COLOR (10 Periods)
Geometric Camera Models: Image formation – Pinhole perspective, Weak perspective, Cameras with lenses, The human eye.
Light: Modelling pixel brightness – Reflection at surfaces, Sources and their effects, the Lambertian with specular model, Area sources.
Color: Human color perception, The physics of color, Representing color, A model of image color, Inference from color – Finding specularities using color, Shadow removal using color.

UNIT-II: TEXTURE AND STEREOPSIS (9 Periods)
Texture: Local texture representations using filters, Pooled texture representations by discovering textons, Synthesizing textures and filling holes in images, Image denoising, Shape from texture.
Stereopsis: Binocular camera geometry and the epipolar constraint, Binocular reconstruction, Human stereopsis.

UNIT-III: SEGMENTATION BY CLUSTERING (9 Periods)
Grouping and Gestalt, Important applications – Background subtraction, Shot boundary detection, Interactive segmentation, Forming imaging regions; Image segmentation by clustering pixels; Segmentation, clustering and graphs – Terminology and facts for graphs, Agglomerative clustering with a graph, Divisive clustering with a graph, Normalized cuts.

UNIT-IV: CLASSIFICATION AND DETECTION OF OBJECTS (9 Periods)
Learning To Classify: Classification, Error and Loss – Using loss to determine decisions, Training error-test error-and-overfitting, Regularization, Error rate and cross-validation, Receiver operating curves.
Classifying Images - Classifying images of single objects.
Detecting Objects in Images – The sliding window method.

UNIT-V: OBJECT RECOGNITION, INFORMATION RETRIEVAL AND APPLICATIONS (8 Periods)
Object Recognition: Categorization, Selection, Feature questions, Geometric questions, Semantic questions.
Basic Technologies from Information Retrieval: Word counts, Smoothing word counts, Approximate nearest neighbors and hashing, Ranking documents.
Applications: Classifying materials and scenes. **Total Periods: 45**

TEXT BOOK:

1. David A. Forsyth and Jean Ponce, *Computer Vision: A Modern Approach,* Pearson Education, Second Edition, 2015.

REFERENCE BOOK:

1. Rafael C. Gonzalez, Richard E. Woods and Steven L. Eddins, *Digital Image Processing using MATLAB,* Tata McGraw Hill Education, Second Edition, 2010.

III B. Tech. – I Semester

(16BT50504) DATA COMMUNICATIONS

(Interdisciplinary Elective – 1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:
Courses on "Digital Logic Design" and "Basic Electronic Devices and Circuits"

COURSE DESCRIPTION:
Concepts of Data Communication; Transmission Media-metallic and optical fiber, Digitization techniques–PCM; Multiplexing, Wireless Communication Systems; Telephone and Cellular Concepts; Data Communication Equipment

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on
- Data communication and networking
- Digital transmission and multiplexing
- Telephone and cellular concepts
- Data communication codes and equipment

CO2. Analyze various types of modulation and multiplexing techniques.
CO3. Design wireless communication equipment to fulfill networking requirements.
CO4. Solve problems pertaining to analog or digital communication system in terms of complexity of the transmitters and receivers.
CO5. Use Data communication hardware and equipment for data communication.
CO6. Contribute towards societal issues and responsibilities in designing and developing sustainable networks.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO DATA COMMUNICATIONS, NETWORKING, SIGNALS, NOISE, MODULATION AND DEMODULATION (9 periods)

Introduction to Data Communications And Networking: Data communication network architecture, Protocols and standards, Standards organizations for data communications, Layered network architecture, Data communications circuits, Serial and parallel data transmission, Data communications circuit arrangements, Data communication networks.

Signals, Noise, Modulation and Demodulation: Signal analysis, Electrical noise and signal-to-noise ratio, Analog modulation systems, Information capacity, Bits, Bit rate, Baud and M-ary encoding, Digital modulation.

UNIT-II: DIGITAL TRANSMISSION, MULTIPLEXING AND T CARRIERS (9 periods)

Digital Transmission: Pulse modulation, Pulse Code Modulation (PCM), Linear versus nonlinear PCM codes, Companding, PCM line speed.

Multiplexing and T Carriers: Time-division multiplexing, T1 digital carrier system, Digital line encoding, T carrier systems, Frame synchronization, Frequency-division multiplexing, Wavelength-division multiplexing.

UNIT-III: WIRELESS COMMUNICATIONS SYSTEMS, TELEPHONE INSTRUMENTS AND SIGNALS (9 periods)

Wireless Communications Systems: Electromagnetic polarization, Rays and wave fronts, Electromagnetic radiation, Spherical wave front and the inverse square law, Wave attenuation and absorption, Optical properties of radio waves, Terrestrial propagation of electromagnetic waves, Basics of microwave communications systems and satellite communications systems.

Telephone Instruments and Signals: The subscriber loop, Standard telephone set, Basic telephone call procedures, Call progress tones and signals, Cordless telephones, Caller ID, Electronic telephones, Units of powers measurement, Crosstalk.

UNIT-IV: CELLULAR TELEPHONE CONCEPTS AND DATA COMMUNICATIONS CODES(9 periods)

Cellular Telephone Concepts: Mobile telephone service, Cellular telephone, Interference, Cell splitting, Sectoring, Segmentation, Dualization, Topology, Roaming and handoff, Network components, First-generation analog cellular telephone, Second- generation cellular telephone systems, Digital cellular telephone.

Data Communications Codes and Error Control: Data communications character codes, Bar codes.

UNIT-V: DATA COMMUNICATION HARDWARE AND EQUIPMENT (9 periods)

Data Communications Hardware: Data communication hardware, Data communication circuits, Line control unit, Serial interfaces.

Data Communications Equipment: Digital service unit and channel service unit, Voice-band data communication modems, Bell systems-compatible voice-band modems, Voice-band modern block diagram, Voice- band modem classifications, Asynchronous voice-band modems, Synchronous voice-band modems, Modem synchronization, ITU-T voice-band modem specifications, 56K modems, Probability of error and bit error rate.

Total Periods: 45

TEXT BOOK:

1. Wayne Tomasi, *Introduction to Data Communications and Networking,* Pearson Education, First Edition, 2005.

REFERENCE BOOKS:

1. Behrouz A. Forouzan, *Data Communications and Networking,* Mc-Graw Hill, Fifth Edition, 2013.

2. Fred Halsall, *Data Communications, Computer Networks and Open Systems*, Pearson Education, Fourth Edition, 1996.

III B. Tech. - I Semester

(16BT51541) MODELING AND SIMULATION

(Interdisciplinary Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:

A Course on "Probability Distributions and Statistical Methods"

COURSE DESCRIPTION:

Discrete event simulation; Useful statistical models; Queueing systems; Properties of random numbers, Test for random numbers; Data collection, Types of simulations with respect to output analysis.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on functional modeling of system design.

CO2. Analyze the performance of queueing systems in real world applications.

CO3. Design dynamic system operations using simulation results.

CO4. Apply mathematical foundations and computer science theory in modeling and designing of experiments for real time systems.

CO5. Select suitable simulation software tools for solving problems related to computer based systems.

CO6. Relate appropriate professional principles and norms of engineering practice for designing the simulation models.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION TO DISCRETE EVENT SIMULATION (08 Periods)

Simulation-Advantages and Disadvantages, Areas of application, Steps in a simulation study, Basics of spreadsheet simulation, Queueing simulation in a spread sheet, Concepts in discrete-event simulation, List processing, Selection of simulation software, Simulation environments.

UNIT II: STATISTICAL MODELS (08 Periods)

Terminology and concepts, Useful statistical models, Discrete distributions, Continuous distributions, Poisson process, Empirical distributions.

UNIT III: QUEUEING MODELS (09 Periods)

Characteristics of queueing systems, Queueing notation, Long-run measures of performance of queueing systems, Steady-state behavior of infinite-population Markovian models, Steady-state behavior of finite-population models, Networks of queues.

UNIT IV: RANDOM NUMBERS (09 Periods)

Properties of random numbers, Generation of pseudo-random numbers, Techniques for generating random numbers, Tests for random numbers, Inverse-transform technique, Acceptance-rejection technique, Special properties.

UNIT V: ANALYSIS OF SIMULATION DATA (11 Periods)

Input Modeling-Data Collection, Identifying the distribution with data, Parameter estimation, multivariate and time series input models,Validation of Simulation Models -Model building verification and validation, Verification of simulation models. Estimation of absolute performance -Types of simulations with respect to output analysis, stochastic nature of output data, Absolute measures of performance and their estimation, Output analysis of terminating Simulations.

Total Periods: 45

TEXT BOOK:

1. Jerry Banks, John S. Carson II, Barry L.Nelson and David M.Nicol, *Discrete-Event System Simulation,* Pearson India,5th edition, 2013.

REFERENCE BOOKS:

1. Narsingh Deo, *System Simulation with Digital Computer*, Prentice Hall India 2009.
2. Averill M. Law, *Simulation Modeling and Analysis*, McGraw Hill Education (India) Private Limited, 4th edition, 2007.

III B. Tech. – I Semester

(16BT50531) COMPUTER NETWORKS LAB

(Common to CSE and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES:

A Course on "Computer Networks"

COURSE DESCRIPTION:

Hands on Practice on Data Link Layer Framing Methods; Routing Algorithms; Congestion Control Algorithms; Connection Management in Transport Layer;

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate Knowledge on:

- Framing methods for data link layer,
- Shortest path using Dijkstra's routing algorithms

CO2. Identify suitable algorithm to find shortest path in a given network

CO3. Design and compute subnet masks and addresses for networking Requirements.

CO4. Solve problems related to Flow control, Error control, congestion control and Network Routing.

CO5. Apply Latest software tools and technologies for designing simple to complex applications in computer networks.

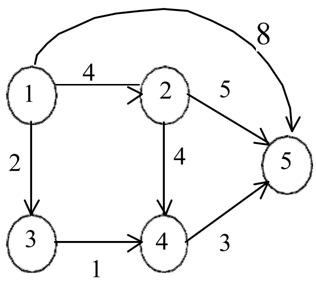
CO6. Assess the impact of wired and wireless Networks in the context of societal applications like VoIP, Multi-user Network Games, Internet of Things.

CO7. Work effectively as an individual to implement mini-project.

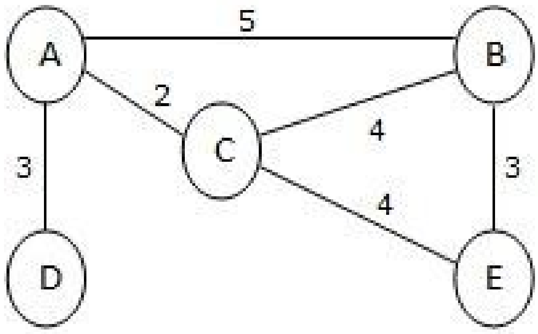
CO8. Demonstrate communication skills both oral and written for preparing and generating reports.

LIST OF EXERCISES:

1. Implement the following data link layer framing methods.
   i. Character count.
   ii. Character stuffing.
   iii. Bit stuffing.
2. Implement the frame sorting technique used in buffers.
3. Design and develop a program to compute checksum for the given frame 1101011011 using CRC-12, CRC-16, and CRC-CCIP. Display the actual bit string transmitted. Suppose any bit is inverted during transmission. Show that this error is detected at the receivers end.
4. Implement Dijkstra's algorithm to compute the Shortest path for the given graph.



5. Develop a program to obtain routing table for each node using Distance Vector Routing Algorithm by considering the given subnet with weights indicating delay between Nodes.



6. Write a program to simulate flow based routing.
7. Write a program to simulate random early detection congestion control algorithm.
8. Using TCP/IP sockets, write a client-server program to open a file available in the server.
9. Write a program for congestion control using leaky bucket algorithm.
10. Write a program for the Mail Client
    i. POP Client: Gives the server name, user name and password retrieve the mails and allow manipulation of mail box using POP commands.
    ii. SMTP Client: Gives the server name, send e-mail to the recipient using SMTP commands
11. Write a program for HTTP server to implement the commands - GET, POST, HEAD and DELETE. The server must handle multiple clients.

REFERENCE BOOK:

1. Andrew S. Tanenbaum and David J. Wetherall, *Computer Networks,* Pearson Education, Fifth edition, 2015.

III B. Tech. – I Semester
(16BT50532) LINUX PROGRAMMING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES:
A Course on "Linux Programming"
COURSE DESCRIPTION:
Hands on Practice with - Shell Programs; System Calls; Environment Variables; Inter Process Communication; File System and Socket Programming.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate practical knowledge on
- Shell programming
- File Structure and System Calls
- Processes management and handling signals,
- IPC and Sockets

CO2. Analyze shell scripts and system calls in Linux operating system.
CO3. Design shell scripts for specified computational problems.
CO4. Use appropriate shell scripts and system calls for solving complex problems
CO5. Create shell scripts and system calls for real time Linux applications.
CO6. Apply contextual knowledge to solve problems related to societal issues.
CO7. Communicate effectively using Linux with engineering community being able to comprehend and write effective programs and prepare reports.

LIST OF EXERCISES:
1 Create two files source.txt and dest.txt using vi editor which contains some text and practice the following commands on those files. cat, tail, head , sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, pg, comm., cmp, diff, cp, mv, ln, rm, unlink, tty, script, clear, date, cal, mkdir, rmdir, du, df, find, umask, ps,who.
2a. Write a shell script that takes a command line argument and reports on whether it is directory, a file, or something else.
b. Write a shell script that accepts one or more file names as arguments and converts all of them to uppercase, provided they exist in the current directory.
3 Write a shell script that accepts a file name, starting and ending line numbers as arguments and displays all the lines between the given line numbers.
a. Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.
4a. Write a shell script to list all of the directory files in a directory.
b. Write a shell script to find factorial of a given number.
5a. Write an interactive file-handling shell program. Let it offer the user the choice of copying, removing, renaming, or linking files. Once the user has made a choice, have the program ask the user for the necessary information, such as the file name, new name and so on.
b. Write a shell script that takes a login name and reports when a person logs in.
6a. Simulate uniq command using C.
b. Simulate grep command using C.
7 Write a C program that takes one or more file or directory names as input and reports the following information on the file:
a. File type
b. Number of links
c. Read, write and execute permissions
d. Time of last access
(Note: Use stat/fstat system calls)
8 a. Write a C Program to display Environment variables.
b. Write a C Program to implement Different types of exec functions.
9 a. Write a Program to create a Zombie Process.
b. Create a Process using fork() and display Child and Parent Process Id's.
10 Implement the Following IPC Forms a) FIFO b) PIPE
11 Perform client and server socket Programming for exchanging of data Using System calls.
12a. Write a program user.c, which extracts some user information from the password database (Hint: Use gethostname() function to obtain the network name of the host computer)
b. Write a program host.c, which extracts some host computer information (Hint: Use getuid() function to obtain the UID of the current user and use UID to obtain detailed password file information).

REFERENCE BOOK:

1. Neil Matthew and Richard Stones, *Beginning Linux Programming,* Wiley Dreamtech, Fourth Edition, 2008.

III B. Tech. – I Semester

(16BT50533) OBJECT ORIENTED ANALYSIS AND DESIGN LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES:
A Course on "Object Oriented Analysis and Design"
COURSE DESCRIPTION:
Hands on Practice to Design and Implement - Automated Teller Machine, Library Information System, Online Ticket Reservation System, Point of Sales, Airport Simulation, Course Registration System, Home Appliance Control System and Hospital Management System using Object-Oriented Language.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate practical knowledge on principles of object oriented analysis and design through UML diagrams.
CO2. Analyze user requirements and identify suitable structural and behavioral modeling components.
CO3. Design and develop UML models for real time applications.
CO4. Solve real world problems by applying structural and behavioral modeling techniques.
CO5. Use UML to design the software system.
CO6. Apply contextual knowledge of UML models to assess societal issues.
CO7. Involve as individual to solve case studies.
CO8. Develop a model for complex computational activities by preparing and presenting reports through effective communication.
LIST OF EXERCISES:
Case studies given below should be Modeled using Visual Modeling tools in different views i.e. Use case view, logical view, component view, Deployment view.
CASE STUDY 1: AUTOMATED TELLER MACHINE (ATM)
Problem Statement:
Software is designed for supporting a computerized ATM banking network. All the process involved in the bank is computerized these days. All the accounts maintained in the bank and also the transactions effected, including ATM transactions are to be processed by the computers in the bank. An ATM accepts a relevant cash card, interacts with user, communicates with the central system to carry out the transaction, dispenses cash, and prints receipts. The system to be designed and implemented must include appropriate record keeping and security provisions. The system must handle concurrent access to the same account.
CASE STUDY 2: LIBRARY INFORMATION SYSTEM
Problem Statement:
A library lends books and magazines to members, who are registered in the system. Also it handles the purchase of new titles for the library. Popular titles are bought in multiple copies. A member can reserve a book or magazine that is not currently available in the library, so that when it is returned back to the library, that person is notified. The library can easily create, update and delete information about the titles, members, loans and reservations in the systems.
CASE STUDY 3: ONLINE TICKET RESERVATION FOR RAILWAYS
Problem Statement:
Computer play an integral part of the day in today's life. It makes the entire job easier and faster, every job is computerized so that the ticket reservation can be done over the online ticket reservation system. During the booking of the ticket reservation, passenger has to select origin, date of journey, destination, class of train etc. The reservation counter keeps track of passenger's information. Thus, the system will have all the details about the trains and facilities provided by them. There are various trains with the different level of convenience for the passengers. The whole database will be maintained by database administrator. There are varieties of trains where the passengers can select the train according to the convenience for their destination journey. The journey could be within the state or across the India. Each train has the three types of classes i.e. Sleeper class, First class and AC compartment. Design the application for the above problem description.
CASE STUDY 4: A POINT OF SALE (POS) SYSTEM
Problem Statement:
A POS System is a computerized application used to record sales and handle payments; it is typically used in a retail store. It includes hardware components such as a computer, bar code scanner and software to run the system. It interfaces to various service applications, such as a third-party tax

calculator and inventory control. These systems must be relatively fault tolerant; that is, even if remote services and temporarily unavailable they must still be of capturing sales and handling at least cash payments. A POS system must support multiple and varied client-side terminals and interfaces such as browser, PDA's and touch-screens.

CASE STUDY 5: A MULTI-THREADED AIRPORT SIMULATION

Problem Statement:

Simulate the operations in an airport. Your application should multiple aircrafts using several runways and gates avoiding collisions/conflicts. Loading: an aircraft uses the runway, lands and then taxis over to the terminal. Take-Off an aircraft taxies to the runway and then takes off.

CASE STUDY 6: ONLINE STUDENT COURSE REGISTRATION SYSTEM FOR UNIVERSITY

Problem Statement:

At the beginning of each semester students may request a course catalogue containing a list of course offerings for the semester. Information about each course, such as professor, department, and prerequisites will be included to help students make informed decisions. The new on-line registration system will allow students to select four course offerings for the coming semester. In addition, each student will indicate two alternative choices in case a course offering becomes filled or cancelled. No course offering will have more than ten students. No course offering will have fewer than three students. A course offering with fewer than three students will be cancelled. Once the registration process is completed for a student, the registration system sends information to the billing system, so the student can be billed for the semester. Professors must be able to access the on-line system to indicate which courses they will be teaching. They will also need to see which students signed up for their course offering. For each semester, there is a period of time that students can change their schedules. Students must be able to access the on-line system during this time to add or drop courses. The billing system will credit all students for courses dropped during this period of time.

CASE STUDY 7: HOME APPLIANCE CONTROL SYSTEM

Problem Statement:

A home appliance control system (HACS) is a system which provides various services to remotely operate on home appliances, such as microwave oven, TV, and garage door etc through remote devices such as mobile phone, desktop and palm-top.A home appliance control system (HACS) is a system which is controlled by a remote system such as a mobile phone or a palm-top, and at the same time controls, monitors and coordinates home appliances such as air conditioner, microwave oven, garage doors, TV set, VCR, audio controller, indoor/outdoor lights, water sprinkler, home security system, bath tub controller, etc. In order to activate home appliances and to allow for different ways of cooking, the HACS needs mechanisms for communication between the different devices in the system, and for coordination among the various processes running on such devices. The system administrator of the HACS system has the ability to add a new appliance or delete an existing one. The system administrator has the ability to add a new remote device and configure it with HACS or delete an existing one when it is not used. Also the system administrator can create an account for a new user or delete existing account if it is no longer used.

CASE STUDY 8: HOSPITAL MANAGEMENT SYSTEM

Problem Statement:

Hospital Management System (HMS) is state-of-the-art software that offers comprehensive solutions to various segments of Healthcare Industry such as Super Specialty, Multi-specialty and General Hospitals of varied capacities, small Nursing Homes, HMOs, Polyclinics and General Practitioners. This HMS solution addresses the issues from multi-discipline angels namely patients, Doctors, Pharmacy, Hospital Management and Services. The software provides both clinical as well as patient care aspects to hospital management. The software is divided into different modules, each addressing a specific activity of the hospital and there by facilitating better patient care. Each module can be used as a standalone solution or can be integrated in a phased manner. Modules are designed so that they meet the present and future requirements of the hospital. HMS offers various sub-systems and a seamless integration. By being modular, each module can be used as a standalone solution or can be integrated in a phased manner. Modules are also so designed to meet the present as well as future requirements of the organization and process a unique ability with the business growth. HMS consists of the Base modules, Add-on modules and Specialty modules. Additional modules both add-on and specialty modules can be seamlessly integrated to the HMS at any time. The Integration Manager takes care of all the data consistency issues.

REFERENCE BOOKS:

1. Grady Booch, James Rum Baugh and Ivar Jacobson, *The Unified Modeling Language User Guide*, Pearson Education, Second Edition, 2009.
2. Hans-Erik Eriksson, Magnus Penker, Brian Lyons and David Fado, *UML 2 Toolkit,* Wiley Dreamtech India Pvt. Ltd.,   2004.

III B.Tech. – II Semester

(16BT3HS02) MANAGERIAL ECONOMICS AND PRINCIPLES OF ACCOUNTANCY

(Common to ME, CSE,IT, and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

Prerequisite: –

COURSE DESCRIPTION:

Managerial Economics; Demand and Elasticity of Demand; Production Functions; Markets and Pricing Policies; Formation of different types of Business Organizations; Basic concepts of Accounting (Journal, Ledger and Trial balance); Trading Account, Profit and Loss Account and Balance sheet with simple adjustments; Computerized Accounting.

Course outcomes:

On successful completion of the course, students will be able to:

CO1: Acquire Knowledge in

- Tools and concepts of Micro Economics.
- Basic Principles and concepts of Accountancy.
- Provides life skills for effective utilization of scarce resources.
- Financial Accounting.
- Significance of Economics and Accountancy

CO2: Develop skills in managerial decision making of an organization.

CO3: Apply the Economic theories i.e., Demand, Production, Cost, Markets and Price.

CO4: Develop effective communication in Business and Accounting transactions.

CO5: Ascertain the profitability and soundness of an organization.

CO6: Practice Financial Accounting

DETAILED SYLLABUS:

UNIT–I: INTRODUCTION TO MANAGERIAL ECONOMICS, DEMAND ANALYSIS (9 Periods)

Definition, Nature and Scope of Managerial Economics. **Demand:** Determinants of demand – Demand function - Law of demand, assumptions and exceptions - Elasticity of demand – Types of elasticity of demand - Demand forecasting and methods of demand forecasting.

UNIT–II: THEORY OF PRODUCTION AND COST ANALYSIS: (9 Periods)

Production Function: Isoquants and Isocosts – Input-output relationship - Law of returns.

Cost Concepts: Total, Average and Marginal Cost **-** Fixed vs. Variable costs – Opportunity Costs Vs Outlay Costs– Separable Costs Vs Joint Costs, Urgent Costs Vs Postponable Costs- Avoidable Costs Vs Unavoidable Costs - **Break Even Analysis (BEA)** – Assumptions, Merits and demerits - Determination of Break Even Point (Simple problems).

UNIT–III: INTRODUCTION TO MARKETS AND PRICING (9 Periods)

Market Structure: Types of Markets - Features of perfect competition - Monopoly and monopolistic competition - Price and Output determination in perfect competition, monopoly and monopolistic Markets.

Pricing : Objectives and policies of pricing – Sealed bid pricing - Marginal cost pricing - Cost plus pricing - Going rate pricing – penetration Pricing –skimming Pricing - Block pricing – Peak load pricing - Cross subsidization.

UNIT–IV: INTRODUCTION TO PRINCIPLES OF ACCOUNTING AND CAPITAL (9 Periods)

Accountancy: Introduction – Concepts – Conventions – Double Entry Book Keeping – Journal – Ledger - Trial Balance (Simple problems).

Capital : Significance - Types of capital – Sources of Capital.

UNIT–V: FINAL ACCOUNTS - COMPUTERIZATION OF ACCOUNTING SYSTEM (9 Periods)

Introduction to Final Accounts - Trading account - Profit and Loss account and Balance Sheet with simple adjustments (Simple problems).**Computerization of Accounting System :** Manual Accounting Vs Computerized Accounting–Advantages and Disadvantages of Computerized Accounting.

Total Periods: 45

TEXT BOOKS:

1. A.R. Aryasri, *Managerial Economics and Financial Analysis*, Tata Mc- Graw Hill, New Delhi, 3rd Edition, 2007.
2. R.Cauvery, U.K. Sudhanayak, M. Girija and R. Meenakshi, *Managerial Economics,* S. Chand and Company,New Delhi, 2nd Edition, 2010.

REFERENCE BOOKS:

1. Varshaney and Maheswari, *Managerial Economics,* Sultan Chand and Sons, New Delhi, 19th Edition, 2005.
2. Ms. Samba Lalita, *Computer Accouting Lab Work,* 1st Edition, Kalyani Publishers, Ludhiana, 2009.
3. S.P. Jain and K.L. Narang*, Financial Accounting*, Kalyani Publishers, Ludhiana, 6th Edition, 2002.

III B. Tech. – II Semester

(16BT61501) DATA WAREHOUSING AND DATA MINING

(Common CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A Course on "Database Management Systems"

COURSE DESCRIPTION: Data Mining Fundamentals; Data Preprocessing; Operational Database Systems and Data Warehouses; Mining Frequent Patterns; Classification and Prediction; Clustering; New Trends and Research Frontiers.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on Concepts of data warehousing and data mining.

CO2. Analyze using data mining techniques to find useful and potential Knowledge.

CO3. Design of Data Warehouse for OLAP applications and deployment.

CO4. Evaluate the usage of association mining techniques on complex data objects.

CO5. Select appropriate techniques to measure the interesting patterns from heterogeneous databases.

CO6. Apply appropriate evolutionary data mining algorithms to find solutions of Real time Applications.

DETAILED SYLLABUS:

UNIT-I: DATA WAREHOUSING AND ONLINE ANALYTICAL PROCESSING (09 Periods)

Data Warehouse, Operational Database Systems versus Data Warehouses, A Multi tired Architecture, A Multidimensional Data Model, Stars, Snowflakes and Fact Constellations: Schemas, Role of Concept hierarchies, Measures, OLAP Operations, From online Analytical processing to Multidimensional Data Mining, Indexing OLAP Data.

UNIT-II: DATA MINING AND DATA PREPROCESSING (08 Periods)

Introduction to Data Mining, kinds of data, kinds of patterns, major issues in Data Mining, Data Pre-processing, Data Cleaning, Data Integration , Data Reduction, Data Transformation and Discretization.

UNIT-III: ASSOCIATIONS AND CLASSIFICATION (10 Periods)

Basic Concepts , Frequent itemset Mining Methods, pattern evaluation methods- From Association Mining to Correlation Analysis ,Classification, Decision Tree Introduction, Bayesian Classification Methods, Rule Based Classification, Prediction: Linear Regression.

UNIT-IV: CLUSTER ANALYSIS (09 Periods)

Cluster Analysis: Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods -k-Means and K-Medoids, Hierarchical methods-Agglomerative and divisive method, Density-Based Method-DBSCAN, Grid-Based Method-STING, Outlier Analysis.

UNIT-V: DATA MINING TRENDS (09 Periods)

Mining Complex Data Types: Mining sequence data, Mining other kinds of data: Spatial, Text, Multimedia and Web data, Data Mining Trends.

Total Periods: 45

TEXT BOOK:

1. Jiawei Han, Micheline Kamber and Jian Pei, *Data Mining: Concepts and Techniques,* Elsevier, 3rd edition, 2013.

REFERENCE BOOKS:

1. K.P. Soman, Shyam Diwakar and V. Ajay, *Insight into Data mining Theory and Practice*, Easter Economy Edition, Prentice Hall of India, 2006.
2. G. K. Gupta, *Introduction to Data Mining with Case Studies*, Easter Economy Edition, Prentice Hall of India, 2006.
3. Tan P.N, Steinbach M.and Kumar V., *Introduction to Data mining,* Addison-Wesley, 2006.

III B. Tech. – II Semester
(16BT60501) SOFTWARE TESTING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:
A course on "Software Engineering"

COURSE DESCRIPTION:
Software Testing Basics: Goals, Defects, Terminology, Methodology, STLC in SDLC, Verification & Validation; Software Testing Techniques: White box testing, Black Box Testing, Regression testing; Test Management: Test Planning, Design & Specifications; Test Automation: Tool selection & Guidelines.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on
- Software Testing Life Cycle.
- Testing Techniques.
- Test Management & Metrics.
- Regression Testing
- Test Automation

CO2. Analyze testing circumstances and their resultants in software development.
CO3. Design and develop the appropriate test cases in accordance to the software development model.
CO4. Use problem solving skills to control and monitor the testing process
CO5. Apply testing tools for testing the software quality.
CO6. Apply contextual knowledge to perform testing on software related to societal applications

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO SOFTWARE TESTING (9 periods)
Evolution of Software Testing, Software Testing—Myths and Facts, Goals of software testing, Psychology for software testing, Software testing definitions, Model for software testing, Effective software testing vs. exhaustive software testing.
Effective testing is hard, Software testing as a process.
Terminology and Methodology: Software testing terminology, Software Testing Life Cycle (STLC), Software testing methodology.

UNIT-II: WHITE BOX TESTING (9 periods)
Need of white-box testing, Logic coverage criteria, Basis path testing, Graph matrices, Loop testing, Data flow testing, Mutation testing.

UNIT-III: BLACK BOX TESTING (8 periods)
Boundary Value Analysis (BVA), Equivalence class testing, State table-based testing, Decision table-based testing, Cause-effect graphing based testing, Error guessing.

UNIT-IV: SOFTWARE TEST MANAGEMENT AND METRICS (10 periods)
Test Management: Test organization, Structure of testing group, Test planning, Detailed test design, Test specifications.
Software Metrics: Definition of software metrics, Classification of software metrics, Size metrics.

UNIT-V: REGRESSION AND AUTOMATION (9 periods)
Regression Testing: Progressive vs. regressive testing, Regression testing produces quality software, Regression testability, Objectives of regression testing, Regression testing types, Defining regression test problem, Regression testing techniques.
Automation and Testing Tools: Need for automation, Categorization of testing tools, Selection of testing tools, Costs incurred in testing tools, Guidelines for automated testing, Overview of some commercial testing tools.

Total Periods: 45

TEXT BOOK:
1. Naresh Chauhan, *Software Testing: Principles and Practices,* Oxford University Press, Second Edition, 2016.

REFERENCE BOOKS:
1. Boris Beizer, *Software Testing Techniques,* Dream Tech Press, Second Edition, 2004.

2. Dr. K. V. K. K. Prasad, *Software Testing Tools,* Dreamtech, First Edition, 2004.

III B. Tech. II Semester
(16BT70402) EMBEDDED SYSTEMS
(Common to CSE, and IT)
(Interdisciplinary Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on 'Digital Logic Design' and 'Computer Organization'
COURSE DESCRIPTION:
Embedded system design approaches; MSP430 Architecture; Instruction Set; On-Chip Resources; Programming; Communication with peripherals; Internet of Things related Issues.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Apply knowledge in
- MSP430 Architecture, Pin out, Instruction set
- High level programming
- Usage of On-chip resources like ADC, DAC, Timers
- Internet of Things related issues

CO2. Analyze various design issues regarding
- Usage of on chip resources
- Low power modes
- Communication support

CO3. Design embedded systems using MSP430 series microcontrollers to suit market requirements.
CO4. Solve engineering problems and arrive at solutions in designing embedded systems to support interconnectivity.
CO5. Apply techniques, program skills, On-Chip resources to design networked embedded systems with an understanding of limitations.
CO6. Reason out and practice professional engineering to deliver efficient and cost effective embedded based products to society.

DETAILED SYLLABUS:
UNIT-I: INTRODUCTION TO EMBEDDED SYSTEMS (09 periods)
Embedded Systems - Definition, Approaches, Applications, Anatomy of microcontroller, Memory, Software; MSP430 Introduction- Pin out, Functional Block diagram, Memory, CPU, Memory mapped input and output, Clock generator; Exceptions- Interrupts and Resets.
UNIT-II: ARCHITECTURE OF MSP430 (09 periods)
CPU, Addressing Modes, Constant Generator and Emulated Instructions, Instruction Set, Example programs, Reflections on CPU and Instruction set, Resets, Clock System.
UNIT-III: FUNDAMENTALS FOR PROGRAMMING (09 periods)
Development Environment, C Programming Language, Assembly Language, Programming and Debugging, Sample programs- Light LEDs in C, Read input from a switch; Automatic Control-Flashing light by delay, use of subroutines, using Timer_A; Header files and issues, Functions, Interrupts and Low power modes.
UNIT - IV: TIMERS, MIXED SIGNAL SYSTEMS AND COMMUNICATION (09 periods)
Timers-Watchdog Timer, RTC, Measurement in capture mode; Mixed-Signal Systems- Comparator_A, ADC10 Architecture & operation, ADC12, Sigma-Delta ADC Architecture & operation, DAC; Communication- Communication Peripherals in MSP430, SPI, Inter-integrated Circuit Bus, Asynchronous communication with the USCI_A.
UNIT - V: HARDWARE SOFTWARE CO-DESIGN AND INTERNET OF THINGS (09 periods)
CO- Design Issues: Co-design Models, Architectures, Languages, a Generic Co-design Methodology
IOT: Introduction, Origins, Drivers and Applications, IOT Communication Models - Device to Device, Device to Cloud, Device to Gateway, Back end Data Sharing Model; IPV6 and IOTs', IOT Issues, Security Issues-challenges; Privacy Considerations, Interoperability/Standards.

Total Periods: 45

TEXT BOOKS:
1. John H. Davies, *MSP430 Microcontroller Basics*, Newnes Publications, 2008.
2. Karen Rose, Scott Eldridge, Lyman Chapin, *The Internet of Things: An Overview: Understanding the Issues and Challenges of a More Connected World*, Internet Society, Oct. 2015.
3. Jorgen Staunstrup, Wayne Wolf, *Hardware /software co-design Principles and Practice*, Springer, 2009.

REFERENCE BOOK:

1. Chris Nagy, *Embedded Systems Design using the TI MSP30 Series*, Newness Publications, 2003.

III B. Tech. – II Semester

(16BT50341) **OPTIMIZATION TECHNIQUES**

(Common to CE, CSE, and CSSE)
(Interdisciplinary Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:
A course on "Multi variable calculus and differential equations"

COURSE DESCRIPTION:
Introduction to optimization; classical optimization techniques; classification of optimization problems; linear programming; transportation and assignment problem; non-linear programming; un-constrained non-linear programming; constrained non-linear programming; dynamic programming.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Demonstrate the knowledge on Optimization techniques for Linear, Non linear and Dynamic programming problems.
CO2. Analyze and quantify a system architecture or product design problem for selecting appropriate objective function, design variables, parameters and constraints.
CO3. Develop mathematical models for real time optimization problems.
CO4. Conduct investigations on complex problems and make recommendations based on solutions, analysis and limitations of models.
CO5. Use optimization techniques for solving complex problems of real time applications.
CO6. Optimize the resources in organizations for sustainable development.

DETAILED SYLLABUS:

UNIT-I: CLASSICAL OPTIMIZATION TECHNIQUES (09 periods)
Introduction, Engineering applications of optimization, Statement of an optimization problem, Design vector, Design constraints, Constraint surface, Objective function, Classification of optimization problems, Single variable optimization, Multi variable optimization without constraints, Multi variable optimization with equality constraints - Lagrange multipliers method; Multi variable optimization with inequality constraint - Kuhn Tucker conditions.

UNIT-II: LINEAR PROGRAMMING (09 periods)
Introduction, Formulation, Graphical solution, Simplex method, Big M-method, Two–phase method, Duality principle, Dual simplex method.

UNIT-III: TRANSPORTATION AND ASSIGNMENT PROBLEMS (09 periods)
Transportation problems: Formulation, Initial basic feasible solution - North–West corner rule, Least cost method, and Vogel's approximation method; Optimal solution using Modified distribution method - Unbalanced transportation problem, Degeneracy.
Assignment problems: Formulation, Solution of assignment problem and its variants, Traveling salesman problem.

UNIT–IV: NON-LINEAR PROGRAMMING (09 periods)
One dimensional minimization methods, classification - Fibonacci method, quadratic interpolation method; classification of unconstrained minimization methods - Powell's method, steepest descent method (Cauchy's method); classification of constrained optimization techniques - interior and exterior penalty function methods.

UNIT–V: DYNAMIC PROGRAMMING (09 periods)
Multistage decision processes, Concept of sub optimization and Principle of optimality, Computational procedure in dynamic programming - calculus method, Tabular method; Linear Programming problem by dynamic programming approach, Applications - reliability problem, shortest path problem, and capital budgeting problem.

Total Periods:45

TEXT BOOKS:

1. Singiresu S Rao, *Engineering Optimization: Theory and Practice*, New Age International, 3rd Edition, 2010.
2. A.Ravindran, K.M.Ragsdell, G.V.Reklaitis, *Engineering Optimization: Methods and applications*, Wiley India Pvt. Ltd., 2nd Edition2006.

REFERENCE BOOKS:

1. C Mohan and Kusum Deep, *Optimization Techniques*, New Age International Publishers, 1st Edition, 2010.
2. Hamdy A. Taha, *Introduction to Operations Research*, PHI, 9th edition, 2013.

III B. Tech. II Semester

(16BT60502) SOFT COMPUTING

(Common to CSE and IT)

(Interdisciplinary Elective–2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION:

Concepts on Soft Computing Techniques; Artificial Neural Networks; Supervised Learning; Unsupervised Learning; Fuzzy logic; Genetic Algorithms.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in
- Artificial Neural Networks
- Supervised Learning Networks
- Unsupervised Learning Networks
- Fuzzy sets, relations and measures
- Genetic Operators

CO2. Analyze neural network architectures, Fuzzy systems and Genetic algorithms.

CO3. Design soft computing solutions for real life computational problems.

CO4. Use soft computing techniques to solve complex computational problems.

CO5. Create algorithms using soft computing techniques.

CO6. Apply contextual knowledge to solve problems related to societal issues like Business Intelligence, Forecasting.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO SOFT COMPUTING AND ARTIFICIAL NEURAL NETWORKS (8 Periods)

Soft Computing: Neural networks, Application scope of neural networks, Hybrid systems, Soft computing, Applications of soft computing.

Artificial Neural Networks: Fundamentals, Evolution, Basic Models, Terminologies, Hebb network.

UNIT-II: SUPERVISED LEARNING NETWORKS (10 Periods)

Perceptron Networks: Theory, Perceptron learning rule, Architecture, Flowchart for training process, Perceptron training algorithm for single and multiple output classes, Perceptron network testing algorithm.

Back-Propagation Networks: Theory, Architecture, Flow chart for training process, Training algorithm, Learning factors of back-propagation networks, Testing algorithm for back-propagation networks.

UNIT-III: UNSUPERVISED LEARNING NETWORKS (9 Periods)

Unsupervised Learning Networks: Fixed weight competitive nets, Kohonen self-organizing feature maps, Learning vector quantization, Counter-propagation networks, Adaptive response theory network.

UNIT-IV: FUZZY LOGIC (10 Periods)

Classical Sets and Fuzzy Sets: Classical sets- Operations, Properties, Function mapping; Fuzzy sets- Operations, Properties.

Classical Relations and Fuzzy Relations: Cartesian product of relation, Classical relations, Fuzzy relations, Tolerance and equivalence relations, Non-interactive fuzzy sets.

UNIT-V: FUZZY SYSTEMS AND GENETIC ALGORITHMS (8 Periods)

Fuzzy Arithmetic and Fuzzy Measures: Fuzzy arithmetic, Extension principle, Fuzzy measures, Measures of fuzziness.

Genetic Algorithms: Genetic operators, Working principle, Fitness function, reproduction.

Total Periods: 45

TEXT BOOK:

1. S. N. Sivanandan and S. N. Deepa, *Principles of Soft Computing*, Wiley India, Second Edition, 2011.

REFERENCE BOOKS:

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun and Eiji Mizutani, Neuro-*Fuzzy and Soft Computing*, Prentice-Hall India, 2003.

2. S. Rajasekaran and G. A. Vijayalakshmi Pai, *Neural Networks, Fuzzy Logic and Genetic Algorithms:* Synthesis and Applications, PHI Learning Private Ltd, 2011.

III B. Tech. – II Semester

(16BT60503) WIRELESS NETWORKS

(Interdisciplinary Elective–2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A Course on "Computer Networks"

COURSE DESCRIPTION:

Generations of Wireless Networks; Voice and Data Processing; Wireless Network Topology; GSM; TDMA; CDMA; Wireless LANs; Wireless WANs; Wireless PAN;

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on
- Wireless Medium Access methods.
- Network Topology
- Wireless LAN, HIPERLAN
- GSM, CDMA, GPRS

CO2. Analyze the network topologies in Wireless Networks

CO3. Design solutions for network communications at physical and transport layers

CO4. Solve complex problems related to network communications and wireless networks

CO5. Apply GSM, CDMA, GPRS and Bluetooth to create Home Access Networks and wireless Personal Area Network.

CO6. Apply contextual knowledge to solve problems using societal applications like health care devices, Internet of Things.

DETAILED SYLLABUS:

UNIT-I: OVERVIEW OF WIRELESS NETWORKS AND WIRELESS MEDIUM ACCESS ALTERNATIVES (9 periods)

Overview of Wireless Networks: Different generations of wireless networks.

Wireless Medium Access Alternatives: Fixed assignment access for voice-oriented networks – Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), Code Division Multiple Access (CDMA); Random access for data-oriented networks – Access methods for wireless LANs; Integration of voice and data traffic.

UNIT-II: NETWORK PLANNING AND WIRELESS NETWORK OPERATIONS (9 periods)

Network Planning: Wireless network topologies – Infrastructure of network topology, Ad hoc network topology; Cellular topology, Cellular concept, Cellular hierarchy; Cell fundamentals.

Wireless Network Operations: Mobility management – Location management, Handoff management, Mobile IP; Security in wireless networks – Security requirements for wireless networks, Overview of network security, Identification schemes.

UNIT-III: INTRODUCTION TO WIRELESS LANS AND IEEE 802.11 WIRELESS LANS (9 periods)

Introduction to Wireless LANs: Historical overview of the LAN industry, Wireless home networking-Home Access Networks (HAN), Needs of HAN, HAN technologies.

IEEE 802.11 WLANs: IEEE 802.11 – Overview of IEEE 802.11, Reference architecture, Layered protocol architecture; The PHY Layer – FHSS, DSSS, DFIR, IEEE 802.11a, IEEE 802.11b; MAC sublayer – General MAC frame format; MAC management sublayer – Registration, Handoff, Security.

UNIT-IV: GSM TECHNOLOGY, CDMA TECHNOLOGY AND MOBILE DATA NETWORKS (10 periods)

GSM Technology: GSM – Reference architecture; Mechanisms to support a mobile environment – Registration, Call establishment, Handoff, Security.

CDMA Technology: CDMA – IS-95 CDMA forward channel, IS-95 CDMA reverse channel, Packet and frame formats in IS-95.

Mobile Data Networks: GPRS – Reference architecture in GPRS, Mobility support in GPRS, Protocol layers in GPRS; SMS – Overview of SMS Operation; Mobile application protocols – Wireless application protocol, i-Mode.

UNIT-V: WIRELESS ATM, HIPERLAN AND WIRELESS PAN (8 periods)

Wireless ATM and HIPERLAN: Wireless ATM – Reference model, Protocol entities, PHY and MAC layer alternatives, Mobility support; HIPERLAN – HIPERLAN-1, Requirements and architecture, PHY and MAC layers; HIPERLAN-2 – Architecture and reference model, PHY layer, DLC layer, Convergence layer, Security, Overall comparison with 802.11.

Wireless PAN: IEEE 802-15 WPAN, Home RF – Architecture; Bluetooth – Overall architecture, Protocol stack, Physical connection, Security. **Total Periods: 45**

TEXT BOOK:

1. Kaveh Pahlavan and Prashant Krishna Murthy, *Principles of Wireless Networks,* PHI Learning Pvt. Ltd., 2009.

REFERENCE BOOKS:

1. William Stallings, *Wireless Communications and Networks,* Pearson Education, Second Edition, 2012.
2. C. Sivaram Murthy and B.S. Manoj, *Ad-hoc Wireless Networks Architectures and Protocols,* Pearson Education, Second Edition, 2007.

III B. Tech. – II Semester

(16BT71210) HIGH PERFORMANCE COMPUTING

(Program Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Computer Organization"

COURSE DESCRIPTION: Cache-based Microprocessor Architecture; Memory Hierarchies; Multithreaded Processors; Common Sense Optimizations; The Role of Compilers; Data Access Optimization; Shared-memory Computers; Parallel Scalability; Introduction to OpenMP; Parallel Jacobi Algorithm; Introduction to MPI; MPI Performance Tools; MPI Parallelization of Jacobi Solver.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:
- Modern Processors and code Optimization.
- Parallel computing paradigms.

CO2. Analyze computation problems and identify the suitable parallel processing approaches to achieve optimum computation.

CO3. Design Parallel processing algorithms for achieving high performance computing.

CO4. Solve shared memory problems using Parallel Programming.

CO5. Use OpenMP and MPI tools in Parallel Programming.

DETAILED SYLLABUS:

UNIT-I: MODERN PROCESSORS (08 Periods)

Stored-program computer architecture, General-purpose cache-based microprocessor architecture, Memory hierarchies, Multicore processors, Multi-threaded processors, Vector processors.

UNIT-II: BASIC OPTIMIZATION TECHNIQUES FOR SERIAL CODE (10 Periods)

Scalar profiling, Common sense optimizations, Simple measures, Large impact, The role of compilers, C++ optimizations, Data access optimization-balance analysis and light speed estimates, Storage order.

Case study: The Jacobi algorithm and Dense matrix transpose.

UNIT-III: PARALLEL COMPUTERS (09 Periods)

Taxonomy of parallel computing paradigms, Shared-memory computers, Distributed-memory computers, Hierarchical systems, Networks. Basics of parallelization, Data Parallelism, Function parallelism, Parallel scalability.

UNIT-IV: SHARED-MEMORY PARALLEL PROGRAMMING WITH OpenMP (09 Periods)

Introduction to OpenMP – Parallel execution, Data scoping, OpenMP work sharing for loops, Synchronization, Reductions, Loop scheduling and tasking.

Case study: OpenMP-parallel Jacobi algorithm, Efficient OpenMP programming-profiling OpenMP programs, Performance pitfalls.

Case study: Parallel sparse matrix-vector multiply.

UNIT V: DISTRIBUTED-MEMORY PARALLEL PROGRAMMING WITH MPI (09 Periods)

Message passing, Introduction to MPI, Examples - MPI parallelization of Jacobi solver; Efficient MPI Programming - MPI performance tools, communication parameters, Synchronization, Serialization, Contention, Reducing communication overheads, Understanding intranode point-to-point communication.

Total Periods: 45

TEXT BOOK:

1. Georg Hager and Gerhard Wellein, *Introduction to High Performance Computing for Scientists and Engineers,* Chapman & Hall/CRC Computational Science Series, First Edition, 2012.

REFERNCE BOOKS:

1. Charles Severance and Kevin Dowd, *High Performance Computing,* O'Reilly Media, Second Edition , 1998.
2. Kai Hwang and Faye Alaye Briggs, *Computer Architecture and Parallel Processing,* McGraw Hill, 1984.

III B. Tech. – II Semester

(16BT71202) MOBILE APPLICATION DEVELOPMENT

(Program Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on 'Java Programming' and 'Web Technologies'.

COURSE DESCRIPTION: Mobile platforms; Mobile User Interface and tools; Introduction to Android; Activities; Views; Menus; Database Storage; SMS; e-mail; Displaying Maps; Building a Location Tracker Web Services Using HTTP; Sockets Programming; Communication between a Service and an Activity; Introduction to iOS.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:
- Mobile platforms and Mobile User Interface
- Android Activities and Intents
- Messaging, Networking, Location based Services, Android Services
- Basics of iOS

CO2. Analyze the context of complex problems and identify user interface design requirements.

CO3. Design and develop solutions for real world problems with android mobile applications.

CO4. Demonstrate problem solving skills to create applications for mobile devices.

CO5. Apply Android studio and iOS tools to develop mobile applications

CO6. Create mobile applications as per societal needs.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION AND MOBILE USER INTERFACE DESIGN (08 Periods)

Mobile web presence, Mobile applications, Marketing, App as a mobile web app; User interface design - Effective use of screen real estate, Mobile application users, Mobile information design, Mobile platforms, Tools of mobile interface design.

Android versions, Features and architecture, Required tools, Android application launching.

UNIT-II: ACTIVITIES, INTENTS AND ANDROID USER INTERFACE (09 Periods)

Activities, Linking activities using intents, Displaying notifications, Components of a screen, Adapting to display orientation, Managing changes to screen orientation, Utilizing the action bar, Listening for UI notifications.

UNIT-III: ADVANCED USER INTERFACE AND DATA PERSISTENCE (10 Periods)

Basic views, Picker views, List view, Image view, Menus with views, Web view, Saving and loading user preferences, Persisting data to files, Creating and using databases.

UNIT-IV: MESSAGING, LOCATION-BASED SERVICES, AND NETWORKING (09 Periods)

SMS messaging, Sending e-mail, Displaying maps, Getting location data, Monitoring a location, Consuming web services using HTTP.

UNIT-V: ANDROID SERVICES AND IOS (09 Periods)

Services, Communication between a service and an activity, Binding activities to services, Threading.

iOS tools, iOS project, Debugging iOS apps, Objective-C basics, Hello world app, Building the derby app in iOS.

Total Periods: 45

TEXT BOOKS:

1. J.F.DiMarzio, *Beginning Android Programming with Android Studio,* Wiley India, Fourth Edition, 2017.
2. Jeff McWherter and Scott Gowell, *Professional Mobile Application Development,* Wiley India, 2012.

REFERENCE BOOKS:

1. Neils Smyth, *Android Stduio Development Essentials,* Creative Space Independent publishing platform, Seventh edition 2016.

2. Paul Deitel, Abbey Deitel and Harvey Deitel, *Android How to Program,* Deitel Associates publishers, 2013.

III B. Tech. – II Semester

(16BT71204) MOBILE COMPUTING

(Common to CSE, and CSSE)

(Program Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Computer Networks"

COURSE DESCRIPTION: Introduction to Mobile Computing, GSM; Medium Access Control, Wireless LAN; Mobile Network and Transport Layers; Data Dissemination; Mobile Ad-Hoc Networks (MANETs), Wireless Application Protocol (WAP).

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:
- GSM, GPRS, 3G, 4G, Wireless LAN, MANETs.
- Protocols in Data Link, Network, Transport and Application layer.

CO2. Analyze the issues related to database design and data retrieval in mobile applications.

CO3. Apply routing algorithms for finding shortest path in MANETs

CO4. Use protocols of Wireless Technologies for security implementation in mobile computing.

CO5. Follow standards in the usage of mobile communications.

DETAILED SYLLABUS:

UNIT-I: OVERVIEW OF MOBILE COMPUTING AND GSM (09 Periods)

Introduction: Introduction to mobile computing, Novel applications, Limitations, and Mobile computing architecture.

GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services, Introduction to 3G and 4G Communications Standards: WCDMA, LTE, WiMAX

UNIT-II: MEDIUM ACCESS CONTROL AND WIRELESS LAN (09 Periods)

Medium Access Control: Motivation for a specialized MAC - Hidden and exposed terminals, Near and far terminals, SDMA, FDMA, TDMA, CDMA.

Wireless LAN: IEEE 802.11 - System architecture, Protocol architecture, Physical layer, Medium access control layer, MAC management; Bluetooth - User scenarios, Architecture, Radio layer, Baseband layer, Link manager protocol, L2CAP, Security.

UNIT-III: MOBILE NETWORK AND TRANSPORT LAYERS (09 Periods)

Mobile IP: Goals, Assumptions, Entities and terminology, IP packet delivery, Tunneling and encapsulation, Optimizations; IPv6; Dynamic Host Configuration Protocol (DHCP).

Mobile Transport Layer: Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/ fast recovery, Transmission/ time-out freezing, Selective retransmission, Transaction oriented TCP; TCP over 2.5G/3G wireless networks.

UNIT-IV: DATABASE ISSUES AND DATA DISSEMINATION (09 Periods)

Database Issues: Hoarding techniques, Caching invalidation mechanisms, Client server computing with adaptation, Power-aware and context aware computing, Database transactional models, Query processing and recovery.

Data Dissemination: Communications asymmetry, Classification of data delivery mechanisms, Push-based mechanisms, Pull-based mechanisms, Hybrid mechanisms, Selective tuning (indexing) techniques.

UNIT-V: MOBILE AD HOC NETWORKS (MANETs) AND WAP (09 Periods)

Mobile Ad Hoc Networks: Properties of a MANET, Spectrum of MANET, Applications, routing and routing algorithms, Security in MANETs.

Wireless Application Protocol: Architecture, Wireless datagram protocol, Wireless transport layer security, Wireless transaction protocol, Wireless session protocol, Wireless application environment.

Total Periods: 45

TEXT BOOKS:

1. Rajkamal, *Mobile Computing***,** OXFORD University Press, Second Edition, 2012.
2. Jochen Schiller, *Mobile Communications,* Pearson Education, Second Edition, 2009.

REFERENCE BOOKS:

1. Gordon A. Gow and Richard K. Smith, *Mobile and Wireless Communication,* Mc Graw Hill, 2006.

2. Hansmann, Merk, Nicklous and Stober, *Principles of Mobile Computing,* Springer, Second Edition, 2003.

III B. Tech. – II Semester
(16BT60504) PRINCIPLES OF PROGRAMMING LANGUAGES

(Program Elective–1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION:

Concepts of Programming Languages, Paradigms; Different Data Types; Arithmetic and Boolean Expressions, Programming Statements; Fundamental of Subprograms; Data Abstraction; Exception Handlers; Logic and Functional Programming Languages;

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Gain knowledge on
- Data types,
- Expressions, statements,
- Subprograms and abstract data types,
- Exceptional handling in object oriented programming languages

CO2. Analyze the constructs of procedural, object-oriented, functional and logic programming languages.

CO3. Design functional forms, structures, control flow, list and predicate functions for the development of interpreted functional languages.

CO4. Use appropriate programming language to develop software applications.

CO5. Select appropriate technique in logic and functional based programming languages to develop effective programs.

CO6. Apply Contextual knowledge in programming languages for societal issues.

DETAILED SYLLABUS:

UNIT-I: PRELIMINARIES AND DATA TYPES (9 periods)

Preliminaries: Reasons for studying concepts of programming languages, Programming domains, Language evaluation criteria, Influences on language design, Language categories, Language design trade-offs, Implementation methods, Programming environments.

Data Types: Primitive, Character string, User-defined, Ordinal, Array, Associative arrays, Records, Tuple, List, Union, Pointer and reference types, Type checking, Strong typing, Type equivalence.

UNIT-II: EXPRESSIONS AND ASSIGNMENT STATEMENTS AND STATEMENT- LEVEL CONTROL STRUCUTERS (10 periods)

Expressions and Assignment Statements: Arithmetic expressions, Overloaded operators, Type conversions, Relational and boolean expressions, Short-Circuit evaluation, Assignment statements, Mixed-mode assignment.

Statement-Level Control Structures: Selection statements, Iterative statements, Unconditional branching, Guarded commands.

UNIT-III: SUBPROGRAMS AND ABSTRACT DATA TYPES (10 periods)

Subprograms and Blocks: Fundamentals of subprograms, Design issues for subprograms, Local referencing environments, Parameter-passing methods, Parameters that are subprograms, Calling subprograms indirectly, Overloaded subprograms, Co-routines.

Abstract Data Types: Concept of abstraction, Introductions to data abstraction, Design issues, Language examples, Parameterized abstract data types.

UNIT-IV: CONCURRENCY AND EXCEPTION HANDLING (8 periods)

Concurrency: Subprogram-level concurrency, Semaphores, Monitors, Message passing, Java threads, C# Threads.

Exception Handling: Exception handling, Exception handling in Ada, Exception handling in C++, Exception handling in Java.

UNIT-V: LOGIC PROGRAMMING LANGUAGES AND FUNCTIONAL PROGRAMMING LANGUAGES (8 periods)

Logic Programming Languages: Predicate calculus, Overview of logic programming**,** Origins of Prolog, Basic elements of Prolog.

Functional Programming Languages: Mathematical functions, Fundamentals of functional programming languages, LISP, An introduction to scheme, Common LISP, ML. **Total Periods: 45**

TEXT BOOK:

1. Robert. W. Sebesta, *Concepts of Programming Languages*, Pearson Education, Tenth Edition, 2015.

REFERENCE BOOKS:

1. D. A. Watt, *Programming Language Design Concepts,* Wiley Dreamtech, 2007.
2. A. B. Tucker, R. E. Noonan, *Programming Languages,* Tata Mc-Graw Hill, Second Edition.

III B. Tech. II-Semester

(16BT6HS01) BANKING AND INSURANCE

(Common to CE, ME, CSE, IT, and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE: —

COURSE DESCRIPTION:

Origin of Banking; Functions of Banking; Role & Functions of RBI; Bank-Customer Relationship; Deposit and Loan Services of Banks; Banking Procedures; Electronic Payment Mechanisms; Business Models; Concepts of Risk and Uncertainty; Fundamentals of Insurance; Principles of Insurance; Essentials of Insurance Contracts; Insurance players in India.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1: Demonstrate Knowledge in
- Tools and concepts of Banking and Insurance.
- Basic Principles and concepts of Insurance and Banking.
- e-fund transfers, e-payments and e-business models

CO2: Develop skills in providing solutions for
- Online banking and e–payments...
- Risk Management through insurance benefits the society at large.
- Money management by leveraging on technology, banking and insurance services.

CO3: Exhibit conceptual soundness about banking and insurance, this would contribute to More employment opportunities.

CO4: Provide life skills for effective utilization of Banking and Insurance facilities.

DETAILED SYLLABUS:

UNIT–I: INTRODUCTION TO BANKING: (9 Periods)

origin and growth of banking, meaning and functions of banking, importance of banking, Reserve Bank of India; functions, monetary policy, open market operations.

UNIT–II: BANK-CUSTOMER RELATIONSHIP: (9 Periods)

Debtor-creditor relationship, anti money laundering, deposit products or services, payment and collection of cheques. Accounts – Types of accounts, procedure for opening and closing an account. Loans and Advances- principles of lending, types of loans,

UNIT–III: BUSINESS MODELS AND ELECTRONIC PAYMENT SYSTEM: (9 Periods)

Features, types of e-payment system, e-cash ,NEFT,RTGS, Credit cards, Electronic purses and Debit cards. Business models- B2B, B2C, C2C, and B2G.

UNIT–IV: INTRODUCTION TO RISK AND INSURANCE: (9 Periods)

Concept of risk, risk *Vs* uncertainty. Insurance definition, Insurance as risk mitigation mechanism, elements of insurance.

UNIT–V: INSURANCE OVERVIEW: **(9 Periods)**

Principles of insurance, insurance types, LIC & GIC insurance contract- nature, elements, functions, IRDA, Insurance Players in India. **Total Periods: 45**

TEXT BOOKS:

1. A.V. Ranganadha Chary, R.R. Paul- *Banking and Financial system*, Kalyani Publisher, New Delhi, 2nd Edition.
2. P.K.Gupta- *Insurance and Risk Management*, Himalaya Publishing House, New Delhi,

REFERENCE BOOKS:

1. Diwan, Praq and Sunil Sharma: '*Electronic Commerce- A Manager's Guide to E-Business*', Vanity Books International, Delhi,2002.
2. Kalakota Ravi and Whinston Andrew B: '*Frontiers of Electronic Commerce*', Pearson Education India, 1996 New Delhi.

3. Schneider, Grey P: '*Electronic Commerce, Course Technology*', Cengage Learning, 2008, 8th Edition, New Delhi.

III B. Tech. – II Semester

(16BT6HS02) BUSINESS COMMUNICATION AND CAREER SKILLS

(Common to CE, ME, CSE, IT, and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A Course on Technical English or English at Diploma level

COURSE DESCRIPTION: Nature and scope of Communication; Corporate Communication; Writing business Documents; Careers and Resumes; Interviews

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1: Demonstrate knowledge in
- Corporate Communication
- Main Stages of Writing Messages
- Career Building

CO2: Analyze the possibilities and limitations of language in
- Communication Networks
- Crisis Management/Communication

CO3: Design and develop the functional skills for professional practice in
- Business Presentations & Speeches

CO4: Apply written and oral communication techniques in preparing and presenting various documents in technical writing.

CO5: Function effectively as an individual and as a member in diverse teams.

CO6: Communicate effectively with the engineering community and society in formal and informal situations.

DETAILED SYLLABUS:

UNIT-I - NATURE AND SCOPE OF COMMUNICATION: (9 periods)

Introduction: Functions of Communication – Roles of a Manager – Communication Basics – Communication Networks – Informal Communication – Interpersonal Communication –Communication Barriers

UNIT-II - CORPORATE COMMUNICATION: (9 periods)

Introduction: What is Corporate Communication? – Corporate Citizenship and Social Responsibility – Corporate Communication Strategy – Crisis Management/Communication – Cross-Cultural Communication.

UNIT-III - WRITING BUSINESS DOCUMENTS: (9 periods)

Introduction: Importance of Written Business Communication, Types of Business Messages – Five Main Stages of Writing Business Messages – Business Letter Writing – Effective Business Correspondence – Common Components of Business Letters – Strategies for Writing the Body of a Letter

UNIT-IV – CAREERS AND RESUMES*:* (9 periods)

Introduction – Career Building – Business Presentations and Speeches – Resume Formats – Traditional, Electronic and Video Resumes – Sending Resumes – Follow-up Letters – Online Recruitment Process

UNIT-V – INTERVIEWS: (9 periods)

Introduction – Fundamental Principles of Interviewing – General Preparation for an Interview – Success in an Interview – Types of Interviewing Questions – Important Non-verbal Aspects – Types of Interviews – Styles of Interviewing **Total Periods: 45**

TEXT BOOK:

1. Meenakshi Raman and Prakash Singh *Business Communication*, , Oxford University Press, New Delhi, Second Edition, 2012.

REFERENCE BOOKS:

1. Neera Jain and Sharma Mukherji, *Effective Business Communication*, Tata Mc Graw-Hill Education, Pvt. Ltd., New Delhi, 2012.
2. Courtland L.Bovee et al., *Business Communication Today*, Pearson, New Delhi, 2011.
3. Krizan, *Effective Business Communication*, Cengage Learning, New Delhi, 2010.

4. R.K. Madhukar, *Business Communication*, Vikas Publishing House Pvt. Ltd., New Delhi, 2005.

III B.Tech. II-Semester

(16BT6HS03) COST ACCOUNTING AND FINANCIAL MANAGEMENT

(Common to CE, ME, CSE, IT, and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITE: —

COURSE DESCRIPTION: Scope, Objectives and Elements of cost Accounting; Cost Sheet and Tender quotations; Variance Analysis: Material variances, Labor variances; Meaning and Scope, Liquidity, Profitability Ratios: concept of Risk and Return on Investment.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1: Acquire Knowledge in

- Elements of Costing.
- Basic concepts of Financial Management.
- Risk and Return
- Significance of Cost Accountancy
- Behavioral Finance

CO2: Develop skills in

- Material, Labor, Overheads control.
- Excellence and ability to minimize the cost of the organization

C03: Develop effective Communication in Cost control and Financial Management.

CO4: Provide solutions for effective investment decisions.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO COST AND COST ACCOUNTING*:* **(9 Periods)**

Cost and Cost Accounting, Scope, Objectives, Advantages and disadvantages – Cost Accounting *Vs* Management Accounting – Elements of Costing – Installation of costing system – Material Control, Labour Control, Overhead Control

UNIT-II: COST SHEET AND PREPARATION OF COST SHEET: **(9 Periods)**

Analysis of Cost – Preparation of cost sheet, estimate, tender and quotation (Simple problems) – Importance of Costing while pricing the products.

UNIT-III: STANDARD COSTING AND VARIANCE ANALYSIS: **(9 Periods)**

Introduction to Standard Costing & Variances – Variance Analysis: Material variances, Labour variances (Simple Problems).

UNIT-IV: INTRODUCTION TO FINANCIAL MANAGEMENT AND RATIO ANALYSIS **(9 Periods)**

Financial Management-Meaning and Scope, Liquidity, Profitability, Financial Statement Analysis through ratios (Simple Problems)

UNIT-V: INTRODUCTION TO INVESTMENT AND BEHAVIORAL FINANCE **(9 Periods)**

Investment-Meaning and Definition- concept of risk and returns-Investment Alternatives- Introduction to Behavioral Finance – Anomalies –Key Concepts –Anchoring – Mental Anchoring-Confirmation and Hindsight Bias-Gambler's Fallacy-Herd Behavior-Over Confidence-Overreaction and Availability Bias-Prospect Theory. **Total Periods: 45**

TEXT BOOKS:

1. S.P. Jain and K.L. Narang: *Cost Accounting*, Kalyani Publishers, Ludhiana, 6th Edition, 2002
2. James C Van Horne, *Financial Management and Policy*, Prentice-Hall of India/Pearson, 12th Edition, 2001 ISBN- 10: 0130326577

REFERENCE BOOKS:

1. The Institute of Company Secretaries of India, *Cost and Management Study Material*, New Delhi.

2. I.M. Pandey, *Financial Management*, Vikas Publishing House Pvt. Ltd., 10th Edition, 2010

III B. Tech. – II Semester

(16BT6HS04) ENTREPRENEURSHIP FOR MICRO, SMALL AND MEDIUM ENTERPRISES

(Common to CE, ME, CSE, IT, and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITE: —

COURSE DESCRIPTION:

Introduction to Entrepreneur Development; Idea generation and formation of Business Plan; Micro and Small Enterprises; Institutional Finance and Support to Entrepreneur; Woman Entrepreneurship.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1: Acquire Knowledge in
- Schemes and institutions encouraging entrepreneurship.
- Basic Principles and concepts of Accountancy.
- Significance of entrepreneurship.

CO2: Develop skills in providing solutions for
- Personal excellence through financial and professional freedom.
- Women entrepreneurship serving as contrivance in societal development

CO3: Develop Critical thinking and evaluation ability.

CO4: Widens knowledge and build up attitude towards trouble shooting.

CO5: Demonstrate business acumen

DETAILED SYLLABUS:

UNIT–I: INTRODUCTION TO ENTREPRENEURSHIP DEVELOPMENT (9 Periods)

Concept of Entrepreneurship – Growth of Entrepreneurship in India **-** Factors affecting entrepreneurship growth - Characteristics of an Entrepreneur – Functions of Entrepreneur – Need for an Entrepreneur – Entrepreneurial Decision Process – Types of Entrepreneurs – Distinction between an Entrepreneur and a manager.

UNIT–II: IDEA GENERATION AND FORMULATION OF BUSINESS PLANS (9 Periods)

Sources of Ideas – Methods of idea generation – Steps in Setting up of a Small Business Enterprise – Formulation of Business Plan – Contents of Business Plan – Significance – Common Errors in Business Plan Formulation, The role of incubation centers for promoting Entrepreneurship, Start-up – New Guidelines.

UNIT–III: MICRO AND SMALL ENTERPRISES (9 Periods)

Meaning and Definition – Micro and Macro units – Essentials – Features – Characteristics – Scope of Micro and Small Enterprises – Objectives of Micro Enterprises – relationship between Micro and Macro Enterprises - Problems of Micro and Small Enterprises

UNIT–IV: INSTITUTIONAL FINANCE (9 Periods)

Institutional Finance **–** Need-Scope-Services - Various Institutions offering Institutional support: – Small Industries Development of Bank of India (SIDBI), State Industrial Development Corporations (SIDCs)– Small Industries Development Organisation (SIDO) – Small Industries Service Institutes (SISIs) – District Industries Centres (DICs) – National Institute of Entrepreneurship and Small Business Development (NIESBUD) – Technical Consultancy Organizations (TCOS). Micro Units Development and Refinance Agency Bank (MUDRA).

UNIT–V: WOMEN AND RURAL ENTREPRENEURSHIP (9 Periods)

Concept of Women entrepreneur - Functions of Women entrepreneurs - Growth of women entrepreneurship in India - Challenges of Women entrepreneurs- Programmes supporting women entrepreneurship – Rural Entrepreneurship – Meaning, Need for Rural entrepreneurship, Problems of rural entrepreneurship, Role of NGOs, Role of Bharatiya Mahila Bank for encouraging Women Entrepreneurs.

Total Periods: 45

TEXT BOOKS:

1. Dr.S.S.Khanka*, Entrepreneurial Development*, S. Chand and Company Ltd, Revised Edition, 2012.
2. Madhurima Lall & Shikha Sahai, *Entrepreneurship*, Excel Books India, 2nd Edition 2008.

REFERENCE BOOKS:

1. Nandan, H., *Fundamentals of Entrepreneurship*, PHI Learning Pvt. Ltd., 2013, New Delhi, 3rd edition 2013.
2. Vasanth Desai, "*The Dynamics of Entrepreneurial Development and Management*", Himalaya Publishing House, 4th edition, 2009

3. Bholanath Dutta, *Entrepreneurship Management* – Text and Cases, Excel Books, 1st edition 2009.

III B. Tech. – II Semester
(16BT6HS05) FRENCH LANGUAGE
(La Langue Francais)

(Common to CE, ME, CSE, IT, and CSSE)

Open Elective

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Oral communications; Basic grammar; advanced grammar; basic writing; Business French (La Francais Commercial)

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1: Demonstrate knowledge in
- Process of communication
- Modes of listening
- Paralinguistic features
- Skimming and Scanning
- Elements of style in writing

CO2: Analyze the possibilities and limitations of language, understanding
- Barriers to Communication
- Barriers to Effective Listening
- Barriers to Speaking
- Formal and metaphorical language

CO3: Design and develop language skills for professional practice.

CO4: Apply basic writing skills in writing Emails and understanding wide range of technical terminologies.

CO5: Understand French culture and civilization.

CO6*:* Communicate effectively with the native French in day to day situation.

DETAILED SYLLABUS:

UNIT-I: ORAL COMMUNICATION: (9 periods)

Introduction - Language as a Tool of Communication, French alphabets, Phonetics and pronunciation, making contacts, giving information, Arranging things, Expression of feelings.

UNIT-II: BASIC GRAMMAR: (9 periods)

Introduction –Articles, -Er ending Verbs, Nouns, Numbers, Gender, Pronouns, Sentence structure – Case study.

UNIT-III: ADVANCED GRAMMAR: (9 periods)

Introduction -Adjectives, Prepositions, Introduction to tenses – Present tense, past tense and future tense, Active and Passive voice.

UNIT-IV: BASIC WRITING: **(9 periods)**

Introduction -Introduction to written communication, Pre-writing, Creating context for writing and Data collection, fill in forms, Write greeting cards, Invitations and Short personal announcements, Short text to describe photos and pictures.

UNIT-V: BUSINESS FRENCH (La Francais Commercial) (9 periods)

Introduction - E-mail writing, Letter writing, Learning technical vocabulary and its application.

Case study of influential French companies, Learning computer/desktop/new age- media vocabulary, Introduction to how to present a topic, Fixing an Appointment

Total Periods: 45

TEXT BOOK:

1. Annie Berther, *Alter Ego,* Hachette Publications, 2012

REFERENCE BOOKS:

1 RegineMerieux, Yves Loiseau, *Connexions,* Goyall Publishers, 2011
2 DelphineRipaud, *Saison,* French and Euroean Inc., 2015

III B. Tech. – II Semester

(16BT6HS06) GERMAN LANGUAGE (Deutsch alsFremdsprache)

(Common to CE, ME, CSE, IT, and CSSE)

Open-Elective

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION:

Oral communication; Basic grammar; Advanced grammar; Basic writing; Berufsdeutcsch (Business German)

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1: Demonstrate knowledge in
- Process of communication
- Modes of listening
- Paralinguistic features
- Skimming and Scanning
- Elements of style in writing

CO2: Analyze the possibilities and limitations of language, understanding
- Barriers to Communication
- Barriers to Effective Listening
- Barriers to Speaking
- Formal and metaphorical language

CO3: Design and develop language skills for professional practice.

CO4: Apply basic writing skills in writing Emails and understanding wide range of technical terminologies.

CO5: Understand German culture and civilization.

CO6: Communicate effectively with the native German in day to day situation.

DETAILED SYLLABUS:

UNIT-I: ORAL COMMUNICATION: (9 periods)

Introduction - Language as a Tool of Communication, German alphabets, Phonetics and pronunciation, making contacts, giving information, Arranging things, Expression of feelings.

UNIT-II: BASIC GRAMMAR: (9 periods)

Introduction –Articles, Verbs, Nouns, Numbers, Gender, Pronouns, Sentence structure – Case study

UNIT-III: ADVANCED GRAMMAR: (9 periods)

Introduction -Adjectives, Prepositions, Introduction to tenses – Present tense, past tense and future tense, Active and Passive voice, Introduction to Case- Akkusativ, Nominativ, Dativ&Genetiv Case.

UNIT-IV: BASIC WRITING: **(9 periods)**

Introduction -Introduction to written communication, Pre-writing, Creating context for writing and Data collection, fill in forms, Write greeting cards, Invitations and Short personal announcements, Short text to describe photos and pictures.

UNIT-V: BERUFSDEUTCSCH (BUSINESS GERMAN): **(9 periods)**

Introduction - E-mail writing, Letter writing, Learning technical vocabulary and its application.

Case studies of influential German companies, Learning computer/desktop/new age- media vocabulary, Introduction to how to present a topic, Fixing an Appointment.

Total Periods: 45

TEXT BOOK:

1. Heuber, *Tangram Aktuelleins*, Heuber Verlag Publications, 2011.

REFERENCE BOOKS:

1. Anta Kursisa, Gerhard Newner,Sara vicenta, *Fir fuer Deutsch 1 und Deutsch 2,* HeuberVerlag Publications, 2005
2. Herman Funk, *Studio D A1,* Cornelsen GOYAL SAAB Publication, 2011.

III B. Tech. – II Semester
(16BT6HS07) INDIAN CONSTITUTION

(Common to CE, ME, CSE, IT, and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION:

Elements, functions and functionaries according to Indian Constitution, understanding for better professional practice and good citizenry

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1: Gain knowledge in
- parliamentary proceedings, laws, legislature, administration and its philosophy
- federal system and judiciary of India
- socials problems and public services like central civil services and state civil services
- Indian and international political aspects and dynamics

CO2: Develop etiquette and professional behavior in line with the constitution of India for becoming a responsible citizen

DETAILED SYLLABUS :

UNIT-I: PREAMBLE AND ITS PHILOSOPHY (8 periods)

Introduction and Evolution of Indian Constitution, preamble and its Philosophy.

UNIT-II: UNION GOVERNMENT (8 periods)

Powers, Functions and Position of President, Vice-President and Council of Ministers, Composition of parliament, Constitution Amendment Procedure, Financial Legislation in Parliament.

UNIT-III: FEDERAL SYSTEM (14 periods)

Centre-State relations, Directive Principles of State Policy, Fundamental Rights and Duties, Centre-State Relations, Features of Federal System, Administrative Relationship between Union and States, Powers, Functions and Position of Governors, Function of Chief Ministers, Council of Ministers, Composition and powers of the State Legislature.

UNIT-IV: JUDICIARY AND PUBLIC SERVICES (10 periods)

The Union Judiciary - Supreme Court and High Court, All India Services, Central Civil Services, State Services, Local Services and Training of Civil Services.

UNIT-V: INTERNATIONAL POLITICS (5 periods)

Foreign Policy of India, International Institutions like UNO, WTO, SAARC and Environmentalism.

Total periods: 45

TEXT BOOK:

1. Briji Kishore Sharma, *Introduction to the Constitution of India,* Prentice Hall of India, 2005.

REFERENCE BOOKS:

1. Mahendra Pal Singh,V. N. Shukla’s *Constitution of India,* Eastern Book Company, 2011.
2. Pandey J. N., *Constitutional Law of India,* Central Law Agency, 1998.

III B. Tech. – II Semester

(16BT6HS08) **INDIAN ECONOMY**

(Common to CE, ME, CSE, IT, and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION:
Introduction; Time Value of Money; Elementary Economic Analysis; Value Analysis, Value Engineering; Economic Planning.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1: Acquire the knowledge in
- Micro and Macro Economics.
- Traditional and Modern methods of Capital Budgeting.
- Five year plans and NITI Aayog.

CO2: Analyze
- Capital Budgeting.
- Value Analysis and Value Engineering.
- Economic analysis
- Law of supply and demand

CO3: Understand the nuances of project management and finance

DETAILED SYLLABUS:

UNIT–I: INTRODUCTION (9 Periods)
Economics- Flow in an Economy, Law of Supply and Demand; Micro and Macro Economics; Relationship between Science, Engineering, Technology, and Economic Development; Concept of Engineering Economics-Types of Efficiency, Definition and Scope of Engineering Economics.

UNIT–II: TIME VALUE OF MONEY (12 Periods)
Concepts and Application; Capital Budgeting-Traditional and Modern Methods; Simple and Compound Interest, Cash Flow Diagram, Principle of Economic Equivalence; Evaluation of Engineering Projects – Present Worth Method, Future Worth Method, Annual Worth Method, Internal Rate of Return Method, Cost-benefit Analysis in Public Projects; Depreciation Policy-Depreciation of Capital Assets, Causes of Depreciation, Straight Line Method and Declining Balance Method.

UNIT–III: ELEMENTARY ECONOMIC ANALYSIS (9 Periods)
Economic Analysis – Meaning, Significance, Simple Economic Analysis; Material Selection for a Product, Substitution of Raw Material; Design Selection for a Product; Material Selection-Process Planning, Process Modification.

UNIT-IV: VALUE ANALYSIS, VALUE ENGINEERING (6 Periods)
Introduction-Value Analysis, Value Engineering, Functions, Aims; Value Analysis vs. Value Engineering; Value Engineering Procedure- Advantages, Application Areas.

UNIT-V: ECONOMIC PLANNING (9 Periods)
Introduction- Need For Planning in India, Five year plans(1951-2012), NITI Aayog (from 2014 onwards); Inclusive Growth-Meaning, Significance, Need for inclusive growth in India, Strategy for more inclusive growth, Challenges and Prospects; Employment and Inclusive Growth in India, Role of engineers in sustaining inclusive growth.

Total Periods: 45

TEXT BOOKS:
1. PanneerselvamR., *Engineering Economics,* PHI Learning Private Limited, Delhi , 2 ed,2013.
2. Jain T.R., V. K.Ohri, O. P. Khanna, *Economics for Engineers,* VK Publication, 1 ed, 2015.

REFERENCE BOOKS:
1. Dutt Rudar & Sundhram K. P. M, *Indian Economy,* S. Chand, New Delhi, 62 revised edition 2010.

2. Misra, S.K. & V. K. Puri, *Indian Economy: It's Development Experience,* Himalaya Publishing House,Mumbai,32 ed ,2010.

III - B. Tech. II –Semester

(16BT6HS09) **INDIAN HERITAGE AND CULTURE**

(Common to CE, ME, CSE, IT, and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Basic traits of Indian Culture; Humanistic Reforms under Jainism and Buddhism; Culture in the medieval period; Socio Religious reforms in Indian Culture; Reform movements for harmonious relations.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1: Acquaint knowledge in

- human aspirations and values in Vedic culture.
- cultural aspects of Buddhism and Jainism
- unification of our country under Mourya's and Gupta's administrations
- socio Religious aspects of Indian culture
- reform movements and harmonious relations.

CO2: Apply ethical principles and reforms as models for the upliftment of the societal status in the present cultural contexts

DETAILED SYLLABUS:

UNIT I : BASIC TRAITS OF INDIAN CULTURE (9 periods)

Meaning and definition and various interpretations of culture . Culture and its features. The Vedic and Upanishadic culture and society. Human aspirations and values in these societies. Chaturvidha purushardhas, Chaturashrma and Chaturvarna theory.

UNIT II : HUMANISTIC REFORMS UNDER JAINISM AND BUDDHISM (9 periods)

Salient features of Jainism - contributions of Jainism to Indian culture, Contributions of Aachaarya and Mahaapragya, Buddhism as a humanistic culture. The four noble truths of Buddhism, Contributions of Buddhism to Indian culture.

UNIT- III: CULTURE IN THE MEDIEVAL PERIOD (9 periods)

Unifications of India under Mouryas and Guptas and their cultural achievements. Cultural conditions under satavahanas. Contributions to pallavas and cholas to art and cultural achievements of vijayanagara rulers.

UNIT-IV: SOCIO RELIGIOUS REFORMS IN INDIAN CULTURE (9 periods)

Western impact on India, Introductin of western education, social and cultural awakening and social reform movements of Rajaramohan Roy - Dayanandha Saraswathi- Anne Besant. (theosophical society)

UNIT-V: REFORM MOVEMENTS FOR HARMONIOUS RELATIONS (9 periods)

Vivekananda, Eswarchandra vidyasagar and Veeresalingam- emancipation of women and struggle against caste. Rise of Indian nationalism. Mahatma Gandhi- Non violence and satyagraha and eradication of untouchability

Total Periods: 45

TEXT BOOK:

1. Valluru Prabhakaraiah, *Indian Heritage and Culture,* Neelkamal Publications Pvt. Ltd. Delhi, First Edition, 2015.

REFERENCE BOOKS:

1. L. P. Sharma, *History of Ancient India,* Konark Publishers, Pvt. Ltd. New Delhi, 2010.
2. L. P. Sharma, *History of Medieval India,* Konark Publishers, Pvt. Ltd. New Delhi, 2010.
3. L. P. Sharma, *History of Modern India*, Konark Publishers, Pvt. Ltd. New Delhi, 2010.
4. *The Cultural Heritage of India* Vol-I, II, III, IV, V, The Ramakrishna Mission Institute of Culture, Calcutta.

III B. Tech. – II Semester
(16BT6HS10) INDIAN HISTORY
(Common to CE, ME, CSE, IT, and CSSE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION:
Introduction; Ancient India; Classical and Medieval era; Modern India; India after independence.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1: Gain knowledge on evolution and history of India as a nation

CO2: Analyze social and political situations of past and current periods

CO3: Practice in career or at other social institutions morally and ethically

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION (8 periods)

Elements of Indian History; History Sources: Archaeology, Numismatics, Epigraphy and Archival research; Methods used in History; History & historiography; sociological concepts-structure, system, organization, social institutions, Culture and social stratification (caste, class, gender, power), State and Civil Society.

UNIT-II: ANCIENT INDIA (9 periods)

Mohenjo-Daro civilization; Harappa civilization; Mauryan Empire

UNIT -III: CLASSICAL AND MEDIEVAL ERA (12 periods)

Classic Era (200 BC - 1200 AD); Hindu - Islamic Era (1200 - 1800 AD).

UNIT-IV: MODERN INDIA (6 periods)

Age of Colonialism (17th - 19th centuries); First war of Indian Independence; Freedom Struggle (1857-1947).

UNIT-V: INDIA AFTER INDEPENDENCE (1947-) (10 periods)

The Evolution of the Constitution and Main Provisions; Consolidation of India as a Nation; Politics in the States; Indian economy; Modernization and globalization, Secularism and communalism, Nature of development, Processes of social exclusion and inclusion, Changing Nature of work and organization.

Total Periods: 45

TEXT BOOK:
1. K. Krishna Reddy, *Indian History,* Tata McGraw-Hill, 21^{st} reprint, 2017

REFERENCE BOOK:
1. Guha, Ramachandra, *India after Gandhi,* Pan Macmillan,2007, Thapar, Romila, Early India, Penguin, 2002

III B. Tech. – II Semester
(16BT6HS11) **PERSONALITY DEVELOPMENT**
(Common to CE, ME, CSE, IT, and CSSE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Soft Skills Lab"

COURSE DESCRIPTION:
Self-esteem and Self-Management; Developing Positive Attitudes; Self-Motivation and Self-Management; Getting Along with the Supervisor; Workplace Success.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1: Demonstrate knowledge in
- Self-Management
- Planning Career

CO2: Analyze the situations based on
- Attitudes
- Thinking strategies

CO3: Design and develop the functional skills for professional practice in

CO4: Function effectively as an individual and as a member in diverse teams.

CO5: Communicate effectively in public speaking in formal and informal situations.

DETAILED SYLLABUS:

UNIT–I: SELF-ESTEEM AND SELF-IMPROVEMENT **(9 Periods)**
Know Yourself – Accept Yourself; Self-Improvement: Plan to Improve - Actively Working to Improve Yourself.
Case study: 1

UNIT–II: DEVELOPING POSITIVE ATTITUDES **(9 Periods)**
How Attitudes Develop – Attitudes are Catching – Improve Your Attitudes.
Case study: 2

UNIT–III: SELF-MOTIVATION AND SELF-MANAGEMENT **(9 Periods)**
Show Initiative – Be Responsible Self-Management; Efficient Work Habits – Stress Management – Employers Want People Who can Think – Thinking Strategies.
Case study: 3

UNIT–IV: GETTING ALONG WITH THE SUPERVISOR **(9 Periods)**
Know your Supervisor – Communicating with Your Supervisor – Special Communications With Your Supervisor – What Should You Expect of Your Supervisor? – What Your Supervisor Expects of You - Moving Ahead Getting Along with Your Supervisor.
Case study: 4

UNIT-V: WORKPLACE SUCCESS **(9 Periods)**
First Day on the Job – Keeping Your Job – Planning Your Career – Moving ahead.
Case study: 5

Total Periods: 45

TEXT BOOK:
1. Harold R. Wallace and L. Ann Masters, *Personality Development,* Cengage Learning, Delhi, Sixth Indian Reprint 2011.

REFERENCE BOOKS:

1. Barun K. Mitra, *Personality Development and Soft Skills,* Oxford University Press, New Delhi, 2011.
2. Stephen R. Covey, *The 7 Habits of Highly Effective People,* Free Press, New York, 1989
3. K. Alex, *Soft Skills,* S. Chand & Company Ltd, New Delhi, Second Revised Edition 2011.

4. Stephen P. Robbins and Timothy, *A. Judge, Organizational Behaviour,* Prentice Hall, Delhi, 16th Edition 2014.

III B. Tech. II-Semester

(16BT6HS12) PHILOSOPHY OF EDUCATION

(Common to CE, ME, CSE, IT, and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION:

Introduction to Philosophy and Engineering Education; Philosophical methods and their implications in engineering; Philosophical education in India; Values and Engineering education; Outcome based education.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1: Acquire knowledge in

- Philosophy of engineering education.
- Philosophical Methods.
- Knowledge acquiring methods.
- Engineering education and responsibilities.

CO2: Understand the impact of Outcome Based Education for effective educational outcomes

CO3: Apply reasoning to assess societal issues with the contextual knowledge of engineering education and responsibilities.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO PHILOSOPHY AND ENGINNERING EDUCATION (9 Periods)

Concept , Significance, and Scope of Philosophy in Engineering – Aims of Engineering Education – relationship between philosophy and engineering education – speculative, normative and critical approaches of philosophy in engineering.

UNIT-II: PHILOSOPHICAL METHODS AND THEIR IMPLICATIONS ENGINEERING (9 Periods)

Introduction to Philosophical approaches: Idealism, Naturalism, Pragmatism, Realism and Existentialism; Significance and Scope in Engineering Education.

UNIT: III: PHILOSOPHICAL EDUCATION IN INDIA (9 Periods)

Different branches of philosophy- meaning, Epistemology: nature and scope; Knowledge acquiring methods; Kinds and instruments of knowledge; Re-shaping of educational thoughts by Indian thinkers: Rabindranath Tagore, Sri Aurobindo Gosh, Mahatma Gandhi, Jiddu Krishnamurthy and Swamy Vivekananda.

UNIT-IV: VALUES AND ENGINEERING EDUCATION (9 Periods)

Introduction; Engineering education and responsibilities: health, social, moral, ethics aesthetic; Value: crisis and strategies for inculcation;

Case study: Engineering Solutions given by Mokshagundam Visvesvaraya

UNIT-V: OUTCOME-BASED EDUCATION (9 Periods)

Institutional visioning; educational objectives ; programme outcomes , curriculum, stakeholders, infrastructure and learning resources ; governance and management, quality in education.

Total periods: 45

TEXT BOOKS :

1. Ganta Ramesh, *Philosophical Foundations of Education,* Neelkamal Publications, 1/e,2013
2. CarlMicham, *Thinking ThroughTechnology (The Paths between Engineering and Philosophy),* University of Chicago Press, 1/e,1994.
3. Louis L Bucciarelli, *Engineering Philosophy,* Delft University Press,1/e, 2003.
4. NBA/ABET Manuals.

REFERENCE BOOKS:

1. Louis L Bucciarelli, *Philosophy of Technology and Engineering Sciences*, North Holland, 1/e, 2009 (e-book).
2. Samuel Florman, *Existential Pleasures of Education,* Martins's Griffin S.T. publication, 1/e 1992.

III B. Tech. – II Semester

(16BT6HS13) **PUBLIC ADMINISTRATION**

(Common to CE, ME, CSE, IT, and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Introduction; Public Policy; Good Governance; E-Governance; Development Administration.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1: Acquire knowledge in
- Public Policy.
- Good Governance.
- E-governance.
- Development Administration.

CO2: Analyze the possibilities and limitations of existing policies through Good Governance perspective.

CO3: Design and develop solutions in e-governance models to find and provide opportunities in e-governance.

CO4: Adopt principles of e-governance in addressing the existing issues and challenges in e-governance sector.

CO5: Understand the significance of Administrative Development in finding professional engineering solutions by probing
- Bureaucracy.
- Role of civil society.

DETAILED SYLLABUS:

UNIT–I: INTRODUCTION **(9 Periods)**

Public and Private Administration- Differences and Similarities, Meaning, Scope; Importance of Public Administration in Modern Era; Public Administration and its implications in the field of Engineering.

Case Study: Unique Identification Authority of India (UIDAI):Aadhaar Project: Challenges Ahead

UNIT–II: PUBLIC POLICY **(9 Periods)**

Meaning and Scope; Policy Formulation in India; Policy making process; Policy Implementation, Engineering and Public Policy**,** Social, ethical, Monetary and fiscal policies; policy implications of engineering;The engineer’s role in Public Policy.

Case Study: NITI Aayog: Demonetization and Aftermath of Demonetization – Cashless transactions.

UNIT–III: GOOD GOVERNANCE **(9 Periods)**

Significance; Objectives; Concepts; Reforms; Organization and its basic problems Administrative and Governance reforms in India; Sustainable and Inclusive growth in India; Engineering and Sustainable Environment-Role of Engineers; Right to information Act

Case Study: Strategies in Good Governance: A Case Study of Karnataka, Kerala and Orissa.

UNIT–IV: E-GOVERNANCE **(9 Periods)**

Meaning, Significance, Issues in E-governance; E-governance Models, Problems and Opportunities; Application of Data Warehousing and Data Mining in Governance; Engineers role in re-engineering E-governance.

Case Study: e-Housing System for Bhavana Nirman Dhanasahayam Online disbursement of housing assistance in Kerala.

UNIT - V: DEVELOPMENT ADMINISTRATION **(9 Periods)**

Introduction; Development Administration-Administrative Development- Sustainable Development - Significance- Objectives; Bureaucracy - Personnel administration and human resources development; Role of civil society-Citizens and administration; Development and Engineering: Issues Challenges and Opportunities.

Case Study: Neeru-Chettu (Water-Tree) of Andhra Pradesh.

Case Study: TPDDL of Delhi and Odisha. **Total Periods: 45**

TEXT BOOKS:

1. M.P. Sharma, B.L. Sadana, HarpreetKaur, *Public Administration in Theory and Practice,* Kitab Mahal, Mumbai, 1/e,2014.
2. CSR Prabhu, *E. Governance – concepts and case studies*, PHI, New Delhi,2/e 2012.

REFERENCE BOOKS:

1. SurendraMunshi, Bijupaul Abraham, *Good Governance, Democratic societies and Globalization,* Sage publications, New Delhi,1/e ,2004.
2. R.K.Sapru, *Public Policy,* Sterling Publishers Pvt. Ltd., New Delhi, 1/e, 2001.

III B. Tech. – II Semester

(16BT60112) BUILDING MAINTENANCE AND REPAIR

(Common to CE, ME, CSE, IT, and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Durability of buildings, Failure and repair of buildings, Material Techniques for repair, Maintenance of buildings, Conservation and recycling.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Acquire basic knowledge on durability and serviceability, failures, repair and rehabilitation of buildings.
CO2. Analyze failures, repair and rehabilitation techniques.
CO3. Solve complex building maintenance problems through proper investigations and interpretation.
CO4. Use modern tools and techniques for various repairs and rehabilitation of structures.
CO5. Provide solutions for building maintenance and repair problems considering health and safety.
CO6. Consider environmental sustainability in building maintenance and repair.
CO7. Maintain ethical standards for quality in repairs and rehabilitation of structures.
CO8. Evaluate specifications and perform cost analysis of building components while repair and rehabilitation.

DETAILED SYLLABUS:

UNIT–I: DURABILITY AND SERVICEABILITY OF BUILDINGS (10 Periods)

Life expectancy of different types of buildings; Effect of environmental elements such as heat, dampness, frost and precipitation on buildings; Effect of chemical agents on building materials, Effect of pollution on buildings, Effect of fire on building; Damage by biological agents like plants, trees, algae, fungus, moss, insects, etc.; Preventive measures on various aspects, Inspection, Assessment procedure for evaluating for damaged structures, Causes of deterioration, Testing techniques.

UNIT–II*:* FAILURE AND REPAIR OF BUILDINGS (10 Periods)

Building failure – Types, Methodology for investigation; Diagnostic testing methods and equipment, Repair of cracks in concrete and masonry, Materials for Repair, Methods of repair, Repair and strengthening of concrete buildings, Foundation repair and strengthening, Underpinning, Leakage of roofs and repair methods.

UNIT–III: TECHNIQUES FOR REPAIR (08 Periods)

Rust eliminators and polymers coating for rebars during repair, Foamed concrete, Mortar and dry pack, Vacuum concrete, Gunite and shotcrete, Epoxy injection, Mortar repairs for cracks, Shoring and underpinning.

UNIT–IV: MAINTENANCE OF BUILDINGS (09 Periods)

Reliability principles and its applications in selection of systems for building, Routine maintenance of building, Maintenance cost, Specifications for maintenance works, Dampness - Damp proof courses, Construction details for prevention of dampness; Termite proofing, Fire protection, Corrosion protection.

UNIT–V: CONSERVATION AND RECYCLING (08 Periods)

Performance of construction materials and components in service, Rehabilitation of constructed facilities, Conservation movement, Materials and methods for conservation work, Recycling of old buildings and its advantages, Examples.

Total Periods: 45

TEXT BOOKS:

1. Dennison Campbell, Allen and Harold Roper, *Concrete Structures – Materials, Maintenance and Repair*, Longman Scientific and Technical, UK, 1991.
2. Allen, R. T. L., Edwards, S. C. and J. D. N. Shaw, *The Repair of Concrete Structures*, Blackie Academic & Professional, UK, 1993.

REFERENCE BOOKS:

1. Peter H. Emmons, *Concrete Repair and Maintenance*, John Wiley and Sons Publications, 2002.
2. Building Construction under Seismic Conditions in the Balkan Region, UNDP/UNIDO Project Rer/79/015, Volume 5, *Repair and Strengthening of Reinforced Concrete, Stone and Brick Masonry Buildings*, United Nations Industrial Development Organisation, Vienna.
3. Shetty, M. S., *Concrete Technology*, S. Chand and Company.
4. Smith, P. and Julian, W., *Building Services*, Applied Science Publications, London, 1976.
5. SP: 25, BIS; *Causes and Prevention of Cracks in Buildings*.
6. Champion, S., *Failure and Repair of Concrete Structures*, John Wiley and Sons Publications, 1961.

7. Perkins, P. H., Repair, *Protection and Water Proofing of Concrete Structures,* E& FN Spon, UK, 3rd Edition, 1997.

III B. Tech. – II Semester
(16BT60113) CONTRACT LAWS AND REGULATIONS
(Common to CE, ME, CSE, IT, and CSSE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION:

Construction contracts; Tenders; Arbitration; Legal requirements; Labour regulations.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate basic Knowledge on construction contracts, tenders, arbitration, legal requirements and labour regulations.
CO2. Analyze contracts and tenders.
CO3. Address the legal issues in contracts and tenders.
CO4. Follow laws and regulations in the preparation of contracts and tenders.
CO5. Prepare contract and tender documents as per the standards.
CO6. Consider project schedule, cost, quality and risk in the preparation of contracts and tenders.

DETAILED SYLLABUS:

UNIT–I: CONSTRUCTION CONTRACTS (09 Periods)

Indian contracts act, Elements of contracts, Types of contracts, Features, Suitability, Design of contract documents, International contract document and laws, Standard contract document, Law of torts.

UNIT–II: TENDERS (09 Periods)

Prequalification, Bidding, Accepting; Evaluation of tender from technical, contractual and financial points of view; Two cover system, Preparation of the documentation, Contract formation and interpretation, Potential contractual problems, Price variation clause, Comparison of actions and laws, Subject matter, Violations.

UNIT–III: ARBITRATION (09 Periods)

Arbitration, Comparison of actions and laws, Agreements, Appointment of arbitrators, Conditions of arbitration, Powers and duties of arbitrator, Rules of evidence, Enforcement of award, Arbitration disputes, Dispute review board.

UNIT–IV: LEGAL REQUIREMENTS (09 Periods)

Legal requirements for planning, Property law, Agency law, Tax laws – Income tax, Sales tax, Excise and custom duties, Local government approval, Statutory regulations, Insurance and bonding, Laws governing purchase and sale, Use of urban and rural land, Land revenue codes, EMD, Security deposits, Liquidated damages.

UNIT–V: LABOUR REGULATIONS (09 Periods)

Social security, Welfare legislation; Laws relating to wages, bonus and industrial disputes; Labour administration, Insurance and safety regulations, Workmen's compensation act, Maternity benefit act, Child labour act, Other labour laws.

Total Periods: 45

TEXT BOOKS:

1. Subba Rao, G. C. V., *Law of Contracts I & II*, S. Gogia & Co., 11th Edition, 2011.
2. Jimmie Hinze, *Construction Contracts,* McGraw Hill, 3nd Edition, 2011.

REFERENCES:

1. Kishore Gajaria, *GT Gajaria's Law Relating to Building and Engineering Contracts in India*, Lexis Nexis Butterworths India, 4th Edition, 2000.
2. Patil, B. S., *Civil Engineering Contracts and Estimates*, University Press (India) Private Ltd., 4th Edition, 2015.
3. Joseph T. Bockrath, *Contracts and the Legal Environment for Engineers and Architects*, McGraw Hill Education, 7th Edition, 2010.
4. Akhileshwar Pathak, *Contract Law*, Oxford University Press, 2011.

III B. Tech. - II Semester

(16BT60114) DISASTER MITIGATION AND MANAGEMENT

(Common to CE, ME, CSE, IT, and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Disasters; Earthquakes; Floods; Cyclones; Droughts; Landslides; Disaster management.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on disasters, their vulnerability and mitigation measures.
CO2. Analyze disasters and their vulnerability.
CO3. Design strategies for effective disaster mitigation.
CO4. Address pre and post disaster issues for better preparedness and mitigation measures, through proper analysis and interpretation.
CO5. Use appropriate methods in disaster mitigation and management.
CO6. Use historical data of disasters to inform the people over preparedness and mitigation measures.
CO7. Solve disaster related issues considering environment.
CO8. Consider economical issues in disaster management.

DETAILED SYLLABUS:

UNIT-I: DISASTERS (09 Periods)

Types of disasters - Natural disasters; Impact of disasters on environment, infrastructure and development; Concepts of hazards and vulnerability analysis, Hazard Assessment, Guidelines for hazard assessment and vulnerability analysis, Basic principles and elements of disaster mitigation.

UNIT-II: EARTHQUAKES (09 Periods)

Introduction to earthquake, Intensity scale (MSK–64), Seismic activity in India, Seismic zones of India, Earthquakes in A.P., Action plan for earthquake disaster preparedness, Elements at risk, Recovery and rehabilitation after earthquake, Earthquake resistant design and construction of buildings; Tsunami – Onset, Types and causes, Warning, Elements at risk, Typical effects, Specific preparedness and mitigation strategies.

UNIT-III: FLOODS, CYCLONES AND DROUGHTS (11 Periods)

Floods and Cyclones: Onset, Types, Warnings; Elements at risk, Typical effects, Indian floods and cyclones, Hazard zones, Potential for reducing hazards, Mitigation strategies and community based mitigation.

Droughts: Onset, Types and warning; Causes, Impact, Early warning and response mechanisms, Mitigation strategies, Droughts in India.

UNIT-IV: LANDSLIDES (08 Periods)

Onset, Types and warning; Causes, Elements at risk, Indian landslides, Hazards zones, Typical effects, Mitigation strategies and community based mitigation.

UNIT-V: DISASTER MANAGEMENT (08 Periods)

Disaster management organization and methodology, Disaster management cycle, Disaster management in India – Typical cases; Cost–benefit analysis with respect to various disaster management programs implemented by NGOs and Government of India.

Total Periods: 45

TEXT BOOKS:

1. V. K. Sharma, *Disaster Management, Medtech Publishing, 2nd Edition, 2013*.
2. Anand S. Arya, Anup Karanth, and Ankush Agarwal, *Hazards, Disasters and Your Community: A Primer for Parliamentarians*, GOI–UNDP Disaster Risk Management Programme, Government of India, National Disaster Management Division, Ministry of Home Affairs, New Delhi, Version 1.0, 2005.

REFERENCE BOOKS:

1. Donald Hyndman and David Hyndman, *Natural Hazards and Disasters*, Cengage Learning, 3rd Edition, 2011.
2. *Disaster Management in India,* A Status Report, Ministry of Home Affairs, Govt. of India, May 2011.
3. Rajendra Kumar Bhandari, *Disaster Education and Management: A Joyride for Students, Teachers, and Disaster Managers*, Springer India, 2014.

4. R. B. Singh, *Natural Hazards and Disaster Management*, Rawat Publications, 2009.

III B. Tech. - II Semester

(16BT60115) ENVIRONMENTAL POLLUTION AND CONTROL

(Common to CE, ME, CSE, IT, and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Fundamentals of air pollution; Dispersion of pollutants; Effects and control of air pollution; Water pollution; Soil pollution and control; Municipal solid waste management.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on air, water, soil pollution and their control and solid waste management.

CO2. Analyze causes and effects of air, water and soil pollution and their remedial measures.

CO3. Recommend suitable solutions to complex environmental pollution problems.

CO4. Use appropriate remedial technique to solve environmental pollution problems.

CO5. Understand the effects of environmental pollution on human health and vegetation.

CO6. Encourage sustainable development through implementation of pollution control measures.

CO7. Maintain IS Codes for environmental quality control.

DETAILED SYLLABUS:

UNIT–I: AIR AND NOISE POLLUTION (08 Periods)

Air Pollution: Scope, Significance, Classification, Sources – Line, Area, Stationary, Mobile; Effects of air pollutants on man, material and vegetation; Global effects of air pollution; Air pollution meteorology - Lapse rate, Inversion, Plume pattern; Dispersion of air pollutants - Dispersion models and applications; Ambient air quality standards.

Noise Pollution: Sound pressure, Power and intensity, Impacts of noise, permissible limits of noise pollution, measurement of noise.

UNIT–II: AIR AND NOISE POLLUTION CONTROL (10 Periods)

Self cleansing properties of the environment, Dilution method, Control at source, Process changes and equipment modifications, Control of particulates – Types of equipment, Design and operation - Settling chambers, Centrifugal separators, Bag house filters, Wet scrubbers, Electrostatic precipitators; Control of gaseous pollutants – Adsorption, Absorption, Condensation, Combustion; Control of air pollution from automobiles, Control of noise pollution.

UNIT–III: WATER POLLUTION AND CONTROL (10 Periods)

Water pollution – Sources, Causes, Effects; Surface and groundwater quality – Physical, Chemical, Biological; Drinking water quality standards, Water purification – Processes, Engineered systems – Aeration, Solids separation, Settling operations, Coagulation, Softening, Filtration, Disinfection; Wastewater – Sources, Causes, Effects, Treatment and disposal – Primary, Secondary, Tertiary; Case studies.

UNIT–IV: SOIL POLLUTION AND CONTROL (08 Periods)

Soil pollutants, Sources of soil pollution, Causes, Effects and control of soil pollution, Diseases caused by soil pollution, Methods to minimize soil pollution, Effective measures to control soil pollution, Case studies.

UNIT–V: MUNICIPAL SOLID WASTE MANAGEMENT (09 Periods)

Types of solid waste, Composition of solid waste, Collection and transportation of solid waste, Methods of disposal – Open dumping, Sanitary landfill, Composting, Incineration, Utilization - Recovery and recycling, Energy Recovery.

Total Periods: 45

TEXT BOOKS:

1. Peavy, H. S, Rowe, D. R., and Tchobanoglous, G., *Environmental Engineering*, McGraw Hill Inc., 1985.
2. C. S. Rao, *Environmental Pollution Control Engineering*, New Age International Pvt. Ltd., 2nd Edition, 2007.
3. Ibrahim A. Mirsa, *Soil Pollution: Origin, Monitoring & Remediation*, Springer, UK, 2nd Edition, 2008.

REFERENCE BOOKS:

1. M. N. Rao and H. V. N. Rao, *Air Pollution,* Tata McGraw–Hill Education Pvt. Ltd., 19th Edition, 2010.
2. Daniel Vallero, *Fundamentals of Air Pollution,* Academic Press (Elsevier), 5th Edition, 2014.

3. S. M. Khopkar, *Environmental Pollution Monitoring and Control,* New Age International Pvt. Ltd., 2nd Edition, 2007.
4. V. M. Domkundwar, *Environmental Engineering,* Dhanpat Rai & Co. Pvt. Ltd., New Delhi, 2014.

III B. Tech. - II Semester
(16BT60116) PLANNING FOR SUSTAINABLE DEVELOPMENT

(Common to CE, ME, CSE, IT, and CSSE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Sustainable development; Environmental impact; Sustainable Policies; Governance; Theories and strategies; Media and education for sustainability.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate the knowledge on sustainable development, environmental impact, sustainable policies, governance, systems and strategies, media and education for sustainability.
CO2. Analyze theories, environmental impact, policies, systems and strategies for sustainable development.
CO3. Develop suitable methods and systems for sustainable development.
CO4. Use appropriate techniques in solving issues related to sustainable development.
CO5. Provide solutions to problems associated with sustainable development considering society.
CO6. Consider environment while planning sustainable development.
CO7. Communicate effectively on sustainable development issues through media and education.
CO8. Consider economical issues while planning for sustainable development.

DETAILED SYLLABUS:

UNIT–I: SUSTAINABLE DEVELOPMENT (09 Periods)

Definition and concepts of sustainable development, Capitalization of sustainability - National and global context; Millennium development goals, Emergence and evolution of sustainability and sustainable development, Theories of sustainability, Case studies.

UNIT–II: ENVIRONMENTAL IMPACT (09 Periods)

Climate change – Science, Knowledge and sustainability; Unforeseen environmental impacts on development, Challenges of sustainable development, Centrality of resources in sustainable development, Case studies.

UNIT–III: SUSTAINABLE POLICIES AND GOVERNANCE (09 Periods)

Governance - Democracy and Eco–welfare; Global civil society and world civil politics, Civic environmentalism, Policy responses to sustainable development, Economics of sustainability, Social responsibility in sustainability, National action, ISO 14001: Environmental management system.

UNIT–IV: SUSTAINABLE SYSTEMS AND STRATAGIES (09 Periods)

Need for system innovation, Transition and co–evolution, Theories and methods for sustainable development, Strategies for eco–innovation, Ecological foot print analysis, Socio ecological indicators – Eco labels; Policy programmes for system innovation, Case studies.

UNIT–V: MEDIA AND EDUCATION FOR SUSTAINABILITY (09 Periods)

Role of emerging media, Remarkable design and communication art, Activism and the public interest, Education for sustainability, Participation in decision making, Critical thinking and reflection, Case studies.

Total Periods: 45

TEXT BOOKS:

1. John Blewitt, *Understanding Sustainable Development*, Earth Scan Publications Ltd., 2nd Edition, 2008.
2. Jennifer A. Elliot, *An Introduction to Sustainable Development*, Earth Scan Publications Ltd., 4th Edition, 2006.

REFERENCE BOOKS:

1. Peter Rogers, Kazi F Jalal and John A Boyd, *An Introduction to Sustainable Development*, Earth Scan Publications Ltd., 2006.
2. Simon Dresner, *The Principles of Sustainability*, Earth Scan Publications Ltd., 2nd Edition, 2008.

3. Peter Bartelmus, *Environment Growth and Development: The Concepts and Strategies of Sustainability*, Routledge, 3rd Edition, 2003.
4. Gabriel Moser, Enric Pol, Yvonne Bernard, Mirilia Bonnes, Jose Antonio Corraliza and Maria Vittoria Giuliani, *People Places and Sustainability*, Hogrefe & Huber Publishers, 2nd Edition, 2003.

III B. Tech. – II Semester

(16BT60117) PROFESSIONAL ETHICS

(Common to CE, ME, CSE, IT, and CSSE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION:

Engineering ethics; Professional ideals and virtues; Engineering as social experimentation; Responsibilities and rights; Global issues.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate the principles of ethics, importance of professional values and social responsibility.
CO2. Analyze the problems in the implementation of moral autonomy and use ethical theories in resolving moral dilemmas.
CO3. Develop suitable strategies to resolve problems arise in practicing professional ethics.
CO4. Provide solutions to complex problems associated with professional ethics by proper analysis and interpretation.
CO5. Use appropriate theories in resolving issues pertain to professional ethics.
CO6. Understand the impact of professional ethics on society and address the limitations of codes of ethics.
CO7. Practice engineering with professionalism, accountability and ethics.
CO8. Function as a member, consultant, manager, advisor and leader in multi-disciplinary teams.
CO9. Write reports without bias and give instructions to follow ethics.

DETAILED SYLLABUS:

UNIT-I: ENGINEERING ETHICS (09 periods)

Scope and aim of engineering ethics, Senses of engineering ethics, Variety of moral issues, Types of inquiry, Moral dilemmas, Moral autonomy-Kohlberg's theory, Gilligan's theory, Consensus and controversy.

UNIT-II: PROFESSIONAL IDEALS AND VIRTUES (08 periods)

Theories about virtues, Professions, Professionalism, Characteristics, Expectations, Professional responsibility, Integrity, Self-respect, Sense of responsibility, Self-interest, Customs and religion, Self-interest and ethical egoism, Customs and ethical relativism, Religion and divine command ethics, Use of ethical theories, Resolving moral dilemmas and moral leadership.

UNIT-III: ENGINEERING AS SOCIAL EXPERIMENTATION (10 periods)

Engineering as experimentation, Similarities to standard experiments, learning from the past and knowledge gained, Engineers as responsible experimenters, Conscientiousness, Moral autonomy and accountability, The challenger case, Codes of ethics and limitations, Industrial standards, Problems with the law of engineering.

UNIT-IV: RESPONSIBILITIES AND RIGHTS (09 periods)

Collegiality and loyalty, Respect for authority, Collective bargaining, Confidentiality, Conflict of interests, Occupational crime, Rights of engineers, Professional rights, Whistle-blowing, The BART case, Employee rights and discrimination.

UNIT-V: GLOBAL ISSUES (09 periods)

Multinational corporations, Professional ethics, Environmental ethics, Computer ethics, Engineers as consultants, Witnesses, Advisors and Leaders, Engineers as Managers, Managerial ethics applied to Engineering Profession, moral leadership. **Total Periods: 45**

TEXT BOOKS:

1. Mike W. Martin and Roland Schinzinger, *Ethics in Engineering*, Tata McGraw-Hill, 3rd Edition, 2007.
2. Govindarajan, M., Nata Govindarajan, M., Natarajan, S. and Senthilkumar, V. S., *Engineering Ethics*, Prentice Hall of India, 2004.

REFERENCE BOOKS:

1. S. Kannan and K. Srilakshmi, *Human Values and Professional Ethics*, Taxmann Allied Services Pvt Ltd., 2009.

2. Edmund G. Seebauer and Robert L. Barry, *Fundamental of Ethics for Scientists and Engineers*, Oxford University Press, 2001.
3. Charles F. Fledderman, *Engineering Ethics*, Pearson Education, 2nd Edition, 2004.
4. R. Subramanaian, *Professional Ethics*, Oxford Higher Education, 2013.

III B. Tech. - II Semester

(16BT60118) **RURAL TECHNOLOGY**

(Common to CE, ME, CSE, IT, and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Rural technology; Non conventional energy; Community development; IT in rural development.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate the knowledge on technologies for rural development.

CO2. Analyze various technologies available which are appropriate for rural development.

CO3. Carryout feasibility study on the public and private partnership for rural development.

CO4. Develop and use latest technologies for rural development.

CO5. Address health and safety issues while choosing technologies for rural development.

CO6. Educate the rural populace on the positive impacts of bio-fertilizers and usage of agro-machinery in agriculture.

DETAILED SYLLABUS

UNIT – I: RURAL TECHNOLOGY (09 Periods)

India - Technology and rural development, Pre and post independence period, Rural India Life, Indian farmer, Role of science and technology in rural development, Rural technology and poverty eradication, Rural business hubs, Technology in improving rural infrastructure, Various organizations related to innovation, Issues of technology transfer - CAPART, NABARD, CSIR, NIF.

UNIT – II: NON CONVENTIONAL ENERGY (09 Periods)

Definition of energy, Types of alternative sources of energy, Sources of non conventional energy – Solar energy: Solar cooker, Solar heater; Biogas, Recycling and management, Wastes conservation, Assessment and production of biomass products and their utilization.

UNIT – III: TECHNOLOGIES FOR RURAL DEVELOPMENT (09 Periods)

Food and agro based technologies, Tissue culture, Nursery, Building and construction technologies, Cultivation and processing of economic plants, Cottage and social industries.

UNIT – IV: COMMUNITY DEVELOPMENT (09 Periods)

Water conservation, Rain water Harvesting, Drinking water, Environment and Sanitation, Bio fertilizers, Medical and aromatic plants, Employment generating technologies – Apiculture, Pisciculture, Aquaculture.

UNIT – V: IT IN RURAL DEVELOPMENT (09 Periods)

Role of information technology (IT) in rural areas, Impact of IT in rural development, Need and necessity of technology, Corporate social responsibilities, Private sector participation (Activities in different spheres: Employment, Education, Health, Agriculture and service sectors) and Saansad Adarsh Gram Yojana (SAGY), Village adoption schemes.

Total Periods:45

TEXT BOOKS:

1. M. S. Virdi, *Sustainable Rural Technologies*, Daya Publishing House, 2009.
2. S. V. Prabhath and P. Ch. Sita Devi, *Technology and Rural India*, Serials Publications, 2012.

REFERENCE BOOKS:

1. R. Chakravarthy and P. R. S. Murthy, *Information Technology and Rural Development,* Pacific Book International, 2012.
2. Shivakanth Singh, *Rural Development Policies and Programmes,* Northern Book Centre, 2002.
3. L. M. Prasad, *Principles and Practice of Management*, S. Chand & Sons, 8th Edition, 2014.

4. Venkata Reddy, K., *Agriculture and Rural Development -Gandhian Perspective*, Himalaya Publishing House, 2001.

III B. Tech. - II Semester
(16BT60308) GLOBAL STRATEGY AND TECHNOLOGY

(Common to CE, ME, CSE, IT, and CSSE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION:

Introduction to strategic management; Strategic management process; Principles of good strategy; Globalization strategies; Research and Development strategies; Technology Management and Transfer; Elements of Transfer Process; Corporate Governance in the Indian scenario.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1: Demonstrate the knowledge on Strategic management, Research & development strategies, Technology management and transfer, Globalization and Corporate governance.

CO2: Indentify and analyze crucial problems in strategic management to improve performance of the organizations.

CO3: Develop the products and production process by using research and development strategies.

CO4: Conduct investigations on the impact of globalization in current scenario in the context of corporate governance.

CO5: Appraise the resources and capabilities of the firm in terms of their ability to confer sustainable development.

CO6: Apply ethics in strategic decision making.

DETAILED SYLLABUS

UNIT-I: STRATEGIC MANAGEMENT (09 Periods)

Introduction, Classes of decisions, Levels of strategy, Core competence, Strategic intent and stretch, Approaches to strategy making, Roles of different strategists, Strategic management- Process, Benefits, Limitations; Ethics in strategic decision making, Principles of good strategy, Strategic Management in India.

UNIT-II: RESEARCH AND DEVELOPMENT STRATEGIES (09 Periods)

Concept, Evolution of R&D Management, R&D as a business, R&D as competitive advantage, Elements of R & D strategies, Integration of R & D, Selection and implementation of R & D strategies, R & D trends.

UNIT-III: TECHNOLOGY MANAGEMENT AND TRANSFER (09 Periods)

Technology Management: Introduction, Technology - Definition, Components, Classification Features; Technology Management- Concept, Nature; Drivers of Management of Technology- Significance, Scope, Responding to technology challenges.

Technology Transfer: Introduction, Definition, Classification, Significance, Elements of process, Types of Technology Transfer, Package, Modes of Transfer, Routes, Channels and Effectiveness of Technology Transfer.

UNIT-IV: GLOBALISATION (09 Periods)

Definition, Stages, Essential conditions for globalization, Globalization strategies, Competitive advantage of Nations, Factors affecting Globalization, Globalization of Indian business.

UNIT–V: CORPORATE GOVERNANCE: THE INDIAN SCENARIO (09 Periods)

Emergence of corporate governance in India- Landmarks, Models, Codes and status in India, Role and Responsibilities of Regulators, The Board of Directors; Corporate Governance- Specific issues in India, Family owned Business, Corporate Governance and the Indian ethos.

Total Periods: 45

TEXT BOOKS:

1. Francis Cherunilam, *Strategic Management,* Himalaya Publishing House, 3rd Edition, 2002.
2. C.S.G.Krishnamacharyulu and Lalitha Ramakrishnan, *Management of Technology,* Himalaya Publishing House, Second Edition, 2012.

REFERENCE BOOKS:

1. White and Bruton, *The Management of Technology and Innovation: A Strategic Approach*, Cengage Learning, 1st Edition, 2007.
2. S.K.Mandak, *Ethics in Business and Corporate Governance,* TMH, 2nd Edition, 2012.

III B. Tech. - II Semester

(16BT60309) INTELLECTUAL PROPERTY RIGHTS AND MANAGEMENT

(Common to CE, ME, CSE, IT, and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Protection of ideas; innovation and artistic endeavors; Acts and procedure related to patents, trademarks, copy right, design registration, trade secrets and cyber laws; Infringement; Commercialization of intellectual property rights; Case studies in each.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1: Demonstrate knowledge on intellectual property rights, patents, trademarks, copyrights, trade secrets and commercialization of intellectual property.

CO2: Analyze the commercial significance of discoveries and developments and to assist in bringing these into public use.

CO3: Investigate and ensure smooth transition from concept to final product by following National & International Laws of Intellectual Property.

CO4: Utilize the various policies and procedures related to patents, trademarks and copyrights relating to IPR.

CO5: Safeguard, review and manage the intellectual property so that it may receive adequate and appropriate legal protection against unauthorized use.

CO6: Follow ethical standards in capacity building and work as a platform for development, promotion, protection, compliance, and enforcement of intellectual property and knowledge.

CO7: Prepare documents and fill applications needed for filing a patent, design, copyright and trade mark.

DETAILED SYLLABUS

UNIT-I: OVERVIEW OF INTELLECTUAL PROPERTY RIGHTS (09 Periods)

Introduction, Intellectual Property vs Conventional Property, and importance of intellectual property rights (IPRs), types of intellectual property, International Treaties for protection of IPR-Paris Convention, World Intellectual Property Organization (WIPO), World Trade Organization (WTO), Trade Related Aspects of Intellectual Property Rights (TRIP) Agreement, General Agreement on Tariffs and Trade(GATT).

UNIT–II: TRADEMARKS (09 Periods)

Introduction, Functions and kinds of trademarks, Trade Mark Registration Process, Post registration procedures, Trade Mark maintenance, Transfer of rights, Inter parties Proceedings, Infringement and Dilution of Ownership of Trade Mark, Trade Mark claims, International Trade Mark Law.

UNIT–III: PATENTS (09 Periods)

Introduction, Rights under Patent Law, Patent Application Process, Terms and Maintenance of Patents Requirements, Patent Ownership and Transfer, Licensing of Patent Rights, Sole and Joint Inventors, Disputes over Inventorship, Patent Infringement, International Patent Law, Patent Cooperation Treaty (PCT), Patent Law Treaty (PLT), Substantive Patent Law Treaty (SPLT).

UNIT-IV: COPY RIGHTS, TRADE SECRETS, CYBER LAWS (09 Periods)

Copy Rights: Introduction, nature and scope, subject matter, Rights afforded by copyright law, Copyrights ownership, transfers and duration, Copyright registration process.

Trade Secrets: Introduction, Determination of Trade Secret Status, Emploer-Employee Relationships, Protection of submissions.

Cyber laws: E-commerce and cyber laws, cyber crime and legislation- need, objective and scope; IT Act 2000, Information Technology and Information Security.

UNIT-V: INDUSTRIAL DESIGN AND COMMERCIALIZATION OF INTELLECTUAL PROPERTY RIGHTS (09 Periods)

Industrial Design: Introduction, Indian Law related to registration of Industrial Designs, Essential requirements for registration of a design in India, International Agreements – Hague System; Conflicts related to registration of design.

Commercialization of Intellectual Property Rights: Competition and Confidentiality Issues, Antitrust Laws, Assignment of Intellectual Property Rights, Technology, Transfer Agreements, Intellectual Property Issues in the Sale of Business, Legal Auditing of Intellectual Property, Due Diligence of Intellectual Property Rights in a Corporate Transaction. **Total Periods: 45**

TEXT BOOKS:

1. Deborah E. Bouchoux, *Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets,* Cengage Learning, 4th edition, 2016.
2. Kompal Bansal and Parikshit Bansal, *Fundamentals of Intellectual Property for Engineers,* BS Publications, 1st Edition, 2013.

REFERENCE BOOKS:

1. Prabuddha Ganguli, *Intellectual Property Rights-Unleashing the Knowledge Economy,* McGraw Hill Education, 6th reprint, 2015.
2. P. Narayanan, Intellectual Property Law, Eastern Book Company, 3rd Edition, 2013.
3. R. Radha Krishnan, S. Balasubramanian, *Intellectual Property Rights: Text and Cases,* Excel Books, 1st Edition, 2008

III B. Tech. – II Semester

(16BT60310) MANAGING INNOVATION AND ENTREPRENEURSHIP

(Common to CE, ME, CSE, IT, and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Industrial Engineering and Management, Management Science, Managerial Economics and Principles of Accountancy.

COURSE DESCRIPTION: Evolution of entrepreneurship from economic theory Managerial and entrepreneurial competencies; Concepts of Shifting Composition of the Economy Purposeful Innovation & Sources of Innovative Opportunity; The Innovation Process; Innovative Strategies; Entrepreneurial Motivation; Entrepreneurs versus inventors; Ethics and International Entrepreneurship; Strategic Issues in International Entrepreneurship; Problem solving Innovation and Diversification.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1: Demonstrate the principles of business innovation and entrepreneurship for establishing industrial ventures.

CO2: Analyze business plans for potential investors and stakeholders and effectively answer probabilistic questions on the substance of plan.

CO3: Develop a comprehensive and well planned business structure for a new venture.

CO4: Conduct investigation on complex problems, towards the development of Project.

CO5: Apply modern statistical and mathematical tools to design projects and subsequent work procedures.

CO6: Apply ethics in constructive innovation framework.

CO7: Exhibit professionalism by employing modern project management and financial tools.

DETAILED SYLLABUS

UNIT-I: CREATIVITY AND INNOVATION (07 Periods)

Introduction, Levels of innovation, Purposeful innovation and the sources of innovative opportunity, The innovation process, Innovative strategies, Strategies that aim at introducing and innovation, Dynamics of ideation and creativity – Inbound, Outbound; Context and process of new product development, Theories of outsourcing.

UNIT-II: PARADIGMS OF INNOVATION (11Periods)

Systems approach to innovation, Innovation in the context of developed economies and Emerging economies, Examining reverse innovation and its application, Performance gap, Infrastructure gap, Sustainability gap, Regulatory gap, Preference gap, organizational factors effecting innovation at firm level.

UNIT-III: SOURCES OF FINANCE AND VENTURE CAPITAL (07 Periods)

Importance of finance, Comparison of venture capital with conventional development capital, Strategies of venture funding, Investment phases, Investment process, Advantages and disadvantages of venture capital, Venture capital developments in India.

UNIT-IV: INTELLECTUAL PROPERTY INNOVATION AND ENTREPRENEURSHIP (11 Periods)

Introduction to Entrepreneurship, Evolution of entrepreneurship from economic theory, Managerial and entrepreneurial competencies, Entrepreneurial growth and development, Concepts, Ethics and Nature of International Entrepreneurship, Intellectual property – forms of IP, Patents, Trademarks, Design registration, Copy rights, Geographical indications, Patent process in India.

UNIT-V: OPEN INNOVATION FRAMEWORK AND PROBLEM SOLVING (09 Periods)

Concept of open innovation approach, Difference between open innovations and Cloud innovation approaches, Limitations and Opportunities of open innovation framework, Global context of strategic alliance, Role of strategic alliance, Problem Identification and Problem Solving, Innovation and Diversification.

Total Periods: 45

TEXT BOOKS:

1. Vinnie Jauhari, Sudhanshu Bhushan, *Innovation Management,* Oxford University Press, 1st Edition, 2014.

2. Drucker, P. F., *Innovation and Entrepreneurship,* Taylor & Francis, 2nd Edition, 2007.

REFERENCE BOOKS:

1. Robert D Hisrich, Claudine Kearney, *Managing Innovation and Entrepreneurship,* Sage Publications, 1st Edition, 2014.
2. V.K.Narayanan, *Managing Technology and Innovation for Competitive Advantage,* Pearson India, 1st Edition, 2002.

III B. Tech. – II Semester

(16BT60311) **MATERIALS SCIENCE**

(Common to CE, ME, CSE, IT, and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Structure and Bonding in metals; Steels, Cast Irons and Non Ferrous alloys; Material Selection for conductors, Insulators and semi conductors; Strengthening mechanisms of metals; Plastics and Ceramics as Insulators; AC and DC properties of Insulators; Semiconductors and Magnetic materials; Composite materials in Electrical and Electronics engineering; Material Selection and manufacturing of Optical fibers.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate the knowledge on concepts of fundamental science and engineering principles relevant to materials.

CO2. Analyze the structures of various types of Ferrous, Non ferrous alloys influencing various engineering applications.

CO3. Conduct investigations to select suitable materials with desired properties for engineering applications.

CO4. Use phase diagrams to interpret the data regarding microstructure of materials.

CO5. Consider health and safety issues while providing materials to real time applications.

CO6. Use composite materials that reduce material waste in design and manufacturing for sustainability.

DETAILED SYLLABUS

UNIT-I: INTRODUCTION TO MATERIAL SCIENCE (7 Periods)

Structure of Metals: Bonds in Solids, Crystallization of metals, Grain and grain boundaries, Effect of grain boundaries on the properties of metals /alloys, Determination of grain size measurement.

Constitution of Alloys: Necessity of alloying, Types of solid solutions, Hume rothery rules, Intermediate alloy phases.

UNIT-II: CAST IRONS, STEELS AND NON-FERROUS METALS (12 Periods)

Structure and properties of Grey cast iron, Spheroidal cast iron, White Cast iron, Malleable Cast iron, Alloy cast irons, Classification of steels, structure and properties of plain carbon steels, Structure and properties of Copper and its alloys, Aluminum and its alloys.

UNIT-III: ELECTRIC CONDUCTORS AND INSULATORS (12 Periods)

Type of materials selected for conductors, Insulators and semi conductors, Introduction to ceramics - Bonding and microstructure, DC properties of ceramic materials, AC properties of ceramic materials, mechanical properties, Ceramics as Conductors, Insulators and capacitors; Introduction to Plastics - DC properties, AC properties, Mechanical properties.

UNIT-IV: SEMICONDUCTORS AND MAGNETIC MATERIALS (09 Periods)

Fabrication of Semiconductors, Producing a silicon wafer-Lithography and Deposition packaging of semiconductors materials; Types of magnetic materials, Measuring magnetic properties, Application of soft magnetic materials in Electromagnets and relays, AC transformers, Generators and motors.

UNIT-V: ADVANCED MATERIALS AND APPLICATIONS (05 periods)

Composites - Fiber reinforced metal matrix, Ceramic matrix, Polymer matrix, Properties and applications of composites; Ceramics - Alumina, Zirconia, Silicon Carbide, SiAlONs, Reaction Bonded Silicon Nitride (RBSN); Glasses- properties and applications, manufacturing of optical fibers.

Total Periods: 45

TEXT BOOKS:

1. Kodgire V D, *Material Science and Metallurgy,* Everest Publishing House, Pune, 31st edition, 2011.
2. Ian. P.Jones, *Material Science for Electrical and Electronic Engineers,* Oxford University Press, 1st Edition, 2000

REFERENCE BOOKS:

1. V. Raghavan, *Physical Metallurgy: Principles and Practices,* PHI, New Delhi, 2nd edition, 2006.
2. William. D. Callister, *Materials Science & Engineering-An Introduction*, John Wiley and Sons, New Delhi, 6th edition, 2002.

III B. Tech. - II Semester
(16BT70412) **GREEN TECHNOLOGIES**
(Common to CE, ME, CSE, IT, and CSSE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –
COURSE DESCRIPTION:
Principles of green engineering; Green communications; Green energy; Green computing; Green construction; Green manufacturing.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Deploy conceptual knowledge in green technologies pertaining to Engineering practice.
CO2. Analyze various green technologies for engineering practice.
CO3. Provide green solutions to engineering problems.
CO4. Apply various green techniques in the engineering practice.
CO5. Consider health and safety issues while providing green solutions to the society.
CO6. Understand issues related to environment sustainability.
CO7. Apply ethical standards for environmental sustainability in the engineering practice.
DETAILED SYLLABUS:
UNIT-I: PRINCIPLES OF GREEN ENGINEERING AND GREEN COMMUNICATIONS (11 Periods)
Principles of Green Engineering:
Introduction, Definition of green engineering, Principles of green engineering.
Green Communications:
Introduction, Origin of Green Communications, Energy Efficiency in Telecommunication systems, Telecommunication system model and energy Efficiency, Energy saving concepts, Quantifying energy efficiency in ICT, Energy efficiency metrics of green wireless networks, Embodied energy of communication devices- Introduction, The extended energy model, Embodied/Operating Energy of a BS in Cellular network- A Case study; Energy efficient standards for wireline communications.
UNIT-II: GREEN ENERGY (09 Periods)
Introduction, adverse impacts of carbon emission, control of carbon emission– methods, greenhouse gas reduction – methods, Energy sources and their availability, Green energy for sustainable development. Green energy sources – Solar energy, Wind energy, Fuel cells, Biofuels, Wave and Geothermal energy (Principle of generation only).
UNIT-III: GREEN IT (09 Periods)
The importance of Green Information technologies, Strategizing Green Initiatives, Implementation of Green IT, Information Assurance, Communication and Social Media, Regulating Green IT- Laws, Standards and Protocols; RoHS, REACh, WEEE, Legislating for GHG Emissions and Energy Use of IT Equipment, Non-regulatory Government Initiatives, Industry Associations and Standard Bodies, Green Building Standards, Green Data Centres, Social Movements and Greenpeace, Conclusions.
UNIT-IV: GREEN CONSTRUCTION (09 Periods)
Green Building: Definition, Typical features, Benefits, Requisites for green building construction, Sustainability, Concept of REDUCE, REUSE, RECYCLE, RETHINK, REPLENISH AND REFUSE (6 R's), Sustainable construction focus point – Site selection, Planning, Water, Energy, Material, Indoor air quality, Construction procedures.
Indian Green Building Council: Introduction to IGBC green homes, Benefits of IGBC, IGBC green home rating system, Introduction to USGBC, LEED rating system, Procedure to get IGBC certification, GRIHA Rating.
UNIT-V: GREEN MANUFACTURING (09 Periods)
Introduction, background, definition, motivation and barriers to green manufacturing, Impact of manufacturing in environmental ecology, Need for green manufacturing, Advantages and Limitations, green manufacturing strategies, Green manufacturing and sustainability, Sustainability tools; Waste stream mapping and application, Green manufacturing through clean energy supply, green lean manufacturing, green packaging and supply chain. **Total Periods: 47**
TEXT BOOKS:

1. Konstantinos Samdanis, Peter Rost, Andreas Maeder, Michela Meo, Christos Verikoukis, *Green Communications: Principles, Concepts and Practice,* John Wiley & Sons, 2015.
2. Soli J. Arceivala, *Green Technologies for a better future,* McGraw Hill Education (India) Pvt Ltd, 2014.
3. San Murugesan, G.R. Gangadharan, *Harnessing Green IT – Principles and Practices,* John Wiley & Sons Ltd., 2008.
4. Tom Woolley, Sam Kimmins, Paul Harrison and Rob Harrison, *Green Building Handbook*, *Volume 1*, E & FN Spon, an imprint of Thomson Science & Professional.
5. *IGBC Green Homes Rating System Version 1.0* – A bridged reference guide.
6. J Paulo Davim, Green Manufacturing: Processes and Systems, Springer, 2012
7. David A Dornfeld, Green Manufacturing: Fundamentals and Applications, Springer, 2013

REFERENCE BOOKS:

1. Athanasios V Alavanidis, Thomais Vlachogianni, *Green Chemistry and Green Engineering*, Synchrona Themata, 2012.
2. G.D. Rai, *Non-conventional Energy Sources*, Khanna Publishers, Delhi, 5th edition,2011.

3. Marty Poniatowski, *Foundation of Green Information Technology, Prentice Hall, 2009.*
4. R. K. Gautham, *Green Homes*, BS publications, 2009.

III B. Tech. – II Semester

(16BT70413) INTRODUCTION TO NANOSCIENCE AND NANOTECHNOLOGY

(Common to CE, ME, CSE, IT, and CSSE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION:

Introduction to the concept of nano; Description of nanomaterial; Nanostructure characterization tools; Classification of nanomaterials; Fabrication of nanomaterial; Different applications of nanostructures and nanomaterials.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in
- Nanoscale technology.
- Difference between micro and nanotechnology
- Classification of Nanostructure and Nanomaterial
- Fabrication of various nanomaterials and nanostructures.

CO2. Analyze numerical and analytical problems in
- Nanomaterial size by using Scanning Electron Microscope and X-Ray diffraction

CO3. Design and fabricate devices based on nanostructures like
- Nano solar cell
- Nano cantilever
- Nano bio-sensor

CO4. Synthesize nano particle of different materials to solve the problems related to fabrication of nanostructures.

CO5. Select appropriate technique for fabrication of nanostructures and nanocomposites.

CO6. Apply ethical standards and legal issues while using chemical substances in fabrication of new nanostructures.

DETAILED SYLLABUS:

UNIT-I: FUNDAMENTALS OF NANOTECHNOLOGY (08 Periods)

Introduction – Scientific revolutions, Time and length scale in structures, Definition of a nanosystem; Dimensionality and size dependent phenomena - Surface to volume ratio Fraction of surface atoms, Surface energy and surface stress, surface defects, Properties at nanoscale (optical, mechanical, electronic, and magnetic).

UNIT-II: IDENTIFICATION AND CHARACTERIZATION TOOLS FOR NANOMATERIALS AND NANOSTRUCTURE (10 Periods)

Field Emission Scanning Electron Microscopy (FESEM), Environmental Scanning Electron Microscopy (ESEM) High Resolution, Transmission Electron Microscope (HRTEM), Scanning Tunneling Microscope(STM), Surface enhanced Raman spectroscopy (SERS), Secondary Ion Mass Spectroscopy, Focused Ion Beam Photoelectron Spectroscopy, X-ray Photoelectron Spectroscopy (XPS), Auger electron spectroscopy (AES), Rutherford backscattering spectroscopy (RBS), X-Ray Diffraction, Intensities in X-Ray Scattering Particle Size Effect.

UNIT-III: CLASSIFICATION OF NANOMATERIALS (10 Periods)

Classification based on dimensionality, Quantum Dots, Wells and Wires-III-V Nanoparticles, Electronic Structure of Nanosemiconductor, Carbon based nanomaterials (buckyballs, nanotubes, graphene), Metal based nano materials (nanogold, nanosilver and metal oxides), Nanocomposites, Nanopolymers, Nanoglasses, Nano ceramics, Biological nanomaterials, Fulrene-discovery and early years,.

UNIT-IV: SOME FABRICATION TECHNIQUES OF NANOMATERIALS AND NANOSTRUCTURES (09 Periods)

Chemical Methods: Metal Nanocrystals by Reduction, Solvothermal Synthesis, Photochemical Synthesis, Sonochemical Routes, Chemical Vapor Deposition (CVD), Metal Oxide Chemical Vapor Deposition (MOCVD), Plasma Enhanced Chemical Vapour Deposition Technique (PECVD), Hydrothermal Method, Sol-Gel.

Physical Methods: Ball Milling, Electrodeposition, Spray Pyrolysis, Flame Pyrolysis, DC/RF Magnetron Sputtering, Molecular Beam Epitaxy (MBE) Thermal Evaporation Method.

UNIT-V: APPLICATIONS (08 Periods)

Solar energy harvesting, Catalysis, Molecular electronics and printed electronics Nanoelectronics, Polymers with a special architecture, Liquid crystalline systems, Linear and nonlinear optical and electro-optical properties, Applications in displays and other devices, Nanomaterials for data storage, Photonics, Plasmonics, Chemical and biosensors, Nanomedicine and Nanobiotechnology, MESFET.

Total Periods: 45

TEXT BOOKS:

1. Pradeep T., *A Textbook of Nanoscience and Nanotechnology*, Tata McGraw Hill Education Pvt. Ltd., 2012.
2. Hari Singh Nalwa, *Nanostructured Materials and Nanotechnology*, Academic Press, 2002.

REFERENCE BOOKS:

1. Nabok A., *Organic and Inorganic Nanostructures*, Artech House, 2005.

2. Dupas C., Houdy P., Lahmani M., *Nanoscience: Nanotechnologies and Nanophysics*, Springer - Verlag Berlin Heidelberg, 2007.
3. S.M. Sze, *Physics of Semiconductor Devices,* 2nd Edition 2001.

III B. Tech. – II Semester

(16BT60505) ENGINEERING SYSTEM ANALYSIS AND DESIGN

(Common to CE, ME, CSE, IT, and CSSE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION:

Systems Process; Technologies for Systems; System Development Life Cycle; System Analysis and Modeling; Levels of Management; Project Management; Systems Implementation and Importance of UML Prototyping; Maintaining and Managing the Systems Output Process

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in
- Systems Process and System Design
- Systems Analysis and Modeling
- System Development Life Cycle
- Design Management and Maintenance Tools.

CO2. Analyze System Process and estimate the given models by using case tools.

CO3. Design and Develop a model to the organizational systems.

CO4. Solve complex problems related to engineering systems and produce accurate results.

CO5. Apply object oriented techniques for modeling dynamic systems.

CO6. Contribute towards societal issues and responsibilities in designing, modeling and developing of organizational systems.

DETAILED SYLLABUS:

UNIT–I: INTRODUCTION (9 periods)

Systems, Types of systems, integrating technologies for systems, Need for system analysis and design, Role of the systems analyst, System development life cycle, CASE tools for analysis and design.

UNIT–II: ANALYSIS AND MODELING ORGANIZATIONAL SYSTEM (9 periods)

Organization as system, System analysis, Depicting systems graphically, Use case modeling, Levels of management, Organizational culture.

UNIT–III: PROJECT MANAGEMENT (10 periods)

Project initiation, Problem in organization, Determining feasibilities, Ascertaining hardware and software needs, Identifying, Forecasting, Comparing costs and benefits, Activity planning and control, Managing the project.

UNIT-IV: OBJECT ORIENTED ANALYSIS AND DESIGN USING UML (8 periods)

Introduction, Object modeling, Dynamic modeling, functional modeling, packages and other UML artifacts, the importance of using UML for modeling.

UNIT-V: DESIGNING EFFECTIVE OUTPUT (9 periods)

Output design objectives, Relating output content to output method, Realizing how output bias affects users, Designing output for display, Case studies-Designing a web site management, Online exam management, Online portal design.

Total Periods: 45

TEXT BOOK:

1. Kenneth E. Kendall and Julie E. Kendall, *System Analysis and Design,* Pearson Education, Ninth Edition, 2011.

REFERENCE BOOKS:

1. Dennis, Wixom and Roth, *Systems Analysis and Design,* John Wiley, Fifth Edition, 2012.
2. Shelly and Rosenblatt, *Systems Analysis and Design,* Cengage Learning, Ninth Edition, 2012.

III B. Tech. – II Semester

(16BT71011) MICRO-ELECTRO-MECHANICAL SYSTEMS

(Common to CE, ME, CSE, IT, and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Overview of Micro Electro Mechanical Systems (MEMS); scaling laws; working principles of microsensors and microactuators; materials; microfabrication processes; packaging of Microsystems.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1: Demonstrate knowledge on MEMS devices, scaling laws, microsensors and microactuators

CO2: Analyze the properties of materials and identify its suitability for MEMS devices.

CO3: Design MEMS devices that meet desired specifications and requirements.

CO4: Analyze and synthesize the information to provide effective solution to engineering problems with MEMS devices.

CO5: Use modern techniques in micro manufacturing process.

CO6: Develop efficient and cost effective MEMS based products for society.

DETAILED SYLLABUS:

UNIT-I: OVERVIEW OF MEMS AND SCALING LAWS (9 periods)

MEMS and Microsystems, Microsystems and microelectronics, miniaturization, applications of MEMS in the automotive industry and in other industries.

Scaling laws of miniaturization: Introduction to scaling, scaling in: geometry, rigid- body dynamics, electrostatic forces, electromagnetic forces, Electricity, Fluid mechanics, Heat transfer.

UNIT -II: WORKING PRINCIPLES OF MICROSYSTEMS (9 periods)

Microsensors, acoustic wave sensors, biomedical and biosensors, chemical sensors, pressure sensors, thermal sensors. Microactuation: actuation using thermal forces, shape-memory alloys, piezoelectric crystals, electrostatic forces. MEMS with microactuators, microgrippers, micromotors, microvalves, micropumps. Microaccelerometers, microfludics.

UNIT-III: MATERIALS FOR MEMS AND MICROSYSTEMS (9 periods)

Substrate and wafers, silicon as a substrate material, silicon compounds, silicon piezoresistors, gallium arsenide, quartz, piezoelectric crystals, polymers, carbon nano tube (CNT), development of CNTs, application of CNTs.

UNIT-IV: MEMS FABRICATION PROCESS AND MICROMANUFACTURING (9 periods)

Photolithography, ion implantation, diffusion, oxidation, chemical vapor deposition, physical vapor deposition, deposition by epitaxy, etching, bulk micromanufacturing, surface micromanufacturing, LIGA process.

UNIT-V: MEMS PACKAGING (9 periods)

Introduction to microsystem packaging, objectives and general considerations in packaging design, three levels of microsystem packaging, interfaces in microsystem packaging, packaging technologies, three-dimensional packaging, selection of packaging materials, signal mapping and transduction, Design case: Pressure sensor packaging.

Total Periods: 45

TEXT BOOK:

1. Tai-Ran Hsu, *MEMS & Microsystems, Design and Manufacture*, McGraw Hill Education (India) Pvt. Ltd., 2002.

REFERENCE BOOKS:

1. G.K.Ananthasuresh, K.J.Vinoy, *Micro and Smart Systems*, Wiley India, 2010.
2. Nitaigour Premchand Mahalik, *MEMS*, McGraw Hill Education (India) Pvt. Ltd., 2007.

III B. Tech. II-Semester
(16BT61205) CYBER SECURITY AND LAWS
(Common to CE, ME, CSE, IT, and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: –

COURSE DESCRIPTION: Cyber Crimes and Indian IT Act; Cyber Offenses; Tools and Methods used in Cyber Crime; Phishing ad Identity Theft; Indian and Global Perspective on Cyber Crimes and Cyber Security; Organizational Implications on Cyber Security; IPR Issues; Cyber Crime and Terrorism; Cyber Crime Illustrations.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in Cyber security, Cyber crimes and its related laws in Indian and Global Act.
CO2. Analyze the legal perspectives and laws related to cyber crimes in Indian context.
CO3. Apply security and privacy methods in development of modern applications and in organizations to protect people and to prevent cyber crimes.
CO4. Solve Cyber security issues using privacy policies.
CO5. Use antivirus tools to minimize the impact of cyber threats.
CO6. Follow security standards for the implementation of Cyber Security and laws.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO CYBER CRIMES AND OFFENSES (9 Periods)

Cyber Crimes: Introduction, Definition, Origin, Cyber crime and information security, Cyber criminals, Classifications of cyber crimes, The legal perspectives and Indian perspective, Cyber crime and Indian ITA 2000, Global perspective on cyber crimes.

Cyber Offenses: Introduction, Criminals planning on attacks, Social engineering, Cyber stalking, Cyber cafe and crimes, Botnets.

UNIT-II: TOOLS AND METHODS USED IN CYBER CRIME & PHISHING AND IDENTITY THEFT (9 Periods)

Introduction, Proxy servers and Anonymizers, Phishing, Password cracking, Key loggers and Spywares, Virus, Worms and Ransomware, Trojan horses and Backdoors, Steganography, DoS and DDoS attacks.

Phishing and Identity Theft: Introduction, Phishing, Identity Theft (ID Theft).

UNIT-III: CYBER CRIMES AND CYBER SECURITY-LEGAL PERSPECTIVES (8 Periods)

Introduction, Cyber laws in Indian context, The Indian IT act, Challenges to Indian law and Cyber crime scenario in India, Consequences of not addressing the weakness in IT act, Digital signatures and the Indian IT Act, Cyber Crime and Punishment, Cyberlaw, Technology and Students in India scenario.

UNIT-IV: CYBER SECURITY-ORGANIZATIONAL IMPLICATIONS (10 Periods)

Introduction, Web threats for organizations – evils and perils, Security and privacy implications from cloud computing, Social Media Marketing-Security risks and Perils for organizations, Social computing and associated challenges for organizations, Protecting people's privacy in organization, Organizational guidelines for internet usage, Safe computing and Usage policy, Incident handling and Best practices.

UNIT-V: CYBER CRIME, TERRORISM AND ILLUSTRATIONS (9 Periods)

Cyber Crime & Terrorism: Introduction, Intellectual property in the cyber space, The ethical dimension of cyber crimes, The psychology, Mindset and skills of hackers and cyber criminals, Sociology of cyber criminals, Information warfare.

Cyber Crime Illustrations: Indian banks lose millions of rupees, Justice vs. Justice, Parliament attack, The Indian case of online gambling, Bank and credit card related frauds, Purchasing goods and services scam, Nigerian 419 scam.

Total Periods: 45

TEXT BOOK:

1. Nina Gobole and Sunit Belapure, *"Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives,"* Wiley India, 2011.

REFERENCE BOOK:

1. Prashant Mali, *"Cyber Law and Cyber Crimes,"* Snow White Publications Pvt. Ltd., 2013.

III B. Tech. – II Semester
(16BT61505) **BIOINFORMATICS**
(Common to CE, ME, CSE, IT, and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —

COURSE DESCRIPTION:

Introduction to Bioinformatics; Biology and Information; Sequence alignment and dynamic programming; Biological Database; Homology Modeling; Structure Prediction; Molecular Dynamics

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on concepts of biological databases, Genome and proteome.

CO2. Analyze biological sequences for Homology Modeling.

CO3. Apply clustering methods for Phylogenetic trees.

CO4. Solve bio sequencing problems using dynamic programming.

CO5. Select and apply appropriate techniques and tools to structure Prediction

DETAILED SYLLABUS:

UNIT-I: NUCLEIC ACIDS, PROTEINS, AND AMINO ACIDS (08 periods)

Bioinformatics-Definition, Nucleic acid structure, Protein structure, the central dogma, Physico-chemical properties of the amino acids and their importance in protein folding, Polymerase chain reaction (PCR)

UNIT-II: INFORMATION RESOURCES FOR GENES AND PROTEIN (10 periods)

Database file formats, Nucleic acid sequence databases, Protein sequence databases

Sequence Alignment Algorithm

Pair wise sequence alignment – The problem, Pair wise sequence alignment – Dynamic programming methods, The effect of scoring parameters on the alignment, Multiple sequence alignment

UNIT-III: PREDICTION OF THE THREE-DIMENSIONAL STRUCTURE OF A PROTEIN AND HOMOLOGY MODELING (09 Periods)

Secondary Structure Prediction, Basic Principles, The Steps of Comparative Modeling, Accuracy of Homology Models, Manual versus Automatic Models, SNPs, Motifs**.**

UNIT-IV: PHYLOGENETIC METHODS (10 periods)

Phylogenetic trees, choosing sequences, Distance matrices and clustering methods, Calculation of distances in the neighbor-joining method, Bootstrapping, Tree optimization criteria and tree search methods, The maximum-likelihood criterion, Calculating the likelihood of the data on a given tree, The parsimony criterion.

UNIT-V: NEW FOLD MODELING (08 periods)

Estimating the Energy of a Protein Conformation, Energy Minimization, Molecular Dynamics, The "Omics" Universe**-**Transcriptomics, Proteomics, Interactomics, Structural Genomics, Pharmacogenomics**.**

Total No. of Periods: 45

TEXT BOOKS:

1. Paul G. Higgs and Teresa K. Attwood, *Bioinformatics and Molecular Evolution* Blackwell Publishing 2005.
2. Anna Tramontano, *Introduction to Bioinformatics,* Chapman and Hall/CRC, 2006.

REFERENCE BOOKS:

1. Hooman H. Rashidi and Lukas K. Buehler, *Bioinformatics Basics, Applications in Biological Science and Medicine***,** CRC Press, Taylor & Francis Group, 2nd Edition, 2005.

2. Rastogi S. C., Namita Mendiratta and Parag Rastogi, *Bioinformatics: Methods and Applications: Genomics, Proteomics and Drug Discovery*, PHI Learning Pvt. Ltd., Third Edition, 2011.

III B. Tech. - II Semester
(16BT61531) DATA WAREHOUSING AND DATA MINING LAB
(Common CSE, and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A Course "Data Warehousing and Data Mining"

COURSE DESCRIPTION:

Hands on practical experience on Warehouse design; OLAP operation; Data pre-processing techniques; Association rule mining; classification of data; Naïve Bayes classifier; Decision tree; Clustering technique using WEKA-Open source machine learning tool.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on the creation and usage of data warehouses.

CO2. Analyze and interpret the results using data mining techniques.

CO3. Design and develop transformations such as filter, join and rank on data warehouses.

CO4. Use classification and clustering techniques to find interesting patterns in large databases.

CO5. Choose and deploy modern tools to handle large, missing and noisy data in datasets.

CO6. Use appropriate data mining algorithms to find solutions for real time societal applications.

CO7. Function effectively as an individual to perform operations on different databases using *Informatica.*

CO8. Communicate effectively using report generation tools on business data.

LIST OF EXERSICES:

Exercises on Informatica

To create Employee data warehouse using Employee database system using following tables. **For the given data tables,**

Employee table / **Dept table**

Name	**Data type**	**Size**	**Name**	**Data type**	**Size**
Eno	Number	20	Eno	Number	20
Ename	Varchar2	25	Ename	Varchar2	25
Deptno	Number	10	Deptno	Number	10
DepName	Varchar2	12	DepName	Varchar2	12
Salary	Number	20	Salary	Number	20
Job	Varchar2	20	Job	Varchar2	20

a. Implement mapping of warehouse server on Employee table.
b. Display the list of employees whose salary is greater than 5000 by designing filter transformation.
c. Find the maximum and minimum salaried employee using aggregate transformation.
d. Join Employee and Dept table using joiner transformation.
e. Rank transformation on employee table.
f. Router transformation on employee and department table.

II. *Exercises* on Weka:

Credit Risk Assessment:

The business of banks is making loans. Assessing the credit worthiness of an applicant is of crucial importance. You have to develop a system to help a loan officer decide whether the credit of a customer is good, or bad. A bank's business rules regarding loans must consider two opposing factors. On the one hand, a bank wants to make as many loans as possible. Interest on these loans is the banks profit source. On the other hand, a bank cannot afford to make too many bad loans. Too many bad loans could lead to the collapse of the bank. The bank's loan policy must involve a compromise: not too strict, and not too lenient.

To do the assignment, you first and foremost need some knowledge about the world of credit. You can acquire such knowledge in a number of ways.

a. Knowledge Engineering. Find a loan officer who is willing to talk. Interview her and try to represent her knowledge in the form of production rules.

b. Books. Find some training manuals for loan officers or perhaps a suitable textbook on finance. Translate this knowledge from text form to production rule form.

c. Common Sense. Imagine yourself as a loan officer and make up reasonable rules which can be used to judge the credit worthiness of a loan applicant.

d. Case Histories. Find records of actual cases where competent loan officers correctly judged when, and when not to, approve a loan application.

The German Credit Data: Actual historical credit data is not always easy to come by because of confidentiality rules. Here is one such dataset, consisting of 1000 actual cases collected in Germany. credit dataset (original) Excel spreadsheet version of the German credit data (Down load from web).In spite of the fact that the data is German, you should probably make use of it for this assignment. (Unless you really can consult a real loan officer!)

A few notes on the German dataset:

‟ **DM** stands for Deutsche Mark, the unit of currency, worth about 90 cents Canadian (but looks and acts like a quarter).

Owns_telephone. German phone rates are much higher than in Canada so fewer people own telephones.

‟ **Foreign_worker**. There are millions of these in Germany (many from Turkey). It is very hard to get German citizenship if you were not born of German parents.

There are **20 attributes** used in judging a loan applicant. The goal is the classify the applicant into one of two categories, good or bad.

i. Preprocess the data in weka with a simple experiments

a) Handling missing data(both nomial and numerical)

b) All types normalization(min-max,z-score,decimal scaling)

c) sampling

ii. Implement Decision tree classification of German data set.

iii.. Implement Naïve Bayes classifier on German data set.

iv. Implement K-means clustering technique for German data.

v. Implement Apriori algorithm, calculate all frequent itemsets(L's) for the following transactional data and display the 10 most significant rules you get using the default values of support and confidence.

Transactional Data:

TID	List of item_ids
T100	I1,I2,I5
T200	I2,I4
T300	I2,I3
T400	I1,I2,I4
T500	I1,I3
T600	I2,I3
T700	I1,I3
T800	I1,I2,I3,I5
T900	I1,I2,I3

REFERENCE BOOKS:

1. Jiawei Han, Micheline Kamber and Jian Pei, *Data Mining: Concepts and Techniques,* Elsevier, 3rd edition, 2013.
2. K.P. Soman, Shyam Diwakar and V. Ajay, *Insight into Data mining Theory and Practice,* Easter Economy Edition, Prentice Hall of India, 2006.
3. I.H Witten, E.Frank, *Data mining: Practical Machine learning Tools and Techniques with java Implementation*, Morgan Kaufmann Publishers,1999.

III B. Tech. – II Semester
(16BT60531) **SOFTWARE TESTING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES:
A course on "Software Testing"
COURSE DESCRIPTION:
Hands on Practice to Develop Functional, System, Regression and Acceptance tests; White Box Testing & Black Box Testing; Test Automation.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate practical knowledge of
- White Box Testing
- Black Box Testing
- Regression Testing
- Test Automation

CO2. Analyze the software requirements and report the bugs.
CO3. Design test cases using relevant testing techniques for an application.
CO4. Demonstrate decision making skills for testing desktop applications.
CO5. Use software testing tools and technologies for testing desktop applications.
CO6. Apply contextual knowledge to perform testing on software related to societal applications.
CO7. Work effectively as an individual and member of a team for testing software applications.

LIST OF EXERCISES:
1. Generate Functional Test Scenarios & Test Cases for the Income Tax Calculator application. (Hint: Use the Application's SRS document supplied by the instructor).
2. Generate System Test Scenarios & Test Cases for the Income Tax Calculator application. (Hint: Use the Application's SRS document supplied by the instructor & Functional Test Scenarios).
3. Generate Regression & User Acceptance test cases for the Income Tax Calculator application. (Hint: Use the Application's SRS document supplied by the instructor & System Test Scenarios).
4. Conduct Basis Path Testing & Data Flow Testing for below listed modules of Income Tax Calculator application:
   a. Salary Income Details
   b. Tax Deduction
   (Hint: Basis Path Testing: Compute dd path & Cyclomatic Complexity; Data Flow Testing: Arrive on du & dc Paths).
5. Conduct Basis Path Testing & Data Flow Testing for below listed modules of Income Tax Calculator application:
   a. Male Taxation
   b. Female Taxation
   (Hint: Basis Path Testing: Compute dd path & Cyclomatic Complexity; Data Flow Testing: Arrive on du & dc Paths).
6. Validate the inputs for the below listed modules of Income Tax Calculator application and arrive on a detailed report about valid inputs and invalid inputs:
   a. Accept Personal Details (APD)
   b. Accept Income Details (AID)
   (Hint: Use equivalence class partitioning methods & BVA techniques appropriately).
7. Validate the inputs for the below listed modules of Income Tax Calculator application and arrive on a detailed report about valid inputs and invalid inputs:
   a. Accept Savings & Donation Details (ASD)
   b. Accept Tax Deduction (ATD)
   (Hint: Use equivalence class partitioning methods & BVA techniques appropriately).
8. Conduct a System Test on the given Desktop application with any Functional Testing Tool.

TEXT BOOK:
1. Naresh Chauhan, *Software Testing: Principles and Practices,* Oxford University Press, Second Edition, 2016.

REFERENCE BOOK:

1. Dr. K. V. K. K. Prasad, *Software Testing Tools,* Dreamtech, First Edition, 2004

III B. Tech. – II Semester

(16BT60532) **SEMINAR**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
	100	100	-	-	-	2

PREREQUISITES:

All the courses of the program up to III B. Tech. I-Semester

COURSE DESCRIPTION:

Identification of topic for the seminar; Literature survey; Performing critical study and analysis of the topic identified; Preparation of report and presentation

COURSE OUTCOMES:

On successful completion of the seminar work, the student will be able to demonstrate:

CO1. Knowledge on the seminar topic

CO2. Analytical ability exercised during the seminar work.

CO3. Ability to investigate and solve complex engineering problems faced during the Seminar work

CO4. Ability to apply techniques to complex engineering activities with an Understanding of limitations as applied in the seminar work.

CO5. Ability to function effectively as an individual as experienced during the Seminar Work

CO6. Ability to present views cogently and precisely on the seminar topic

CO7. Ability to engage in life-long leaning as experience during the seminar work.

IV B. Tech. – I Semester
(16BT61201) CLOUD COMPUTING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on "Computer Networks" and "Operating Systems".

COURSE DESCRIPTION: Virtualization, Virtualization Technologies; Cloud Computing Fundamentals, Deployment Models; Cloud Computing Architecture; Cloud Computing Mechanisms; Cloud Security, Cloud Disaster Recovery; Working with Clouds; and Case Studies.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on services, architecture, types of infrastructural models, disaster recovery and virtualization.

CO2. Analyze the issues in cloud computing Data, Network and Host security.

CO3. Apply API development skills in web applications for Cloud deployment.

CO4. Use research based knowledge to build cloud applications.

CO5. Use advanced programming languages to access cloud services.

CO6. Build cloud environment suitable for societal requirements.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO VIRTUALIZATION AND TECHNOLOGIES (9 periods)

Introduction to Virtualization: Definition, Objectives, Characteristics, Benefits of virtualization, Taxonomy of virtualization technologies, Pros and cons of virtualization.

Virtualization Technologies: VMware, Hyper-V, Zen and virtual iron.

UNIT-II: FUNDAMENTAL CLOUD COMPUTING AND MODELS (9 Periods)

Cloud Computing: Origin and influences, Basic concepts and terminology, Goals and benefits, Risks and challenges.

Cloud Models: Roles and boundaries, Cloud characteristics, Cloud delivery models, Cloud deployment models.

UNIT III: CLOUD COMPUTING MECHANISMS AND ARCHITECTURE (9 Periods)

Cloud-Enabling Technology: Broadband networks and internet architecture, Data center technology, Virtualization technology, Web technology, Multitenant technology, Service technology.

Cloud Architectures: Architecture - Workload distribution, Resource pooling, Dynamic scalability, Elastic resource capacity, Service load balancing, Cloud bursting, Elastic disk provisioning, Redundant storage.

UNIT-IV: CLOUD SECURITY AND DISASTER RECOVERY (9 Periods)

Cloud Security: Data, Network and host security, Cloud security services and cloud security possible solutions.

Cloud Disaster Recovery: Disaster recovery planning, Disasters in the cloud, Disaster management, Capacity planning and cloud scale.

UNIT-V: CLOUD CASE STUDIES (9 Periods)

Case Studies: Software-as-a-Service (SaaS) - Salesforce.com, Facebook; Platform–as-a-Service (PaaS) - Google App Engine, MS-Azure and IBM Bluemix; Infrastructure-as-a- Service (IaaS) - Amazon EC2, Amazon S3 and Netflix.

Total Periods: 45

TEXT BOOKS:

1. Thomas Erl and RicardoPuttini *Cloud Computing- Concepts, Technology and Architecture,* Pearson, 2013.
2. Ivanka Menken and Gerard Blokdijk, *Cloud Computing Virtualization Specialist Complete Certification Kit-Study Guide Book,* Lightning Source, 2009

REFERENCE BOOKS:

1. Barrie Sosinsky, *Cloud Computing Bible,* Wiley India Pvt Ltd, 2011.
2. Rajkumar Buyya, James Broberg and Andrzej Goscinski, *Cloud Computing Principles and Paradigms***,** John Wiley and Sons, 2011.

3. John W. Rittinghouse and James F. Ransome, *Cloud Computing Implementation, Management and Security*, CRC Press, Taylor & Francis Group, 2010.

IV B. Tech. - I Semester

(16BT51501) COMPILER DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on "Theory of Computation"

COURSE DESCRIPTION:

Lexical analysis; Parsers; Run Time Environments; Syntax Directed Translation; Type checking; Code Optimization; Code Generation and Compiler tools.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on the phases involved in design of compilers.

CO2. Analyze code optimization Techniques.

CO3: Design experiments for implementing parsing techniques.

CO4. Synthesize rules in compiler to demonstrate semantic attribution during Parsing.

CO5: Use compiler construction tools such as LEX and YACC for designing a Parser.

CO6: Apply Ethical principles for usage of stack and other storage memory.

DETAILED SYLLABUS:

UNIT I– INTRODUCTION TO COMPILER AND LEXICAL ANALYSIS (09 Periods)

Structure of a compiler, Interpretation- Interpreters, Recursive interpreters, Iterative interpreters.

Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Specification of Tokens, The Lexical-Analyzer Generator LEX.

UNIT II – SYNTAX ANALYSIS (09 Periods)

The Role of the Parser, Eliminating Ambiguity, Eliminating of Left Recursion and Left Factoring.

Top-Down Parsing: Recursive descent parsing, Non Recursive Predictive parsing, LL (1) Grammars, A traditional top-down parser generator—YACC

Bottom-Up Parsing: Shift reduce parsing, LR parsers – Simple LR parser, Canonical LR parser, LALR parser, Using Ambiguous Grammars.

UNIT III – SYNTAX DIRECTED TRANSLATION AND TYPE CHECKING (09 Periods)

Syntax directed definition, S-attributed and L-attributed definitions, Construction of syntax trees.

Type Checking: Type Expressions, Type Equivalence, Rules for Type Checking, Type Conversions, Overloading of Functions and Operators.

UNIT IV – INTERMEDIATE CODE GENERATOR AND RUN TIME ENVIRONMENTS (09 Periods)

Preprocessing the intermediate code,Preprocessing of expressions, Preprocessing of if-statements and goto statements, Preprocessing of routines**,**Variants of Syntax Trees, Three Address Code, Boolean expressions, Flow-of-Control Statements, Control- Flow Translation of Boolean Expressions.

Run time Environments:

Storage organization, Stack Allocation of Space, Access to Nonlocal Data on the Stack.

UNIT V – CODE OPTIMIZATION AND CODE GENERATION (09 Periods)

Basic Blocks and Flow Graphs, Optimization of Basic Blocks, The principal sources of optimization, Introduction to data flow analysis.

Code Generation:

Issues in the Design of a Code Generator, The Target Language, Simple Code Generator, Peephole optimization, Register allocation and assignment.

Total Periods: 45

TEXT BOOK:

1. Alfred V. Aho, Monica S.Lam, Ravi Sethi, Jeffrey D. Ullman, *Compilers–Principles, Techniques and Tools*, Pearson Education, 2nd edition, 2012.

REFERENCE BOOKS:

1. Dick GruneKees van Reeuwijk Henri, *Modern Compiler Design,* Springer,2nd edition, 2012.
2. David Galles, *Modern Compiler Design,* Pearson Education Asia, 2007.

IV B. Tech. – I Semester

(16BT51203) **WEB TECHNOLOGIES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Java Programming".

COURSE DESCRIPTION:

Hyper Text Markup Language (HTML); Features of HTML5; Cascading Style Sheets (CSS); JavaScript; JQuery; Bootstrap; Hypertext Preprocessor (PHP); MySQL.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on web page design elements, dynamic content and database interaction.
CO2. Analyze user requirements to develop web applications.
CO3. Design client-server applications using web technologies.
CO4. Demonstrate problem solving skills to develop enterprise web applications.
CO5. Use HTML, CSS, JavaScript, JQuery, Bootstrap and PHP technologies for device independent web application development.
CO6. Apply Web Technologies to develop interactive, dynamic and scalable web applications for societal needs.

DETAILED SYLLABUS:

UNIT-I: HTML **(11 Periods)**

Introduction: Fundamentals of HTML, Working with text, Organizing text in HTML, Working with links and URLs, Creating tables, Working with images, Canvas, Forms, Frames and Multimedia.

HTML5: Introduction, HTML5 document structure, Creating editable content, Checking spelling mistakes, Exploring custom data attributes, Client-Side storage, Drag and drop feature, Offline web applications, Web communications, Cross-Document messaging and desktop notifications.

UNIT-II: CSS AND JAVASCRIPT **(8 Periods)**

CSS: Introduction, CSS selectors, Inserting CSS in an HTML document, Backgrounds, Fonts, and Text styles, Creating boxes, Displaying, Positioning and floating elements, Features of CSS3, Media queries.

Javascript: Overview of JavaScript, JavaScript functions, Events, Image maps and animations, JavaScript objects, Working with browser and document objects.

UNIT-III: JQUERY and BOOTSTRAP **(9 Periods)**

JQuery: Introduction, JQuery selectors, Events, Methods to access HTML elements and attributes, Introduction to AJAX.

Bootstrap: Getting started with Bootstrap, Creating responsive layouts using Bootstrap CSS - Basic HTML structure for Bootstrap, Responsive classes, Rendering images, the grid system, Constructing data entry forms.

UNIT-IV: INTRODUCTION TO PHP **(9 Periods)**

Introduction, Data types, Variables, Constants, Expressions, String interpolation, Control structures, Functions, Arrays, Embedding PHP code in web pages, Object Oriented PHP.

UNIT-V: PHP WEB FORMS AND MYSQL **(8 Periods)**

PHP Web forms: PHP and web forms, Sending form data to a server, Working with cookies and session handlers

PHP with MySQL: Interacting with the database, Prepared statement, Database transactions.

Total Periods: 45

TEXT BOOKS:

1. Kogent Learning Solutions Inc, *HTML 5 Black Book: Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP and JQuery,* Dreamtech Press, Second Edition, 2016.
2. W. Jason Gilmore, *Beginning PHP and MySQL,* APress, Fourth Edition, 2011.

REFERENCE BOOKS:

1. Snig Bahumik, *Bootstrap Essentials,* PACKT Publishing, 2015 (e-book).

2. Thomas A. Powell, *The Complete Reference: HTML and CSS,* Tata McGraw Hill, Fifth Edition, 2010.
3. Andrea Tarr, *PHP and MySQL,* Willy India, 2012.

IV B. Tech. – I Semester

(16BT70501) BIG DATA ANALYTICS

(Program Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course "Data Warehousing and Data Mining"

COURSE DESCRIPTION:
Big Data; Types of Data Elements; Introduction to Hadoop; MapReduce; Building Blocks of Hadoop; Big Data Analytics Applications; Predictive and Descriptive Analytics**.**

COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge in
- Big Data Characteristics,
- Hadoop & Hadoop Distributed File System
- Hadoop Framework & Hadoop Release
- Map Reduce work flow
- Hive and Hive Services.

CO2. Analyze large data sets by using Hadoop, Map Reduce, Hive, Pig tools.
CO3. Design and develop Map Reduce models for data sets.
CO4. Solve complex problems and store the results of the large data sets.
CO5. Select Hive and Hive services techniques for effective database models.
CO6. Contribute towards societal issues and responsibilities in designing, modeling and developing Big Data systems.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO BIG DATA (10 periods)
Big data characteristics: Volume–Variety–Velocity-Veracity; Analytics, Basic nomenclature, Analytics process model, Analytical model requirements, Types of data sources, Sampling, Types of data elements, Missing values, Standardizing data, Outlier detection and treatment, Categorization.

UNIT-II: HADOOP AND HADOOP DISTRIBUTED FILE SYSTEMS (8 periods)
A brief history of Hadoop, The Hadoop ecosystem, Hadoop release, The building blocks of Hadoop, Name node-data node-secondary name node, Job tracker, Task tracker.
The Hadoop Distributed File System: The design of HDFS, HDFS concepts, Hadoop file systems.

UNIT-III: MAPREDUCE (10 periods)
MapReduce workflows, How MapReduce works, Anatomy of MapReduce: MapReduce1, MapReduce2, Failures in classic MapReduce; YARN, Failure in YARN, Job scheduling - The fair scheduler, The capacity scheduler; Shuffle and sort in MapReduce.

UNIT-IV: HIVE AND PIG (9 periods)
Hive: The Hive shell, Hive services, Comparison with traditional databases, HiveQL, Tables, Querying data, User-defined functions.
Pig: Introduction to Pig, Pig Latin.

UNIT-V: CASE STUDIES (8 periods)
Hadoop usage at Last.fm, Hadoop and Hive at Facebook, Nutch Search Engine, Log Processing at Rackspace, Mahout, Sqoop, Crunch, Spark.

Total Periods: 45

TEXT BOOKS:
1. Bart Baesens, *Analytics in a Big Data World: The Essential Guide to Data Science and its Applications,* Wiley Publications, 2014.
2. Tom White, *Hadoop: The Definitive Guide,* O'Reilly Publications, Fourth Edition, 2016.

REFERENCE BOOKS:

1. Paul Zikopoulos, Chris Eaton, and Paul, *Understanding Big Data: Analytics for Enterprise Class Hadoop and streaming Data,* The McGraw-Hill Companies, 2012.
2. Chuck Lam, *Hadoop in Action,* Manning Publications, 2011.

IV B. Tech. – I Semester

(16BT71205) CRYPTOGRAPHY AND NETWORK SECURITY

(Common to CSE, and IT)

(Program Elective–3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Computer Networks".

COURSE DESCRIPTION: Principles and Practice of Cryptography and Network Security; Classical Systems; Symmetric Block Ciphers; Public-key Cryptography; Hash Functions; Authentication; Key Management; Key Exchange; Signature Schemes; E-mail; Web Security; Malicious Software; Intrusion Detection; Phishing and Identity Theft.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:
- Cryptographic algorithms and their mathematical models
- Message Authentication
- Digital Signatures
- Malicious Software
- Intrusion Detection
- Phishing and Identity Theft

CO2. Analyze vulnerabilities and threats on information systems based on various security parameters.

CO3. Apply security and privacy methods to protect and prevent cyber crimes.

CO4. Solve information privacy issues using encryption and digital signatures.

CO5. Use firewall and PGP to protect network and e-mail respectively.

CO6. Follow standards in implementation of network security.

DETAILED SYLLABUS:

UNIT-I: CLASSICAL ENCRYPTION TECHNIQUES (6 Periods)

Introduction: Services, Mechanisms, and Attacks concepts, The OSI security Architecture, Model for network security.

Classical Encryption Techniques: Symmetric cipher model, Substitution techniques- Ceaser cipher, Hill cipher, Poly and mono alphabetic cipher, Transposition techniques.

UNIT-II: BLOCK CIPHERS AND PUBLIC-KEY CRYPTOGRAPHY (8 Periods)

Block Ciphers: Block cipher principles, The data encryption standard (DES), The Strength of DES, Block cipher design principles, Block cipher modes of operation.

Public-Key Cryptography: Principles of public-Key cryptosystems, the RSA algorithm, Diffie-Hellman key exchange.

UNIT-III: MESSAGE AUTHENTICATION CODES, HASH FUNCTIONS, AND DIGITAL SIGNATURES (10 Periods)

Message Authentication Codes: Message authentication requirements, Message authentication functions, Message authentication codes.

Hash Functions: Security of hash functions and MACs, Hash algorithms-SHA, HMAC.

Digital Signatures: Digital Signatures and The Indian IT Act, Digital signature standard (DSS), Authentication applications- Kerberos.

UNIT-IV: ELECTRONIC MAIL SECURITY, IP SECURITY AND WEB SECURITY (11 Periods)

Electronic Mail Security: Pretty good privacy (PGP).

IP Security: IP security overview, Architecture, Authentication header, Encapsulating security payload, Combining security associations.

Web Security: Web security Considerations**,** Secure sockets layer (SSL), Transport layer security (TLS), Secure electronic transaction.

UNIT-V: MALICIOUS SOFTWARE, INTRUSION DETECTION, PHISHING AND IDENTITY THEFT (10 Periods)

Malicious Software: Spywares, Viruses and worms, DoS and DDoS attacks.

Intrusion Detection: Key loggers, Intrusion detection, Password management-Password protection, Password selection; Firewall design principles, Trusted systems.

Phishing and Identity Theft: Proxy servers, Anonymizers, Phishing and identity theft (ID Theft).

Total Periods: 45

TEXT BOOKS:

1. William Stallings, *Cryptography and Network Security Principles and Practice,* Pearson Education, Fourth Edition, 2010.
2. Nina Gobole and Sunit Belapure, *Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives,* Wiley India, 2011.

REFERENCE BOOK:

1. Behrouz A Forouzan and Debdeed Mukhopadhyay, *Cryptography and Network Security*, McGraw Hill Education, Second Edition, 2010

IV B. Tech. – I Semester

(16BT70502) ETHICAL HACKING

(Program Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A Course on "Computer networks"

COURSE DESCRIPTION:

Network and Computer Attacks; Foot Printing and Social Engineering; Port Scanning; Enumeration; Desktop and Server Operating System vulnerabilities; Hacking Web Servers; Cryptography; Network Protection System; Hacking Wireless Network.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate Knowledge on
- Network and Computer attacks
- OS Vulnerabilities
- Hacking web servers, Hacking wireless network

CO2. Analyze system and network vulnerabilities.

CO3. Design security solutions for risks that arise from hacking.

CO4. Use appropriate ethical hacking technique to solve security problems.

CO5. Apply contextual knowledge to assess safety and legal issues in applications like cyber crime, social engineering.

CO6. Inculcate use of ethical hacking practices while maintaining professional ethics.

DETAILED SYLLABUS:

UNIT-I: ETHICAL HACKING OVERVIEW, NETWORK AND COMPUTER ATTACKS (9 periods)

Ethical Hacking Overview: Ethical hacking, Certification programs for network security personnel. **Network and Computer Attacks:** Malicious software, Protection against malware, Intruder attacks on networks and computers, Addressing physical security.

UNIT-II: FOOTPRINTING AND SOCIAL ENGINEERING, PORT SCANNING (9 periods)

Footprinting and Social Engineering: Using web tools for foot printing, Conducting competitive intelligence, Using domain name system zone transfers, Introduction to social engineering. **Port Scanning:** Port scanning, Using port scanning tools, Conducting ping sweeps, Understanding scripting.

UNIT-III: ENUMERATION, OS VULNERABILITIES (9 periods)

Enumeration: Enumeration, Enumerating windows operating systems, Netware operating system and Unix operating system.

Desktop and Server OS Vulnerabilities: Windows OS vulnerabilities, Tools for identifying vulnerabilities in windows, Best practices for hardening windows systems, Linux OS vulnerabilities.

UNIT-IV: HACKING WEB SERVERS, HACKING WIRELESS NETWORK (9 periods)

Hacking Web Servers: Understanding web applications, Web application vulnerabilities, Tools for web attackers and Security testers. **Hacking Wireless Network:** Understanding wireless technology, Wireless network standards, Authentication, Wardriving, Wireless hacking.

UNIT-V: CRYPTOGRAPHY, NETWORK PROTECTION SYSTEM (9 periods)

Cryptography: Understanding cryptography basics, Cryptography attacks.

Network Protection System: Understanding routers, Firewalls, Intrusion detection and prevention systems, Honeypots.

Total Periods: 45

TEXT BOOK:

1. Michael T. Simpson, Kent Backman and James E. Corley, *Hands-On Ethical Hacking and Network Defense,* Cengage Learning, First edition, 2013.

REFERENCE BOOKS:

1. Kimberly graves, *CEH Official Certified Ethical Hacker Review Guide,* Wiley Publications, 2007.
2. Michael Gregg, *Certified ethical hacker (CEH) Cert guide,* Pearson Education, 2014.

IV B. Tech. - I Semester

(16BT61503) SOFTWARE PROJECT MANAGEMENT

(Program Elective–2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A Course on "Software Engineering".

COURSE DESCRIPTION:

Conventional Software Management; Evolution of Software Economics; Improving Software Economics; Lifecycle Phases; Artifacts of the Process; Workflow of the Process; Checkpoints of the Process; Software Economics; Iterative Process Planning; Project Organization and Responsibilities; Project Control and Project Instrumentation; Agile Overview.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on software effort estimation techniques, Agile life cycle, project control and instrumentation.

CO2. Analyze the major and minor milestones, artifacts, metrics from management and technical perspectives.

CO3. Design and develop software products using conventional and modern principles of software project management. CO4. Effectively implement project management through appropriate planning of Work flows and Work Breakdown Structures of the process.

CO5. Select appropriate techniques to evaluate progress of software project in terms of milestones and check points.

CO6. Apply appropriate ethical principles to be followed in management of software economics.

DETAILED SYLLABUS:

UNIT – I: SOFTWARE MANAGEMENT (**09 periods**)

Software management:

The Waterfall Model, Conventional Software Management Performance, Evolution of Software Economics**:** Software Economics, Pragmatic Software Cost Estimation.

Improving Software Economics:

Reducing Software Product Size, Improving Software Processes, Improving Team Effectiveness, Improving Automation, Achieving Required Quality.

UNIT – II: LIFE CYCLE PHASES (09 periods)

Conventional and Modern Software Management:

Principles of Modern Software Engineering, Principles of Modern Software Management, Transitioning to an Iterative Process.

Life Cycle Phases:

Engineering and Production Stages, Inception, Elaboration, Construction, Transition Phases.

UNIT – III: ARTIFACTS, ARCHITECTURES AND WORKFLOWS (09 periods)

Artifacts of The Process: The Artifact Sets, Management Artifacts, Engineering Artifacts.

Model Based Software Architectures: Architecture- Management Perspective, Technical Perspective.

Workflows of the Process: Software Process Workflows, Iteration Workflows.

UNIT – IV: CHECKPOINTS, PROCESS PLANNING AND PROJECT ORGANIZATION (09 periods)

Checkpoints of a process: Major Milestones, Minor Milestones, Periodic Status Assessments.

Iterative Process Planning: Work Breakdown Structures, Planning Guidelines, The Cost and Schedule Estimating Process

Project Organizations and Responsibilities: Line of Business Organizations, Project organizations, Evolution of Organizations.

UNIT – V: PROJECT CONTROL AND AGILE MANAGEMENT (09 periods)

Project control and process Instrumentation: The Seven Core Metrics, Management Indicators, Quality Indicators.

Agile Management: An Agile Overview, Role of a project manager, Benefits of Agile.

Total Periods: 45

TEXT BOOK:

1. Walker Royce, *Software Project Management,* Pearson Education, 3rd Edition, 1998.

REFERENCE BOOKS:

1. Michele Sliger and Stacia Broderick, *The Software Project Manager's Bridge to Agility,* Addison-Wesley, 2008.
2. Bob Hughes and Mike Cotterell, *Software Project Management,* Tata McGraw- Hill, 2006.

IV B. Tech. – I Semester

(16BT70503) COMPUTER FORENSICS

(Program Elective–3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A Course on "Computer Networks"

COURSE DESCRIPTION:

Computer Forensic Technologies; Evidence Collection and Data Seizure; Duplication and Preservation of Digital Evidence; E-mail Investigations; Data Analysis and Validation; Processing Crime and Incident Scenes; Mobile Device and Network Forensics; Computer Forensic Tools; Report Writing for Investigations

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on
- Occurrence of Cyber Crime, Cyber Detectives.
- Evidence and Data Capture and Computer Forensic Analysis.
- Law Enforcement crime and incident scenes.

CO2. Analyze and present computer forensic evidence.

CO3. Design solutions for a wide range of computer forensic problems - attack on routers and e-mail crimes.

CO4. Conduct investigations on forensic data.

CO5. Utilize appropriate forensic tools to collect digital evidence.

CO6. Apply contextual knowledge to assess the computer crimes relevant to cyber crime detection.

DETAILED SYLLABUS:

UNIT–I: OVERVIEW OF COMPUTER FORENSICS TECHNOLOGY AND SERVICES (9 Periods)

Computer Forensics Fundamentals: Computer forensics, Use of computer forensics in law enforcement, Benefits of professional forensics methodology, Steps taken by computer forensics specialists.

Types of Computer Forensics Technologies: Types of military computer forensic technology, Types of law enforcement, Computer forensic technology, Types of business computer forensic technology.

Computer Forensics Services: Occurrence of cyber crime, Cyber detectives, Computer forensics investigative services.

UNIT–II: COMPUTER FORENSICS EVIDENCE CAPTURE AND INVESTIGATIONS (9 Periods)

Evidence Collection and Data Seizure: Collect evidence, Collection options, Types of evidence, The rules of evidence, Volatile evidence, General procedure – Collection and archiving, Methods of collection, Collection steps; Controlling contamination- The chain of custody; Duplication and preservation of digital evidence- Preserving the digital crime scene; Computer evidence processing steps.

E–Mail Investigations: Exploring the role of e-mail in investigations, Investigating e-mail crimes and violations.

UNIT-III: COMPUTER FORENSIC ANALYSIS (10 Periods)

Data Analysis and Validation: Determining data to collect and analyze, Validating forensic data, Addressing data, Hiding techniques, Performing remote acquisitions.

Processing Crime and Incident Scenes: Identifying digital evidence, collecting evidence in private-sector incident scenes, Processing law enforcement crime, Preparing for a search, Seizing digital evidence at the scene, Storing digital evidence.

UNIT–IV: FORENSICS IN VARIOUS AREAS AND FORENSICS TOOLS (10 Periods)

Mobile Device Forensics: Understanding mobile device forensics, Acquisition procedures for Mobile devices.

Network Forensics and Live Acquisitions: Network Forensic Overview, Performing live acquisitions, Developing standard procedure for network forensics.

Computer Forensic Tools: Types of computer forensic tools, Computer forensic hardware and software tools.

UNIT–V: REPORT WRITING FOR INVESTIGATIONS (7 Periods)

Types of reports, Report structure, Writing reports clearly, Designing the layout and presentation of reports, Generating report findings with forensic software tools, Using access data FTK to generate reports.

Total Periods: 45

TEXT BOOKS:

1. John R. Vacca, *Computer Forensics, Computer Crime Scene Investigation,* Firewall Media, First Edition, 2009.
2. Bill Nelson, Amelia Phillips and Christopher Steuart, *Guide to Computer Forensics and Investigations,* Cengage Learning, Fourth Edition, 2010.

REFERENCE BOOKS:

1. Nina Godbole and Sunit Belapure, *Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives,* Wiley India Pvt Ltd, First Edition, 2011.

2. Kevin Mandia, Chris Prosise and Matt Pepe, *Incident Response & Computer Forensics,* Tata McGraw-Hill, Second Edition, 2006.

IV B. Tech. – I Semester

(16BT70504) DESIGN PATTERNS

(Program Elective–3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A Course on "Object Oriented Analysis and Design"

COURSE DESCRIPTION:
Introduction to Design Patterns; Creational Patterns; Structural Patterns; Behavioral Patterns.

COURSE OUTCOMES:
After successful completion of the course, the student will be able to:

CO1. Demonstrate knowledge on
- Creational patterns
- Structural Patterns
- Behavioral Patterns

CO2. Analyze various object oriented concepts using Design Patterns.
CO3. Implement Design Pattern in C++ or Java.
CO4. Use Appropriate design Pattern to solve computational problems.
CO5. Create Design Pattern to enhance software quality of a system.
CO6. Apply contextual knowledge of design patterns to address human computer interaction in societal applications.

DETAILED SYLLABUS:

UNIT-I: DESIGN PATTERNS (9 periods)
Design patterns in Smalltalk Model/View/Controller, Describing design patterns, The catalog of design patterns, Organizing the catalog, Design patterns to solve design problems, Select a design pattern, Use a design pattern.

UNIT-II: DOCUMENT EDITOR (9 periods)
Designing a document editor, Design problems, Document structure, Formatting, Embellishing the user interface, Supporting multiple look-and-feel standards, Supporting multiple window systems, User operations spelling checking and hyphenation.

UNIT-III: CREATIONAL PATTERNS (8 periods)
Abstract Factory, Builder, Factory method, Prototype, Singleton, Discussion of creational patterns.

UNIT-IV: STRUCTURAL PATTERNS (9 periods)
Adapter, Bridge, Composite, Decorator, Façade, Flyweight, Proxy, Discussion of structural patterns.

UNIT-V: BEHAVIORAL PATTERNS (10 periods)
Chain of responsibility, Command, Interpreter, Iterator, Mediator, Memento, Observer, State, Strategy, Template method, Visitor.

Total Periods: 45

TEXT BOOK:
1. Gamma, Vlissides, Helm and Johnson, *Design Patterns: Elements of Reusable Object Oriented Software,* Pearson Education, 1995.

REFERENCE BOOK:
1. James W. Cooper, *Java Design Patterns - A Tutorial,* Addison Wesley, 2000.

IV B. Tech. I-Semester
(16BT71508) INTERNET OF THINGS

(Common to CSE, IT, and CSSE)
(Program Elective–3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A Course on Computer Networks

COURSE DESCRIPTION:
Internet of Things Components; Communication models; Prototyping; Hardware; Design models; Analytics for IoT.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on Protocols, functional blocks and communication models of Internet of things.
CO2. Identify appropriate sensors and communication modes used in IoT based systems.
CO3. Design appropriate solutions for IoT applications using Raspberry Pi and Arduino kits.
CO4. Appropriately synthesize the models and applications for usage in Home automation and cities.
CO5. Apply evolutionary techniques to perform analytics on the data integrated from IoT based systems.
CO6. Use advances in IoT technology to design and develop applications.

DETAILED SYLLABUS:

UNIT- I: INTRODUCTION TO INTERNET OF THINGS (08 periods)
Definition, Characteristics, Things, Protocols, Logical Design, Functional Blocks, Communication models, APIs, Enabling Technologies, Levels & Deployment templates.

UNIT- II: DEVICES AND END POINTS (10 periods)
IoT Devices-Examples-Raspberry PI interfaces, Arduino interfaces, Programming Raspberry PI with Python, Other IOT devices, Domain Specific IoTs.

UNIT-III: SENSORS AND CONNECTIVITY (08 periods)
Sensors-Types of Sensor Nodes; Internet Communications, IP Addresses, MAC Address, TCP & UDP ports, Application Layer Protocols.

UNIT-IV: DESIGN METHODOLOGY AND CASE STUDIES (10 periods)

Design Methodology:
Purpose and Requirements specifications, Process Specifications, Domain Model specifications, Information Model specifications, Service specification, Level Specifications, Functional View specifications, Operational View specifications, Device and Component integration, Application development.

Case Studies: Home Automation, Cities.

UNIT-V: DATA ANALYTICS FOR IOT (09 periods)
Analytics, Apache Hadoop, Hadoop MapReduce for Batch Data Analysis, Apache Oozie, Chef and Case studies.

Total Periods: 45

TEXT BOOK:

1. Arshdeep Bahga, Vijay Madisetti, *Internet of Things–A hands-on approach,* University Press, 2015.

REFERENCE BOOKS:

1. Adrian McEwen and Hakim Cassimally, *Designing the Internet of Things,* Wiley Publishing, 2013.
2. CharlesBell, *Beginning Sensor Networks with Arduino and Raspberry Pi,* Apress, 2013.
3. Marco Schwartz, *Internet of Things with the Arduino Yun,* Packt Publishing, 2014.
4. Matt Richardson, Shawn Wallace, *Getting Started with Raspberry Pi,* Maker Media, Inc, 2012.

IV B. Tech. – I Semester

(16BT71208) SERVICE ORIENTED ARCHITECTURE

(Common to CSE and IT)
(Program Elective-3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Software Engineering".
COURSE DESCRIPTION: Web Services; Principles of SOA; Service Layers; Simple Object Access Protocol (SOAP); Web Services Description Language (WSDL).
COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:
- Principles, services and policies of service orientation.
- Fundamentals of web services.
- XML, WSDL related to SOA.

CO2. Analyze complex business process critically in identifying appropriate service model logic.
CO3. Design service oriented architecture suitable for different environments.
CO4. Use XML, SOAP and service interface design tools for building service oriented architecture.

DETAILED SYLLABUS:

UNIT-I: SOA AND EVOLUTION (10 Periods)
Introducing SOA: Fundamental SOA, Common characteristics of contemporary SOA, Common pitfalls of adopting SOA. **The Evolution of SOA:** An SOA timeline, The continuing evolution of SOA, The roots of SOA.
Web Services and Primitive SOA: The web services framework, Services, Service descriptions, Messaging.

UNIT-II: SOA AND WS-* EXTENSIONS (8 Periods)
WS-* and Contemporary SOA (Part I): Message Exchange Patterns (MEP), Service activity, Coordination, Atomic transactions, Business activities.
WS-* and Contemporary SOA (Part-II): Addressing, Reliable messaging, Correlation, Policies, Metadata exchange.

UNIT-III: PRINCIPLES, SERVICE LAYERS AND PLANNING (9 Periods)
Principles of Service-Orientation: Service-orientation and the enterprise, Anatomy of SOA, Common principles of service orientation, Inter relationship of service orientation principles, Service orientation and Object orientation.
Service Layers: Service-orientation and contemporary SOA, Service layer abstraction, Application service layer, Business service layer, Orchestration service layer, Agnostic services, Service layer configuration scenarios.
SOA Delivery Strategies: SOA delivery lifecycle phases, The Top-down strategy, the bottom-up strategy, the agile strategy.

UNIT - IV: SERVICE ORIENTED ANALYSIS AND SERVICE MODELING (8 Periods)
Service Oriented Analysis: Objectives and service oriented analysis process, Benefits of a business centric SOA and Deriving business services.
Service Modeling: Service modeling, Service modeling guidelines, Classifying service model logic, Contrasting service modeling approaches.

UNIT - V: SERVICE ORIENTED DESIGN AND SERVICE DESIGN (10 Periods)
Service-Oriented Design: Objectives and Service oriented design process, WSDL related XML schema language basics, WSDL language basics, SOAP language basics, Service interface design tools.
Service Design: Service design overview, Entity-centric business service design, Application service design, Task-centric business service design, Service design guidelines.

Total Periods: 45

TEXT BOOK:
1. Thomas Erl, *Service-Oriented Architecture - Concepts, Technology, and Design,* Pearson Education, 2011.

REFERENCE BOOKS:
1. Eric Newcomer, *Understanding SOA with Web Services,* Pearson Education, Second Edition, 2005.

2. Shankar Kambhampaty, *Service Oriented Architecture for Enterprise and Cloud Applications,* Wiley-India, Second Edition, 2010.

IV B. Tech. – I Semester

(16BT70505) **HUMAN COMPUTER INTERACTION**

(Common to CSE and IT)

(Program Elective-4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Computer Graphics".

COURSE DESCRIPTION:

Graphical User Interface; Design Process; Screen Designing; Windows; Components; Software Tools; Interaction Devices.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on principles, characteristics, tools and devices of Human Computer Interaction.

CO2. Analyze the user requirements, technological and physical characteristics of users for better interface design.

CO3. Design appropriate user interface for desktop and web applications.

C04. Conduct investigations on User requirements to provide an effective user interface.

CO5. Utilize user interface mockup tools and input, output and pointing devices for designing user interfaces.

CO6. Apply Contextual knowledge to develop interfaces for differently abled people.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION (9 periods)

Importance of User Interface: Definition, Importance of good design, Benefits of good design, A brief history of screen design.

Characteristics of Graphical and Web User Interfaces: The graphical user interface - popularity of graphics, The concept of direct manipulation, Graphical systems, Characteristics; Web user Interface - Popularity, Characteristics; Principles of user interface design.

UNIT-II: CONTROL DESIGN PROCESS (8 periods)

Design Process: Human interaction with computers, Importance of human characteristics, human considerations in design, Human interaction speeds, and understanding business functions.

UNIT-III: SCREEN DESIGN (10 periods)

Design Goals: Screen meaning and purpose, Organizing screen elements, Ordering of screen data and content, Screen navigation and flow, Visually pleasing composition, Amount of information, Focus and emphasis, Presenting information simply and meaningfully, Information retrieval on web, Statistical graphics, Technological considerations in interface design.

UNIT-IV: WINDOWS AND MULTIMEDIA (8 periods)

Windows Menus and Navigation Schemes: Selection of window, Selection of device based and screen based controls.

Components: text and messages, Icons and images, Multimedia, Color uses, Problems with colors, choosing colors.

UNIT-V: SOFTWARE TOOLS AND DEVICES (10 periods)

Software Tools: Specification methods, Interface building tools, Interaction devices - Keyboards and keypads, Pointing devices, Speech and auditory interfaces; Image and video displays, drivers.

Total Periods: 45

TEXT BOOKS:

1. Wilbert O. Galitz, *The Essential Guide to User Interface Design*, Wiley India Education, Second Edition, 2008.
2. Ben Schneiderman and Catherine Plaisant, *Designing theUser Interface,* Pearson Education, Fourth Edition, 2009.

REFERENCE BOOKS:

1. A Dix, Janet Finlay, G. D. Abowd and R. Beale, *Human-Computer Interaction,* Pearson Publishers, Third Edition, 2008.
2. Jonathan Wolpaw and Elizabeth Winter Wolpaw, *Brain-Computer Interfaces: Principles and Practice,* Oxford Publishers, First Edition, 2012.

IV B. Tech. – I Semester
(16BT71203) **INFORMATION RETRIEVAL SYSTEMS**
(Program Elective - 4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on "Data Structures" and "Database Management Systems".

COURSE DESCRIPTION: Architecture of Information Retrieval Systems; Functional Capabilities; Data Structures; Mathematical Algorithms; Indexing; Similarity and Clustering; Human Perception and Presentation; Text Search Techniques and Evaluation Measures.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1: Demonstrate knowledge on:
- Information Retrieval System Architecture
- Functional capabilities
- Indexing and data presentation methods.
- Evaluation measures of Information Retrieval Systems.

CO2: Analyze indexing methods and clustering algorithms to group similar data items for efficient search.

CO3: Design and develop data structures used to store and retrieve data items.

CO4: Demonstrate problem solving skills in the usage of mathematical algorithms for information retrieval.

CO5: Use text search algorithms and collaborative filtering techniques for information retrieval and visualization methods for information presentation.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION (9 Periods)

Primary information retrieval problems, Objectives of information retrieval system, Functional overview, Understanding the search functions, Relationship to DBMS, Digital libraries and data warehouses, Data structures and mathematical algorithms.

UNIT II: INGEST AND INDEXING (9 Periods)

Ingest: Introduction, Item receipt, Duplicate detection, Item normalization, Zoning and creation of processing tokens, Stemming, Entity processing, Categorization, Citational metadata.

Indexing: Manual indexing process, Automatic indexing of text and multimedia.

UNIT III: SEARCH AND CLUSTERING (12 Periods)

Search: Similarity measures and ranking, Hidden markov models, Ranking algorithms, Relevance feedback, Selective dissemination of information search, Weighted searches for boolean systems, Multimedia searching.

Clustering: Introduction to clustering, Thesaurus generation, Item clustering, Hierarchy of clusters.

UNIT IV: INFORMATION PRESENTATION (7 Periods)

Introduction, Presentation of the hits, Display of the item, Collaborative filtering, Multimedia presentation, Human perception and presentation.

UNIT V: SEARCH ARCHITECTURE AND EVALUATION (8 Periods)

Search Architecture: Index search optimization, Text search optimization, GOOGLE Scalable multiprocessor architecture.

Evaluation: Information system evaluation, Measures used in system evaluation

Total Periods: 45

TEXT BOOK:

1. Gerald Kowalski, *Information Retrieval Architecture and Algorithms,* Springer, 2013.

REFERENCE BOOKS:

1. Christopher D. Manning, Prabhakar Raghavan and Hinrich Schütze, *An Introduction to Information Retrieval,* Cambridge University Press, 2012.
2. Ricardo Baeza-Yates and Berthier Ribiero-Neto, *Modern Information Retrieval the concepts and technology behind search,* Addison Wesley, Second Edition, 2010.

IV B. Tech. – I Semester

(16BT70506) MULTIMEDIA APPLICATION DEVELOPMENT

(Program Elective-4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:

Courses on "Object Oriented Programming through C++" and "Computer Graphics"

COURSE DESCRIPTION:

Multimedia; Fundamental Concepts in Audio and Video; Action Script 3.0; Multimedia Data Compression; Multimedia Network Communications and Applications.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on
- Multimedia and Hypermedia
- Action Script 3.0
- Video representations and standards
- Multimedia Network Communications.

CO2. Analyze Action Script 3.0 principles, functions and components for developing multimedia authoring applications.

CO3. Design multimedia software for developing Internet applications and flash animations.

CO4. Develop solutions for simple to complex real life multimedia applications.

CO5. Use compression techniques and Action script 3.0 for development of multimedia applications.

CO6. Apply contextual knowledge to address issues like data compression, network communications in societal applications.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO MULTIMEDIA (8 periods)

Definition of Multimedia, Multimedia and Hypermedia, World Wide Web, Overview of multimedia software tools, Graphics and image data representations - Graphics/Image data types, popular file formats.

UNIT-II: ACTION SCRIPT-I (10 Periods)

Action Script 3.0 core concepts - Tools for writing action script code, Flash client runtime environments, Compilation, Just In Time compilation, Classes and objects, Creating a program, Packages, Defining a class, Variable and values, Constructor parameters and arguments; Action Script 3.0 conditionals, Loops and functions - Conditionals, Loops; Functions - Package-level functions, Nested functions, Source-file-level functions.

UNIT-III: ACTION SCRIPT-II (10 Periods)

Action Script 3.0 data types and type checking - Data types and type annotations, Untyped variables, parameters, Return values, Strict modes three special cases, Warnings for missing type annotations, Detecting reference errors at compile time, Casting, Conversion to primitive types, Default variable values, Null and undefined; Action Script 3.0 events and event handling - Action script event basics, Accessing the target object, Accessing the object that registered the listener.

UNIT-IV: MULTIMEDIA DATA COMPRESSION (10 Periods)

Lossless compression algorithms - Basics of information theory, Run-length coding, Variable length coding, and Dictionary based coding; Lossy compression algorithms - Quantization, Transform coding; Image compression standards - JPEG standard, JPEG 2000.

UNIT-V: MULTIMEDIA NETWORKS COMMUNICATIONS (7 Periods)

Multimedia Networks - Basics of multimedia networks, Multiplexing technologies, LAN and WAN; Multimedia network communications and applications - Quality of multimedia data transmission, Multimedia over IP, Media-on-demand.

Total Periods: 45

TEXT BOOK:

1. Ze-Nian Li and Mark S. Drew, *Fundamentals of Multimedia,* Pearson Education, Second Edition, 2008.
2. Colin Moock, *Essential Action Script 3.0,* SPD O'Reilly, First Edition, 2007.

REFERENCE BOOKS:

1. Nigel Chapman and Jenny Chapman, *Digital Multimedia,* Wiley Dreamtech, Second Edition, 2004.
2. Fred Halsall, *Multimedia Communications,* Pearson, First Edition, 2004.

IV B. Tech. – I Semester

(16BT61204) SEMANTIC WEB

(Program Elective - 4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Web Technologies".

COURSE DESCRIPTION: Semantic web fundamentals; Semantic web technology; Ontology web language; Swoogle; Semantic web services.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:

- Semantic web search
- RDF and SWOOGLE
- Semantic web services
- RDFS and OWL

CO2. Analyze layers of web architecture for describing web content.

CO3. Design semantic web search engine for capturing information on the current web.

CO4. Select RDF and SWOOGLE for search engine usage.

DETIALED SYLLABUS:

UNIT-I: INTRODUCTION TO SEMANTIC WEB (9 Periods)

The world of the semantic web: WWW, Internet usage, Meta data, Search engine for traditional web and semantic web.

UNIT-II: SEMANTIC WEB TECHNOLOGY (9 Periods)

Resource Description Framework (RDF), Rules of RDF, Aggregation-Distributed information, core elements of RDFS, Ontology and taxonomy, Inferencing based on RDF schema, RDF tools.

UNIT-III: WEB ONTOLOGY LANGUAGE –OWL (8 Periods)

Web ontology language (OWL), Define Classes: Localize global properties, Set operators and enumeration, Define properties; Ontology matching and distributed information, OWL ontology Header, Camera ontology in OWL, Three faces of OWL.

UNIT-IV: SWOOGLE (10 Periods)

Swoogle Architecture, FOAF, Semantic markup, Issues, Prototype system, Design of semantic web search engine, Discovery and indexation strategy, Need for Semantic Web services.

UNIT-V: SEMANTIC WEB SERVICES (9 Periods)

Semantic web services and applications, OWL-S: Upper ontology, WSDL-S, OWL-S to UDDI mapping, Design of the search engine and implementations.

Total Periods: 45

TEXT BOOK:

1. Liyang Yu, *Introduction to the Semantic Web and Semantic web services,* Chapman & Hall/CRC, Taylor & Francis group, 2007.

REFERENCE BOOKS:

1. Johan Hjelm, *Creating the Semantic Web with RDF,* Wiley, 2001
2. Grigoris Antoniou and Frank van Harmelen, *A Semantic Web Primer,* MIT Press, 2004.

IV B. Tech. - I Semester

(16BT61231) **CLOUD COMPUTING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on "Cloud Computing".

COURSE DESCRIPTION: Hands-on experience on creating virtual machines on Windows and Linux platforms; Development of service based web applications and their deployment.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate hands-on experience on Virtualization models and Cloud Environment.
CO2. Analyze the given experiment and relate to existing cloud architectures.
CO3. Apply API development skills in web applications for cloud deployment.
CO4. Demonstrate independent problem solving skills in developing dynamic web applications.
CO5. Use advanced programming languages to access cloud services.
CO6. Build suitable cloud environment for societal requirements.
CO7. Work effectively as an individual and as a member in team for mini-project implementation.
CO8. Demonstrate communication skills, both oral and written for preparing and presenting reports.

LIST OF EXERCISES:

1. Create VM's with given set of configuration on Hyper-V Ubuntu 14LTs files with 2GB RAM & 200GB Hard Disk through Infrastructure Services (IaaS).
2. Create Virtualization on VMware Windows 7 OS with 4GB RAM & 500GB Hard Disk" through Infrastructure as a Service (IaaS).
3. Develop a simple web application for student details & operative using Salesforce.com in Cloud Platform under Software as Service (SaaS).
4. Develop a simple web application for personal Homepage, Attributes, Controllers, GUI, Visual Page, Forms, and Templates under Software as Service (SaaS).
5. Develop a web application for performing calculator operations. Deploy this application on Salesforce.com Cloud Platform under Software as Service (SaaS).
6. Develop a web application on IBM Bluemix Cloud Platform for executing application using Eclipse under Platform as a Service.
7. Create virtual machine instance with given set of configuration on Amazon web Services (AWS) under Infrastructure as a Service (IaaS).
8. Create virtual machine instance with set of configuration on Amazon S3 (Simple Storage Service) in Amazon Web Service (AWS) under Infrastructure as a Service (IaaS).
9. Develop a web application on IBM Bluemix Cloud Platform for implementing IoT application.
10. Develop a calculator web based application on MS-Azure Platform i.e. Platform as a Service (PaaS).
11. Develop a student home page web based application on MS-Azure Platform i.e. Platform as a Service (PaaS) Cloud.
12. Develop a mobile app on Google App Engine for uploading a resume into a website, collaborated with Drop box. The resume should be encrypted. (PaaS)
13. Develop a service call to run on Drop box resumes for picking the resumes of given skill set. (PaaS)
    i. 6+ years of Exp in Java Development.
    ii. 10 years of experience in Automation Testing.
    iii. 15+ years of Managerial experience with technical background.
    iv. 5-7 years of on-site experience in .NET support and programming.

REFERENCE BOOKS:

1. Barrie Sosinsky, *Cloud Computing Bible,* Wiley India Pvt Ltd, 2011.
2. Rajkumar Buyya, James Broberg and Andrzej Goscinski, *Cloud computing principles and paradigms,* John Wiley and Sons, 2011.
3. Thomas Erl and RicardoPuttini, *Cloud Computing- Concepts, Technology & Architecture***,** Pearson, 2013.
4. John W. Rittinghouse and James F. Ransome, *Cloud Computing implementation, Management and Security,* CRC Press, ISBN: 9788120341609, Taylor & Francis group, 2010.

IV B. Tech. – I Semester

(16BT51233) WEB TECHNOLOGIES LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on "Web Technologies".

COURSE DESCRIPTION: Hands-on experience on HTML, HTML5, CSS, JavaScript, JQuery, Bootstrap, PHP and MySQL.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on web page design elements, dynamic content and database Interaction.

CO2. Analyze user requirements to develop web applications.

CO3. Design client-server applications using web technologies.

CO4. Demonstrate problem solving skills to develop enterprise web applications.

CO5. Use HTML, CSS, JavaScript, JQuery, Bootstrap and PHP technologies for device independent web application development.

CO6. Apply web technologies to develop interactive, dynamic and scalable web applications for societal needs.

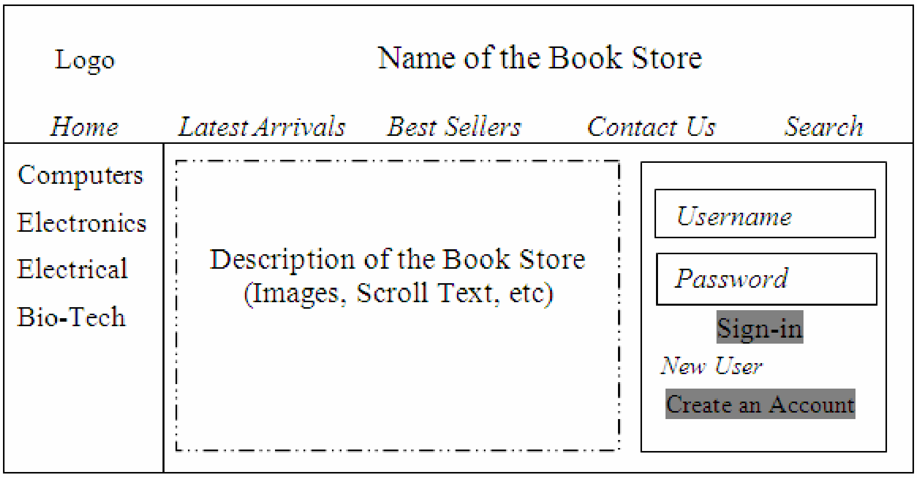
CO7. Work effectively as an individual and as a member in team for mini-project implementation.

CO8. Demonstrate communication skills, both oral and written for preparing and presenting reports.

LIST OF EXERCISES:

1. Design the following static web pages of an online book store web application.

a. Home Page:



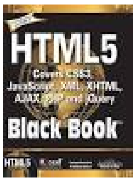
b. Catalogue Page:

The catalogue page should display the following details of available books.

i. Snap shot of cover page
ii. Title of the text book
iii. Author name
iv. Publisher
v. Price
vi. More details link.

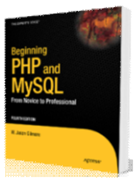
Logo	Name of the Book Store			
Home	*Latest Arrivals*	*Best Sellers*	*Contact Us*	*Search*

Computers
Electronics
Electrical
Bio-Tech



HTML5 Black Book
Kogent Learning Solutions
Dreamtech Press
Rs. 570/-

More Details



Beginning PHP and MySQL
4th Edition
W Jason Gilmore
Apress
Rs. 520/-

More Details

c. Registration Page:

Design the Registration page with the following fields and navigate it with create an account link.

i. First Name ii. Last Name iii. Gender iv. Date of Birth
v. Username vi. Password vii. Confirm Password
viii. Address ix. Postal Code x. Mobile No. xi. Email-Id

2. a. Design a web page to store username and password information using the local storage concept.
   b. Design a web page to store employee information including Name, Emp. Id, Department, Salary and Address on a client's machine using a real SQL database.
3. Apply the following styles to all web pages of online book store web application.
   a. Fonts and Styles: font-family, font-style, font-weight and font-size
   b. Backgrounds and colors: color, background-color, background-image and background-repeat
   c. Text: text-decoration, text-transformation, text-align and text-indentation, text-align
   d. Borders: border, border-width, border-color and border-style
   e. Styles for links: A: link, A: visited, A:active, A:hover
   f. Selectors, Classes, Layers and Positioning elements.
4. Write a JavaScript/JQuery code to validate the following fields of the Registration web page.
   a. First Name/Last Name - should contain only alphabets and the length should not be less than 8 characters.
   b. Username - It should contain combination of alphabets, numbers and underscore. It should not allow spaces and special symbols.
   c. Password - It should not less than 8 characters in length and it contains one uppercase letter and one special symbol.
   d. Date of Birth - It should allow only valid date; otherwise display a message stating that entered date is invalid. Ex. 29 Feb. 2009 is an invalid date.
   e. Postal Code: It must allow only 6 digit valid number.
   f. Mobile No. - It should allow only numbers and total number of digits should be equal to 10.
   g. e-mail id - It should allow the mail id with the following format:
      Ex. mailid@domainname.com
5. Design a web page with the following features using HTML5,JavaScript and JQuery
   a. Displaying of images with Custom animated effects

b. Playing of selected video from the list of videos

c. Showing the animated text in increasing and decreasing font size

d. Changing the size of the area in a web page using DIV tag

e. Hiding and Showing elements in a web page.

6. Design a web page with the following features using Bootstrap and Media Query.
   a. Components
   b. Responsive tables
   c. Responsive images and videos

7. a. Deploy and navigate web pages of online book store using WAMP/XAMPP web server.

   b. Write a PHP program to read user name and favorite color from the HTML form. Display the name of the user in green color and sets user favorite color as a background for the web page.

8. Write a PHP code to read the username and password entered in the Login form of the online book store and authenticate with the values available in cookies. If user enters a valid username and password, welcome the user by username otherwise display a message stating that, entered details are invalid.

9. Write a PHP code to read user details entered through the registration web page and store the same into MySQL database.

10. Write a PHP code for storing books details like Name of the book, author, publisher, edition, price, etc into MySQL database. Embed a PHP code in catalogue page of the online book store to extract books details from the database.

11. Mini Project - 1: Design a web application for selling products online with the following features.

    Mobile website option - The online store should be built on a responsive design template and its features need to be available to all users, at any time, from anywhere and in any device.

    Image options - The photos should also be taken from different points of view to give you a clearer idea of the product. Image options should include viewing angles, zoom, multiple images, and more. Detailed product description - The description should often include the important details, such as the expiration date, size dimensions, weight, manufacturers date, and practical uses must be included in a good product description.

    Order Tracking - The customers should be able to track their ordered products by logging into an account created upon registration. Payment Options - An online website should allow credit card/debit card/net banking for payment.

12. Mini Project – 2: Design a social website with the following features Build Profile - Members allow to build their profiles.

    Upload content - The Social Networking Sites allow members to upload text messages, photographs, audio and video files. All posts are arranged in descending order with the ast post coming first.

    Build conversations - Content posted by members can be browsed and commented upon by all members who form part of the community. Content can also be tagged from third party sites on subjects that interest the group.

REFERENCE BOOKS:

1. Kogent Learning Solutions Inc, *HTML 5 Black Book: Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP and JQuery,* Dreamtech Press, Second Edition, 2016.
2. W. Jason Gilmore, *Beginning PHP and MySQL,* APress, Fourth Edition, 2011.
3. Snig Bahumik, *Bootstrap Essentials,* PACKT Publishing, 2015. (e-book).

IV B. Tech. – I Semester

(16BT70531) COMPREHENSIVE ASSESSMENT

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
	100	100	-	-	-	2

PREREQUISITES: All the courses of the program

COURSE DESCRIPTION:
Assessment of student learning outcomes in all the courses of the program

COURSE OUTCOMES:

On successful completion of Comprehensive Assessment, the student will be able to demonstrate:

CO1. Knowledge in the courses of the program.

CO2. Analytical ability in the courses of the program.

CO3. Design skills in the courses of the program.

CO4. Ability to investigate and solve complex engineering problems in the courses of the program.

CO5. Ability to apply tools and techniques to complex engineering activities with an understanding of limitations in the courses of the program.

CO6. Ability to provide solutions as per societal needs with consideration to health, safety, legal and cultural issues in the courses of the program.

CO7. Understanding of the impact of the professional engineering solutions in environmental context and need for sustainable development in the courses of the program.

CO8. Ability to apply ethics and norms of the engineering practice in the courses of the program.

CO9. Ability to function effectively as an individual in the courses of the program.

CO10. Ability to present views cogently and precisely in the courses of the program.

CO11. Ability to engage in life-long in the courses of the program.

IV B. Tech. – II Semester
(16BT80531) **PROJECT WORK**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
100	100	200	-	-	-	12

PREREQUISITES: All the courses of the program

COURSE DESCRIPTION:

Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Preparation of thesis and presentation.

COURSE OUTCOMES:

On successful completion of the project work, the student will be able to demonstrate:

CO1. Knowledge on the project topic

CO2. Analytical ability exercised in the project work.

CO3. Design skills applied on the project topic.

CO4. Ability to investigate and solve complex engineering problems faced during the project work.

CO5. Ability to apply tools and techniques to complex engineering activities with an understanding of limitations in the project work.

CO6. Ability to provide solutions as per societal needs with consideration to health, safety, legal and cultural issues considered in the project work.

CO7. Understanding of the impact of the professional engineering solutions in environmental context and need for sustainable development experienced during the project work.

CO8. Ability to apply ethics and norms of the engineering practice as applied in the project work.

CO9. Ability to function effectively as an individual as experienced during the project work.

CO10. Ability to present views cogently and precisely on the project work.

CO11. Project management skills as applied in the project work.

CO12. Ability to engage in life-long leaning as experience during the project work.

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(Autonomous)

COURSE STRUCTURE (2016-2017)

INFORMATION TECHNOLOGY

I B.Tech. (I Semester)

S. No	Course Code	Course Title	L	T	P	Periods per week	C	Scheme of Examination Max. Marks		
								Int.	Ext.	Total
1.	16BT1HS01	Technical English	3	1	-	4	3	30	70	100
2.	16BT1BS01	Engineering Chemistry	3	1	-	4	3	30	70	100
3.	16BT1BS03	Matrices and Numerical Methods	3	1	-	4	3	30	70	100
4.	16BT1BS04	Multi-Variable Calculus and Differential Equations	3	1	-	4	3	30	70	100
5.	16BT10501	Programming in C	3	1	-	4	3	30	70	100
6.	16BT1HS31	English Language Lab	-	-	3	3	2	50	50	100
7.	16BT1BS31	Engineering Chemistry Lab	-	-	3	3	2	50	50	100
8.	16BT10331	Computer Aided Engineering Drawing	-	1	6	7	3	50	50	100
9.	16BT10531	Programming in C Lab	-	-	3	3	2	50	50	100
		Total:	**15**	**6**	**15**	**36**	**24**	**350**	**550**	**900**

I B.Tech. (II Semester)

S. No	Course Code	Course Title	L	T	P	Periods per week	C	Scheme of Examination Max. Marks		
								Int.	Ext.	Total
1.	16BT1BS02	Engineering Physics	3	1	-	4	3	30	70	100
2.	16BT2BS01	Transformation Techniques and Partial Differential Equations	3	1	-	4	3	30	70	100
3.	16BT20441	Basic Electronic Devices and Circuits	3	1	-	4	3	30	70	100
4.	16BT21201	Object Oriented Programming through C++	4	1	-	5	4	30	70	100
5.	16BT21501	Digital Logic Design	3	1	-	4	3	30	70	100
6.	16BT1BS32	Engineering Physics Lab	-	-	3	3	2	50	50	100
7.	16BT20451	Analog and Digital Electronics Lab	-	-	3	3	2	50	50	100
8.	16BT21231	IT Workshop	-	-	3	3	2	50	50	100
9.	16BT21232	Object Oriented Programming Lab	-	-	3	3	2	50	50	100
		Total:	**16**	**5**	**12**	**33**	**24**	**350**	**550**	**900**

II B.Tech. (I Semester)

S. No	Course Code	Course Title	L	T	P	Periods per week	C	Scheme of Examination Max. Marks		
								Int.	Ext.	Total
1.	16BT3BS01	Probability Distributions and Statistical Methods	3	1	-	4	3	30	70	100
2.	16BT30501	Computer Organization	3	1	-	4	3	30	70	100
3.	16BT30502	Data Structures	3	1	-	4	3	30	70	100
4.	16BT31201	Discrete Mathematical Structures	3	1	-	4	3	30	70	100
5.	16BT50502	Linux Programming	3	1	-	4	3	30	70	100
6.	16BT31501	Operating Systems	3	1	-	4	3	30	70	100
7.	16BT30531	Data Structures Lab	-	-	3	3	2	50	50	100
8.	16BT50532	Linux Programming Lab	-	-	3	3	2	50	50	100
9.	16BT31531	Operating Systems Lab	-	-	3	3	2	50	50	100
		Total:	**18**	**6**	**9**	**33**	**24**	**330**	**570**	**900**

II B.Tech. (II Semester)

S. No	Course Code	Course Title	L	T	P	Periods per week	C	Scheme of Examination Max. Marks		
								Int.	Ext.	Total
1.	16BT3HS01	Environmental Studies	3	-	-	3	3	30	70	100
2.	16BT41204	Theory of Computation	3	1	-	4	3	30	70	100
3.	16BT40502	Database Management Systems	3	1	-	4	3	30	70	100
4.	16BT41201	Design and Analysis of Algorithms	3	1	-	4	3	30	70	100
5.	16BT41202	Java Programming	3	1	-	4	3	30	70	100
6.	16BT41203	Software Engineering	3	1	-	4	3	30	70	100
7.	16BT40531	Database Management Systems Lab	-	-	3	3	2	50	50	100
8.	16BT31231	Java Programming Lab	-	-	3	3	2	50	50	100
9.	16BT4HS31	Soft Skills Lab	-	-	3	3	2	50	50	100
		Total:	**18**	**5**	**9**	**32**	**24**	**330**	**570**	**900**

III B.Tech. (I Semester)

S. No	Course Code	Course Title	L	T	P	Periods per week	C	Scheme of Examination Max. Marks		
								Int.	Ext.	Total
1.	16BT51201	Computer Graphics and Multimedia	3	1	-	4	3	30	70	100
2.	16BT50501	Computer Networks	3	1	-	4	3	30	70	100
3.	16BT51501	Compiler Design	3	1	-	4	3	30	70	100
4.	16BT51202	Object Oriented Analysis and Design	3	1	-	4	3	30	70	100
5.	16BT51203	Web Technologies	3	1	-	4	3	30	70	100
6.		**Interdisciplinary Elective-1**	3	1	-	4	3	30	70	100
	16BT50341	Optimization Techniques								
	16BT50442	Microprocessors and Interfacing								
	16BT60404	Image Processing								
	16BT60503	Wireless Networks								
7.	16BT51231	CASE Tools and Computer Networks Lab	-	-	3	3	2	50	50	100
8.	16BT51232	Computer Graphics and Multimedia Lab	-	-	3	3	2	50	50	100
9.	16BT51233	Web Technologies Lab	-	-	3	3	2	50	50	100
		Total:	**18**	**6**	**9**	**33**	**24**	**330**	**570**	**900**

III B.Tech. (II Semester)

S. No	Course Code	Course Title	L	T	P	Periods per week	C	Scheme of Examination Max. Marks		
								Int.	Ext.	Total
1.	16BT3HS02	Managerial Economics and Principles of Accountancy	3	1	-	4	3	30	70	100
2.	16BT61501	Data Warehousing and Data Mining	3	1	-	4	3	30	70	100
3.	16BT61201	Cloud Computing	3	1	-	4	3	30	70	100
4.		**Interdisciplinary Elective-2**	3	1	-	4	3	30	70	100
	16BT60441	Pattern Recognition								
	16BT70402	Embedded Systems								
	16BT60502	Soft Computing								
	16BT61202	Ad-hoc and Wireless Sensor Networks								
5.		**Program Elective – 1**	3	1	-	4	3	30	70	100
	16BT30503	Python Programming								
	16BT61203	Advanced Databases								
	16BT61204	Semantic Web								
	16BT61503	Software Project Management								
6.		**Open Elective**	3	1	-	4	3	30	70	100
7.	16BT61231	Cloud Computing Lab	-	-	3	3	2	50	50	100
8.	16BT61232	Knowledge Engineering Lab	-	-	3	3	2	50	50	100
9.	16BT61233	Seminar	-	-	-	-	2	-	100	100
10.	16BT6MOOC	MOOC	-	-	-	-	-	-	-	-
		Total:	**18**	**6**	**6**	**30**	**24**	**280**	**620**	**900**

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(Autonomous)

COURSE STRUCTURE (2016-2017)

INFORMATION TECHNOLOGY

III B.Tech. (II Semester) - Open Electives

S. No.	Course Code	Open Elective Course Title	S. No.	Course Code	Open Elective Course Title
1.	16BT6HS01	Banking and Insurance	16.	16BT60114	Disaster Mitigation and Management
2.	16BT6HS02	Business Communication and Career Skills	17.	16BT60115	Environmental Pollution and Control
3.	16BT6HS03	Cost Accounting and Financial Management	18.	16BT60116	Planning for Sustainable Development
4.	16BT6HS04	Entrepreneurship for Micro, Small and Medium Enterprises	19.	16BT60117	Professional Ethics
5.	16BT6HS05	French Language	20.	16BT60118	Rural Technology
6.	16BT6HS06	German Language	21.	16BT60308	Global Strategy and Technology
7.	16BT6HS07	Indian Constitution	22.	16BT60309	Intellectual Property Rights and Management
8.	16BT6HS08	Indian Economy	23.	16BT60310	Managing Innovation and Entrepreneurship
9.	16BT6HS09	Indian Heritage and Culture	24.	16BT60311	Materials Science
10.	16BT6HS10	Indian History	25.	16BT70412	Green Technologies
11.	16BT6HS11	Personality Development	26.	16BT70413	Introduction to Nanoscience and Technology
12.	16BT6HS12	Philosophy of Education	27.	16BT60505	Engineering System Analysis and Design
13.	16BT6HS13	Public Administration	28.	16BT71011	Micro-Electro-Mechanical Systems
14.	16BT60112	Building Maintenance and Repair	29.	16BT61205	Cyber Security and Laws
15.	16BT60113	Contract Laws and Regulations	30.	16BT61505	Bio-informatics

IV B.Tech. (I Semester)

S. No	Course Code	Course Title	L	T	P	Periods per week	C	Scheme of Examination Max. Marks		
								Int.	Ext.	Total
1.	16BT5HS01	Management Science	3	1	-	4	3	30	70	100
2.	16BT71201	Big Data Technologies	3	1	-	4	3	30	70	100
3.	16BT71202	Mobile Application Development	3	1	-	4	3	30	70	100
4.		**Program Elective – 2**	3	1	-	4	3	30	70	100
	16BT71203	Information Retrieval Systems								
	16BT71204	Mobile Computing								
	16BT71505	Network Programming								
	16BT60501	Software Testing								
5.		**Program Elective – 3**	3	1	-	4	3	30	70	100
	16BT71205	Cryptography and Network Security								
	16BT71206	.Net Technologies								
	16BT71207	E-commerce								
	16BT71208	Service Oriented Architecture								
6.		**Program Elective – 4**	3	1	-	4	3	30	70	100
	16BT71209	Machine Learning								
	16BT71508	Internet of Things								
	16BT71210	High Performance Computing								
	16BT70505	Human Computer Interaction								
7.	16BT71231	Big Data Technologies Lab	-	-	3	3	2	50	50	100
8.	16BT71232	Mobile Application Development Lab	-	-	3	3	2	50	50	100
9.	16BT71233	Comprehensive Assessment	-	-	-	-	2	-	100	100
		Total:	**18**	**6**	**6**	**30**	**24**	**280**	**620**	**900**

IV B.Tech. (II Semester)

S. No	Course Code	Course Title	L	T	P	Periods per week	C	Scheme of Examination Max. Marks		
								Int.	Ext.	Total
1.	16BT81231	Project Work	-	-	-	-	12	100	100	200
		Total:	**-**	**-**	**-**	**-**	**12**	**100**	**100**	**200**
			Grand Total :					**2350**	**4150**	**6500**

I B.Tech. - I Semester

(16BT1HS01) TECHNICAL ENGLISH

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: English at Intermediate level

COURSE DESCRIPTION:

Introduction to Communication; Active Listening; Effective Speaking; Reading; and Writing.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Demonstrate knowledge in:
   - Process of communication
   - Modes of listening
   - Paralinguistic features
   - Skimming and Scanning
   - Elements of style in writing
2. Analyze the possibilities and limitations of language for understanding.
   - Barriers to Communication
   - Barriers to Effective Listening
   - Barriers to Speaking
   - Formal and metaphorical language
3. Design and develop functional skills for professional practice.
4. Apply writing skills in preparing and presenting documents.
5. Function effectively as an individual and as a member in diverse teams.
6. Communicate effectively with the engineering community and society in formal and informal situations.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO COMMUNICATION

Introduction –Language as a Tool of Communication – Communicative Skills (Listening, Speaking, Reading and Writing) – Effective Communication – Modes of Communication – Barriers to Communication (classification)

UNIT-II: ACTIVE LISTENING

Introduction – Reasons for poor Listening – Traits of a Good Listener – Listening Modes – Types of Listening – Barriers to Effective Listening – Listening for General Content and Specific Information

UNIT-III: EFFECTIVE SPEAKING Introduction – Achieving Confidence, Clarity and Fluency – Paralinguistic Features – Barriers to Speaking – Types of Speaking – Persuasive Speaking.

UNIT-IV - READING

Introduction and Reading Rates – Reading and Interpretation – Intensive and Extensive Reading – Critical Reading – Reading for Different Purposes – SQ3R Reading Technique –Study Skills.

UNIT-V: WRITING

Introduction – Language – Elements of Style – Techniques for Good Technical Writing – Referencing and Styling – Right Words and Phrases – Sentences.

TEXT BOOK:

1. Meenakshi Raman & Sangeetha Sharma, *Technical Communication*, Oxford University Press, New Delhi, 2012.

REFERENCE BOOKS:

1. Ashraf Rizvi*, Effective Technical Communication*, McGraw-Hill Education (India) Pvt.Ltd., New Delhi, 2015.
2. Sanjay Kumar & Pushp Lata, *Communication Skills*, Oxford University university press 2012 University Press, New Delhi, 2013.
3. Teri Kwal Gamble and Michael Gamble, *Communication Works*, Tata Mc Graw-Hill, New Delhi, 2010.

4. Rajendra Pal and J.S. Korlahalli, *Essentials of Business Communication*, Sultan Chand and Sons (P) Ltd, New Delhi, 2010.

I B.Tech. - I Semester
(16BT1BS01) ENGINEERING CHEMISTRY

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITE: Intermediate/Senior Secondary Chemistry

COURSE DESCRIPTION: Water technology, Chemistry of Engineering materials, Nanochemistry, Green Chemistry, Electro chemical cells, Sensors, Corrosion and Lubricants.

COURSE OUTCOMES:

After completion of the course, a successful student is able to:

CO1: Acquire basic knowledge in water technology, engineering plastics, conducting polymers, composites, Electro chemical cells, Nano Chemistry, principles of Green Chemistry, corrosion phenomenon and lubricants.

CO2: Develop analytical skills in:

a. Determination of hardness of water.
b. Determination of viscosity, flame and fire points, cloud and pour points.

CO3: Develop designing skills in:

a. Synthesis of engineering plastics.
b. Chemical methods for the synthesis of Nano materials.

CO4: Develop skills for providing solutions through:

a. Mitigation of hardness of water.
b. Newer Nanomaterials and engineering plastics for specific applications

CO5: Acquire awareness to practice engineering in compliance to modern techniques such as:

a. Nalgonda technique for defluoridation of water
b. Electroplating technique for control of corrosion.

CO6: Acquire awareness to societal issues on:

a. Quality of water.
b. Bio-diesel
c. Chemical materials utility and their impact.

DETAILED SYLLABUS:

UNIT–I: WATER TECHNOLOGY (9 periods)

Introduction: Types of water, impurities in water and their consequences, types of hardness of water, units of hardness of water, disadvantages of hardness of water, estimation of hardness of water by EDTA method, Boiler troubles: Scales and Sludges, Caustic embrittlement, Boiler corrosion and Priming and Foaming.

Softening of water: Zeolite process and Ion exchange process, advantages and disadvantages. Desalination of brackish water by Reverse Osmosis, Numerical problems on estimation of hardness of water.

Fluorides in water: Effects on human health, defluoridation method-Nalgonda method; comparison of merits and demerits of various defluoridation methods (Nalgonda, Bone Charcoal, Activated Alumina, Contact precipitation, Brick, Reverse osmosis).

UNIT – II: CHEMISTRY OF ENGINEERING MATERIALS (9 periods)

Engineering Plastics: Definition, general properties, synthesis, properties and applications of PC, PTFE, and PMMA.

Conducting polymers: Definition, types of conducting polymers: Intrinsic and extrinsic conducting polymers with examples, engineering applications of conducting polymers.

Biodegradable polymers: Definition, properties, classification, mechanism of degradation of biodegradable polymers and their applications.

Composites – Introduction, types of composites: fiber reinforced particulate and layered composites with examples, advantages of composites and applications.

UNIT– III: NANOCHEMISTRY AND GREEN CHEMISTRY (9 periods)

Nanochemistry: Introduction, classification, properties and applications of Nano materials (nano particles, nano tubes, nano wires, nano composites, dendrimers); synthesis of Nano materials – Sol-gel process.

Green Chemistry: Introduction, principles of green chemistry, Tools of Green Chemistry with Examples, Applications of Green Chemistry in science and technology.

Biodiesel: Introduction, Synthesis (Trans esterification method), advantages, disadvantages and applications.

UNIT–IV: ELECTROCHEMICAL CELLS AND SENSORS (9 periods)

Electrochemical cell: Introduction, EMF of an electrochemical cell.

Batteries: Introduction, types of Batteries: primary and secondary batteries with examples, Ni-Cd batteries, Lithium-ion batteries, Lithium- Polymer batteries, Applications of batteries.

Fuel Cells: Definition, examples: H_2 – O_2 Fuel cell, solid oxide fuel cell, Bio-fuel cell and applications of fuel cells.

Sensors - Introduction, Types of Sensors, electrochemical sensor: construction and working principle of potentiometric sensor, and applications of electrochemical sensors.

UNIT–V: CORROSION AND LUBRICANTS (9 periods)

Corrosion: Introduction, Definition, types of corrosion (dry and wet corrosion), galvanic corrosion, concentration cell corrosion, Factors influencing corrosion, Corrosion control: cathodic protection; sacrificial anodic protection and impressed current cathodic protection; protective coatings: Galvanizing and Electroplating (Nickel).

Lubricants: Definition, functions of lubricants, mechanism of lubrication, classification of lubricants, properties of lubricants – viscosity, flash and fire points, cloud and pour points, Aniline points, neutralization number and mechanical strength.

Total periods: 45 periods

TEXT BOOKS:

1. P.C.Jain & Monika Jain, **Engineering Chemistry**, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 16th edition, 2013.
2. K.N. Jayaveera, G.V. Subba Reddy & C. Ramachandraiah **Engineering Chemistry**, Mc. Graw-Hill Higher Education, Hyderabad, 1st edition, 2015.

REFERENCE BOOKS:

1. A.K. Bandyopadhyay, **Nano Materials,** New Age international publishers, 2nd edition, 2014.
2. Paul T. Anastas and John C Warner, **Green Chemistry: Theory and practice,** Oxford University Press, 2000.

I B.Tech. - I Semester

(16BT1BS03) MATRICES AND NUMERICAL METHODS

(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate /Senior secondary mathematics

COURSE DESCRIPTION: Fundamentals of matrix theory; numerical solutions of equations, curve fitting; interpolation; numerical differentiation and integration; numerical solutions of ordinary differential equations.

COURSE OUTCOMES: After completion of the course a successful student is able to

CO1: Acquire basic **knowledge** in
- (a) Finding the rank of matrices and analyzing them.
- (b) Solving algebraic and transcendental equations by various numerical methods.
- (c) Fitting of various types of curves to the experimental data.
- (d) Estimating the missing data through interpolation methods.
- (e) Identification of errors in the experimental data
- (f) Finding the values of derivatives and integrals through various numerical methods.
- (g) Solving differential equations numerically when analytical methods fail.

CO2: Develop skills in **analyzing** the
- (a) methods of interpolating a given data
- (b) properties of interpolating polynomials and derive conclusions
- (c) properties of curves of best fit to the given data
- (d) algebraic and transcendental equations through their solutions
- (e) properties of functions through numerical differentiation and integration
- (f) properties of numerical solutions of differential equations

CO3: Develop skills in **designing** mathematical models for
- (a) Fitting geometrical curves to the given data
- (b) Solving differential equations
- (c) Constructing polynomials to the given data and drawing inferences.

CO4: Develop numerical skills in **solving the problems** involving
- (a) Systems of linear equations
- (b) Fitting of polynomials and different types of equations to the experimental data
- (c) Derivatives and integrals
- (d) Ordinary differential equations

CO5: Use relevant numerical **techniques** for
- (a) Diagonalising the matrices of quadratic forms
- (b) Interpolation of data and fitting interpolation polynomials
- (c) Fitting of different types of curves to experimental data
- (d) obtaining derivatives of required order for given experimental data
- (e) Expressing the functions as sum of partial fractions

DETAILED SYLLABUS:

UNIT–I : MATRICES (11 periods)

Rank of a matrix, echelon form, normal form, inverse of a matrix by elementary row operations. Solutions of linear system of equations. Eigen values, Eigen vectors and properties (without proof), Diagonalization. Quadratic form (QF), reductions to canonical form using orthogonal transformation and nature of QF.

UNIT-II NUMERICAL SOLUTIONS OF EQUATIONS AND CURVE FITTING (8 periods)

Solutions of Algebraic and Transcendental equations by bisection method, Regula-Falsi method, Newton – Raphson's method. Curve fitting by the principle of least squares, fitting of a straight line, parabola and exponential curves.

UNIT- III INTERPOLATION (8 periods)

Interpolation, difference operators and their relationships, Newton's forward and backward formulae, Lagrange's interpolation formula. Partial fractions using Lagrange's interpolation formula.

UNIT-IV NUMERICAL DIFFERENTIATION AND INTEGRATION (8 periods)

Numerical differentiation using Newton's forward and backward formulae. Numerical integration using Trapezoidal rule, Simpson's $1/3^{rd}$ rule and $3/8^{th}$ rule.

UNIT- V NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS (10 periods)

Numerical solutions of first order Initial value problems using Taylor series method, Euler's method , modified Euler's method, Runge – Kutta method (4^{th}order only) and Milne's predictor – corrector method.

Total no. of periods: 45

TEXT BOOK:

1. T.K.V. Iyenger, B. Krishna Gandhi, S.Ranganadham and M.V.S.S.N.Prasad, ***Mathematical Methods,*** S.Chand and Company, 8/e, 2013

REFERENCE BOOKS:

1. B.S. Grewal, ***Higher engineering mathematics***, Khanna Publishers, 42^{nd} Edition. 2012

2. S.S.Sastry, ***Introductory methods of Numerical Analysis***, Prentice Hall of India, 5/e, 2013

I B.Tech. - I Semester

(16BT1BS04) MULTI-VARIABLE CALCULUS AND DIFFERENTIAL EQUATIONS

(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate /Senior secondary mathematics

COURSE DESCRIPTION: First order differential equations; higher order linear differential equations; functions of several variables; applications of integration; multiple integrals; vector calculus.

COURSE OUTCOMES: After completion of the course a successful student is able to

CO1: Acquire knowledge in
- (a) Higher order Differential equations
- (b) Maximum and minimum values for the functions of several variables
- (c) Double and triple integrals
- (d) Differentiation and integration of vector functions.
- (e) Line and surface volume
- (f) transforming integrals from three dimensional surfaces and volumes on to plane surfaces

CO2: Develop skills in analyzing the
- (a) methods for differential equation for obtaining appropriate solutions,
- (b) Properties of oscillatory electrical circuits and heat transfer in engineering systems
- (c) The variations in the properties of functions near their stationary values
- (d) Flow patterns of fluids, electrical and magnetic flux and related aspects

CO3: Develop skills in designing mathematical models for
- (a) R-C and L-R-C oscillatory electrical circuits
- (b) Heat transfer and Newton's law of cooling
- (c) Engineering concepts involving lengths of curves and areas of planes, Flux across surfaces

CO4: Develop analytical skills in solving the problems involving
- (a) Newton's law of cooling
- (b) non homogeneous linear differential equations
- (c) maximum and minimum values for the functions
- (d) lengths of curves, areas of surfaces and volumes of solids in engineering
- (e) transformation of integrals from three dimensional surfaces and volumes on to plane surfaces

CO5: Use relevant mathematical techniques for evaluating
- (a) various types of particular integrals in differential equations
- (b) stationary values for multi variable functions
- (c) multiple integrals in change of variables
- (d) integrations of vector functions.

DETAILED SYLLABUS:

UNIT-I: FIRST ORDER DIFFERENTIAL EQUATIONS (6 periods)

Linear and Bernoulli type, exact equations and reducible to exact. Orthogonal trajectories (Both Cartesian and polar forms). Newton's law of cooling.

UNIT II: HIGHER ORDER LINEAR DIFFERENTIAL EQUATIONS (9 periods)

Method for solution of linear equations- Differential operator *D*, Solution of second order linear homogeneous equations with constant coefficients, Solution of Higher order homogeneous linear equations with constant coefficients, **Solution of Non homogeneous linear equations**-Operator methods for finding particular integrals- for cases – e^{ax}, sin ax, cos ax, x^n, $e^{ax}V(x)$, xV(x). Method of Variation of parameters. Applications to oscillatory electrical circuits.

UNIT-III: FUNCTIONS OF SEVERAL VARIABLES (8 periods)

Functions of Two Variables: Limits, Continuity; **Partial Derivatives**: Total Differential and Derivatives, Jacobian, Functional dependence, Taylor's Theorem, maxima and minima of functions of two variables with and without constraints – Lagrange's method of undetermined multipliers.

UNIT-IV: APPLICATIONS OF INTEGRATION AND MULTIPLE INTEGRALS (10 periods)

Applications of integration to – lengths of curves, areas of surfaces of revolution, Double and Triple integrals – change of order of integration, change of variables in integrals. Area enclosed by plane curves, volumes of solids.

UNIT-V: VECTOR CALCULUS (12 periods)

Vector differentiation: Gradient of a scalar field and Directional Derivative, Divergence and Curl of a Vector field

Line integrals: Line integrals independent of path – work done.

Surface area and Surface Integrals: Surface Area, Surface Integrals, Flux across a surface.

Green's Theorem: Green's Theorem (without proof)-verification- applications

Gauss Divergence Theorem and Stoke's Theorem: Gauss Divergence theorem (without proof), Stokes's Theorem (without proof) –verifications and applications. **Total no. of periods: 45**

TEXT BOOK:

1. T.K.V. Iyengar, B. Krishna Gandhi,S.Ranganatham and M.V.S.S.N.Prasad, ***Engineering Mathematics, Vol-1***, S. Chand &Company, 13/e, 2014

REFERENCE BOOKS:

1. Grewal, B.S., ***Higher engineering mathematics***,Khanna publishers, Delhi, 42/e. 2012.
2. Kreyszig, E., ***Advanced Engineering Mathematics***,John Wiley and Sons, Inc.,9/e.2012.

I B.Tech. - I Semester
(16BT10501) **PROGRAMMING IN C**
(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: NIL

COURSE DESCRIPTION:

Program design; Operators and Expressions; Data Input and Output; Control Statements; Functions; Arrays; Strings; Pointers; Structures & Unions and File handling Techniques;

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1: Demonstrate knowledge in:
- o Elements of C Language
- o Selection and Repetition statements.
- o Arrays, Strings and Functional statements.
- o Derived data types, Files and Pointers

CO2: Analyze complex engineering problems to develop suitable solutions

CO3: Design algorithms for specified engineering problems

CO4: Use appropriate 'C' language constructs for solving engineering problems

CO5: Write programs using 'C' language to implement algorithms

DETAILED SYLLABUS:

UNIT I – INTRODUCTION TO C PROGRAMMING, OPERATORS & EXPRESSIONS (08 periods)

Introduction to C Programming: The C Character set, Writing First Program of C, Identifiers and Keywords, Data types, Constants, Variables and Arrays, Declarations, Expressions, Statements and Symbolic Constants.

Operators and Expressions: Arithmetic Operators, Unary Operators, Relational and Logical Operators, Assignment Operators, the Conditional Operators.

UNIT II – DATA INPUT AND OUTPUT & CONTROL STATEMENTS (08 periods)

Data Input and Output: Single Character Input and Output, Input Data & Output data, The gets and puts Function.

Control Statements: Branching: The if-else Statement, Looping: The while Statement, More Looping: The do-while Statement, Still More Looping: The for Statement, Nested Control Statement, The switch Statement, The break & continue Statements, The goto Statement.

UNIT III – FUNCTIONS, PROGRAM STRUCTURES & ARRAYS (11 p*eriods*)

Functions: A Brief Overview, Defining a Function, Accessing a Function, Function Prototypes, Parsing Argument to a Function, Recursion.

Program Structure: Storage Classes, Automatic Variables, External (Global) Variables, Static Variables, Multi file Programs,

Arrays: Defining an Array, Processing an Array, Processing Array to function, Multidimensional Arrays. Linear search, Binary search, Fibonacci search, Bubble sort and Insertion sort

UNIT IV – STRINGS & POINTERS (09 periods)

Strings: Defining a String, NULL Character, Initialization of Strings, Reading and Writing a String, Processing a Strings, Character Arithmetic, Searching and Sorting of Strings, Library Functions for Strings.

Pointers: Pointer Declaration, Passing Pointers to a Function, Pointers and One-dimensional Arrays, Dynamic Memory Allocation, Operations on Pointers, Pointers and Multidimensional Arrays, Arrays of Pointers.

UNIT V – STRUCTURES AND UNIONS & FILE HANDLING (09 periods)

Structures and Unions: Defining a Structure, Processing a Structure, User-Defined Data types (typedef), Structures and Pointers, Passing Structures to Function, Self –Referential Structures, Unions

File Handling: Files introduction, Opening and Closing a Data File, Reading and Writing a Data File, Processing a Data File, Unformatted Data File, Concept of Binary Files, Accessing the File Randomly.

Total Periods: *45*

TEXT BOOK:

1. Byron Gottfried and Jitender Kumar C "*Programming with C*," Third Edition, McGraw Hill Education (India) Pvt, Ltd, New Delhi, 2016.

REFERENCE BOOKS:

1. PradipDey and Manas Ghosh, *"Programming in C",* Second Edition, Oxford University Press, NewDelhi, 2007.
2. E. Balagurusamy, "*Programming in C",* Seventh Edition, Mc Graw Hill Education (India) Pvt, Ltd, New Delhi, 2014.

I B.Tech. - I Semester
(16BT1HS31) **ENGLISH LANGUAGE LAB**
(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: English at intermediate or equivalent level.
COURSE DESCRIPTION: Phonetics Vocabulary Building; Functional Grammar; Just a Minute; Elocution/Impromptu; Giving Directions/Conversation Starters; Role Play; Public Speaking; Describing People, Places, Objects and Events; Reading Comprehension; Listening Comprehension; Information Transfer.
COURSE OUTCOMES:
On successful completion of this course, the students will be able to:
1. Demonstrate knowledge in
   - Phonetics
   - Information Transfer
2. Analyze the functional knowledge in
   - Vocabulary
   - Grammar
3. Design and develop functional skills for professional practice.
4. Apply the techniques of Listening and Reading skills to comprehend Listening and Reading comprehension.
5. Function effectively as an individual and as a member in diverse teams to demonstrate
   - Extempore talk and
   - Role Play
6. Communicate effectively in public speaking in formal and informal situations.
7. Recognize the need to engage in lifelong learning to upgrade competence of knowledge and communication.

LIST OF EXERCISES:
1. Phonetics
2. Vocabulary Building
3. Functional Grammar
4. Just a Minute
5. Elocution/Impromptu
6. Giving Directions/Conversation Starters
7. Role Play
8. Public Speaking
9. Describing People, Places, Objects and Events.
10. Reading Comprehension
11. Listening Comprehension
12. Information Transfer

TEXT BOOK:
1. Department Lab Manual

REFERENCE BOOKS:

1. D. Sudha Rani, *A Manual for English Language Laboratories*, Pearson Education.
2. D. Sudha Rani, *Advanced Communication Skills Laboratory Manual*, Pearson Education.
3. R. Manivannan and G. Immanuel, *Communication Skills Laboratory*, VK Publications, Sivakasi, 2013
4. Nira Kumar*, English Language Laboratories*, PHI Learning Pvt. Ltd., New Delhi, 2011.

SUGGESTED SOFTWARE:
1. ETNL Language Lab Software Version 4.0
2. GEMS - Globarena E- Mentoring System.
3. Speech Solutions.
4. English Pronunciation Dictionary by Daniel Jones.
5. Learn to Speak English 8.1, The Learning Company - 4 CDs.
6. Mastering English: Grammar, Punctuation and Composition.
7. English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
8. Dorling Kindersley Series - Grammar.
9. Language in Use 1, 2 & 3.
10. Cambridge Advanced Learner's Dictionary - 3rd Edition.
11. Centronix - Phonetics.
12. Let's Talk English, Regional Institute of English South India.
13. The Ultimate English Tutor.

I B.Tech. - I Semester
(16BT1BS31) **ENGINEERING CHEMISTRY LAB**
(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE REQUISITE: Intermediate/Senior Secondary Chemistry

COURSE DESCRIPTION: Estimation of hardness, alkalinity, dissolved oxygen of water samples and estimation of Iron by volumetric methods, determination of effect of P^H on rate of corrosion, measurement of viscosity of lubricants; Instrumental methods like potentiometer, conductivity meter, P^H meter and colorimeter; synthesis of Polymers and Nano materials.

COURSE OUTCOMES:

After completion of the course, a successful student is able to:

CO1: Acquire basic Knowledge about the volumetric analysis and synthesis of materials used for engineering applications.

CO2: Acquire analytical skills in the estimation of hardness of water, alkalinity of water, dissolved oxygen in water and estimation of Iron through wet laboratory methods.

CO3: Develop designing skills for the synthesis of polymers and Nanomaterials.

CO4: Acquire skills to use instrumental techniques for the determination of Electrical conductance of electrolytes, EMF of a cell, PH of a solution, determination of viscosity of lubricants and estimation of iron in cement.

CO5: Provide solutions for environmental issues through determination of quality of water.

List of Experiments:

A minimum of any **Ten** experiments are to be conducted among the following:.

1. Estimation of Hardness of water by EDTA method.
2. Estimation of alkalinity of Water.
3. Estimation of Dissolved Oxygen in water.
4. Estimation of Ferrous Iron by Dichrometry.
5. Preparation of Novalac Resin.
6. Synthesis of Nano metal-oxide using sol– gel process.
7. Conductometric titration of strong acid Vs strong base
8. Estimation of Ferrous ion by Potentiometry.
9. Determination of amount of corrosion of metals in different medium
10. Measurement of viscosity of lubricants by Ostwald viscometer.
11. Determination of P^H of a given solution by P^H metry.
12. Estimation of Ferric iron in cement by Colorimetric method.

Total Time Slots: 12

I B.Tech. - I Semester

(16BT10331) COMPUTER AIDED ENGINEERING DRAWING

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	1	6	3

PRE-REQUISITES: *None*

COURSE DESCRIPTION:

Engineering drawing conventions; importance of engineering drawing; fundamental concepts of sketching; computed aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.

COURSE OUTCOMES:

After completion of the course, a successful student is able to:

- CO1: Understand, write and read the language of engineering drawing in industry through International System of Standards.
- CO2: Develop the imagination and mental visualization ability for interpreting the geometrical details of engineering objects.
- CO3: Produce different views and projection in drawing.
- CO4: Use modern CAD software for design and drafting of drawings.
- CO5: Create multi-view drawings suitable for presentation to Engineering community.
- CO6: Introduce and communicate universally accepted conventions and symbols for their usage in technical drawing.

DETAILED SYLLABUS:

UNIT : I - BASICS OF ENGINEERING DRAWING PRACTICE, GEOMETRICAL CONSTRUCTIONS, CONICS AND SPECIAL CURVES (18 periods)

Introduction, drawing instruments and its uses, sheet layout, BIS conventions, lines, lettering and dimensioning practices. Geometrical constructions: Construction of regular polygons: Pentagon, Hexagon, Heptagon and Octagon. Conic sections**:** Introduction, construction of ellipse: rectangular method, eccentricity method. Construction of parabola: rectangular method, eccentricity method. Construction of hyperbola: eccentricity method. Special curves***:*** cycloid, involute.

UNIT: II – INTRODUCTION TO COMPUTER AIDED SKETCHING (18 periods)

Computer screen, layout of the software, creation of 2D/3D environment, selection of drawing size and scale, Standard tool bar/menus, Coordinate system, description of most commonly used toolbars, navigational tools: commands and creation of lines, Co-ordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination and perpendicularity.

UNIT: III – PROJECTION OF POINTS, STRAIGHT LINES AND PLANES (21 periods)

Introduction, method of projection, planes of projection, reference line and notations. Projection of points: Points in all the four quadrants. Projection of straight lines**:** lines inclined to HP / VP plane, inclined to both HP and VP planes (straight lines are assumed to be in first quadrant only)**.** Projection of planes**:** projection of triangle, square, rectangle, rhombus, pentagon, hexagon and circular plane for the condition inclined to HP / VP by change of position method.

UNIT IV –PROJECTION OF SOLIDS AND SECTION OF SOLIDS (21 Periods)

Projections of Solids: Introduction, projection of solids: prisms, pyramids, cylinders and cones with axis perpendicular to VP/HP and axis inclined to VP/HP only. Sections of solids**:** Introduction, Cutting plane, sectional views of right regular solids resting with base on HP: prisms, pyramids, cylinder and cone and true shapes of the sections.

UNIT V –ORTHOGRAPHIC AND ISOMETRIC PROJECTIONS AND DEVELOPMENT OF SURFACES (22 periods)

Orthographic projection: simple exercises. Isometric projection: Simple exercises.
Development of surfaces: prisms, pyramids, cylinders, cone and miscellaneous surfaces

Total Periods: *100*

Note: *Student shall practice Unit-I using sketch book only and remaining units using sketch book first and later CAD package.*

TEXT BOOKS:

1. D.M.Kulkarni, A.P.Rastogi, A.K.Sarkar, Engineering Graphics with AutoCAD, PHI Learning Private Limited, New Delhi, Revised Edition, 2010.
2. N D Bhat & V M Panchal, Engineering Drawing, Charotar Publishing House, Gujarat, 51st edition, 2013.

REFERENCE BOOKS:

1. Sham Tickoo, AutoCAD 2013 for Engineers and Designers, Dreamtech Press, 2013.
2. M.H.Annaiah & Rajashekar Patil, Computer Aided Engineering Drawing, New Age International Publishers, 4th Edition, 2012.
3. T.Jeyapoovan, Engineering Drawing and Graphics Using AutoCAD, Vikas Publishing House, 3rd Edition, 2010.
4. Jolhe, Engineering Drawing, Tata McGraw Hill Education Private Limited, 1st Edition, 2007.

5. Basant Aggarwal, Engineering Drawing, Tata McGraw Hill Education Private Limited, 1st Edition, 2008.

I B.Tech - I Semester
(16BT10531) **PROGRAMMING IN C LAB**
(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on "Programming in C"

COURSE DESCRIPTION: Hands on practice in developing and executing simple programs using C Programming constructs– Conditional statements, Loops, Arrays, Strings, Functions, Structures, Pointers and Functions.

COURSE OUTCOMES:

On successful completion of this course the students will be able to:

1. Demonstrate practical knowledge of using C language constructs:
   - Selection and Repetition statements.
   - Arrays, Strings and Functional statements.
   - Derived data types, Files and Pointers
2. Analyze problems to develop suitable algorithmic solutions
3. Design Solutions for specified engineering problems
4. Use appropriate 'C' language constructs for solving engineering problems
5. Implement and execute programs using 'C' language
6. Document programs and communicate effectively while conducting Professional transactions.

List of Exercises:

1. a. Let a and b are two integer variables whose values are 10 and 13 respectively. Write a program to evaluate the following arithmetic expressions.

   i) a + b   ii) a–b   iii) a * b   iv) a/b   v) a % b

   b. Write a program to evaluate the following algebraic expressions after reading necessary values from keyword.

   i) $(ax + b)/(ax - b)$

   ii) $2.5 \log x + \cos 32^0 + | x^2 + y^2 |$

   iii) $x^5 + 10 x^4 + 8$ and $x^3 + 4 x + 2$

   iv) ae^{kt}

2. a. Mr. Gupta deposited Rs.1000 in a bank. The bank gives simple interest at the rate of 15% per annum. Write a program to determine the amount in Mr. Gupta's account at the end of 5 years. (Use the formula I = P T R / 100)

   b. A cashier has currency notes of denominations Rs.10, Rs. 50 and Rs. 100. If the amount to be withdrawn is input in hundreds, find the total number of notes of each denomination the cashier will have to give to the withdrawer.

   c. In a town, the percentage of men is 52. The percentage of total literacy is 48.If total percentage of literate men is 35 of the total population; write a program to find the total number of illiterate men and women if the population of the town is 8000.

3. a. Write a program that prints the given 3 integers in ascending order using if - else.

   b. Write a program to calculate commission for the input value of sales amount.

   Commission is calculated as per the following rules:

   i) Commission is NIL for sales amount Rs. 5000.

   ii) Commission is 2% for sales when sales amount is >Rs. 5000 and <= Rs. 10000.

   iii) Commission is 5% for sales amount >Rs. 10000.

   c. A character is entered through keyboard. Write a program to determine whether the character entered is a capital letter, a small case letter, a digit or a special symbol. The following table shows the range of ASCII values for various characters.

Characters ASCII values

Characters	ASCII values
A - Z	65 - 90
a - z	97- 122
0 - 9	48 - 57
Special Symbols	0 - 47, 58 - 64, 91- 96, 123 - 127

4. a. If cost price and selling price of an item is input through the keyboard, write program to determine whether the seller has made profit or incurred loss. Also determine how much profit or loss he incurred in percentage.

b. An insurance company calculates premium as follows:

i. If a person's health is excellent and the person is between 25 and 35 years of age and lives in a city and is a male then premium is Rs.4 per thousand and the policy amount cannot exceed Rs.2 lakhs.

ii. If a person satisfies all the above conditions and is female then the premium is Rs.3 per thousand and the policy amount cannot exceed Rs.1 lakh.

iii. If a person's health is poor and the person is between 25 and 35 years of age and lives in a village and is a male then premium is Rs.6 per thousand and the policy cannot exceed Rs. 10000.

iv. In all other cases the person is not insured.

Write a program to determine whether the person should be insured or not, his/her premium rate and maximum amount for which he/she can be insured.

5. a. Write a program, which takes two integer operands and one operator as input from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, %. Use switch statement)

b. Write a program to find the grace marks for a student using switch. The user should enter the class obtained by the student and the number of subjects he has failed in. Use the following rules:

i. If the student gets first class and the number of subjects failed is >3, then no grace marks are awarded. If the number of subjects failed is less than or equal to '3' then the grace is 5 marks per subject.

ii. If the student gets second class and the number of subjects failed in is >2, then no grace marks are awarded. If the number of subjects failed in less than or equal to '3' then the grace is 4 marks per subject.

iii. If the student gets third class and the number of subjects failed in is >1, then no grace marks are awarded. If the number of subjects failed in is equal to '1' then the grace is 5 marks per subject.

6. a. Write a program to find the sum of individual digits of a positive integer.

b. A Fibonacci sequence is defined as follows:

The first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a program to generate the first N terms of the sequence.

Write a program to generate all the prime numbers between 1 and N, where N is a value supplied by the user.

7. a. Write a program to find the largest and smallest number in a given list of integers.

b. Write a program to perform the following:

i. Addition of two matrices.

ii. Multiplication of two matrices.

8. a. Write a program that uses functions to perform the following operations:

i. To insert a sub-string in main string at a specified position.

ii. To delete N characters from a given string from a specified position.

b. Write a program to determine whether the given string is palindrome or not.

c. Write a program to display the position or index in the main string S where the sub string T begins. Display -1 if S does not contain T.

d. Write a program to count the number of lines, words and characters in a given text.

9. a. Write a program to read list of student names and perform the following operations using functions.
   i. to print list of names
   ii. to sort them in ascending order
   iii. to print the list after sorting.
   b. Write a menu driven program to read list of student names and perform the following operations using array of character pointers.
   i. to insert a student name
   ii. to delete a name
   iii. to print the name
10. Write a program that uses functions to perform the following operations:
   i. Reading a complex number
   ii. Writing a complex number
   iii. Addition of two complex numbers
   iv. Multiplication of two complex numbers
   (**Note:** Represent complex number using a structure.)
11. a. Write a program to accept the elements of the structure as:
   Employee-name,Basic pay
   Display the same structure along with the DA, CCA and Gross salary for 5 employees.
   Note: DA=51% of Basic pay, CCA=Rs.100.consolidated.
   b. Define a structure to store employee's data with the following specifications:
   Employee-Number, Employee-Name, Basic pay, Date of Joining
   i. Write a function to store 10 employee details.
   ii. Write a function to implement the following rules while revising the basic pay.
   If Basic pay<=Rs.5000 then increase it by 15%.
   If Basic pay> Rs.5000 and <=Rs.25000 then it increase by 10%.
   If Basic pay>Rs.25000 then there is no change in basic pay.
   Write a function to print the details of employees who have completed 20 years of service from the date of joining.
12. a. Write a program which copies one 'text file' to another 'text file'.
   b.Write a program to reverse the first N characters of a given text file.
   Note: The file name and N are specified through command line.
13. Write a program to print the output by giving the Customer_ID as an input.

REFERENCE BOOKS:

1. Byron Gottfried and Jitender Kumar C, *Programming with C,* 3rd Edition, McGraw Hill Education(India) Pvt. ltd, 2016.
2. Pradip Dey and Manas Ghosh, *Programming in C,* 2nd Edition, Oxford University Press, 2007.

I B.Tech. - II Semester
(16BT1BS02) **ENGINEERING PHYSICS**
(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Intermediate / senior secondary Physics
COURSE DESCRIPTION: Lasers; optical fibers; principles of quantum mechanics; band theory of solids; semiconductors; dielectric properties of materials; acoustics of buildings; superconductors; crystallography and nanomaterials.
COURSE OUTCOMES:
On successful completion of this course, the students will be able to:
1. Acquire basic knowledge of lasers, optical fibers, quantum mechanics, dielectrics, semiconductors, and superconductors, acoustic of buildings, crystallography and nanomaterials.
2. Analyze the construction and working of various laser systems, semiconductor devices, various types of optical fibers and its communication system and nano materials properties.
3. Gain skills in designing lasers, optical fiber cable, semiconductor devices, acoustically good halls and nanomaterials.
4. Develop problem solving skills in engineering context.
5. Use relevant techniques for assessing ball milling, pulsed laser deposition, p-n junction and Laser.

DETAILED SYLLABUS:
UNIT-I: LASERS AND FIBER OPTICS
Lasers: Introduction, characteristics of lasers, spontaneous and stimulated emission of radiation, Einstein's coefficients – condition for amplification, population inversion, Nd: YAG laser, Helium-Neon laser, semiconductor laser and applications of lasers.
Fiber optics: Introduction, principle of optical fiber, acceptance angle, acceptance cone and numerical aperture, classification of optical fibers, optical fiber communication system and applications of optical fibers.
UNIT-II:PRINCIPLES OF QUANTUM MECHANICS AND BAND THEORY OF SOLIDS
Principles of Quantum Mechanics: Introduction, de-Broglie's hypothesis, Schrödinger's one dimensional wave equation (time independent), significance of wave function, particle in a one dimensional potential box, Fermi-Dirac distribution and effect of temperature (qualitative treatment).
Band Theory of Solids: Electron in a periodic potential, Kronig-Penney model (qualitative treatment), origin of energy bands formation in solids, distinction between conductors, semiconductors and insulators based on band theory.
UNIT-III: SEMICONDUCTORS AND DIELECTRIC PROPERTIES OF MATERIALS
Semiconductors: Introduction, types of semiconductors, intrinsic carrier concentration, electrical conductivity in semiconductors, drift and diffusion currents, Einstein's relation, Hall effect and its applications, direct and indirect band gap semiconductors, p-n junction, energy band diagram of p-n diode, LED, photo diode and Solar cell.
Dielectric Properties of Materials: Introduction, dielectric constant, electronic, ionic and orientation polarizations (qualitative treatment), local field, frequency dependence of polarizability (qualitative treatment), ferroelectricity.
UNIT-IV: ACOUSTICS OF BUILDINGS AND SUPERCONDUCTIVITY
Acoustics of Buildings: Introduction, basic requirement of acoustically good hall, reverberation and time of reverberation, Sabine's formula for reverberation time (qualitative treatment), absorption coefficient of sound and its measurement, factors affecting the architectural acoustics and their remedies.
Superconductivity: Introduction, General properties - Meissner effect, penetration depth, Type-I and Type-II superconductors, flux quantization, Josephson effects, BCS theory (qualitative treatment), applications of superconductors.
UNIT-V: CRYSTALLOGRAPHY AND NANOMATERIALS
Crystallography: Introduction, crystal planes, crystal directions and Miller indices, separation between successive (hkl) planes, X-ray diffraction by crystal planes, Bragg's law- powder method.
Nanomaterials: Introduction, principles of nanomaterials, properties of nanomaterials, synthesis of nanomaterials by ball milling and pulsed laser deposition and applications of nanomaterials.

TEXT BOOK:
1. P. K. Palaniswamy, *Engineering Physics*, Scitech Publications India Private Limited, 2nd Edition, 2009.

REFERENCE BOOKS:
1. Dr. S. Mani Naidu, *Engineering Physics*, Pearson Education, 1st Edition, 2013.
2. M.N. Avadhanulu,P.G.Kshirsagar, *A textbook of Engineering Physics*, S.Chand & Company Ltd. Revised Edition 2014.
3. K. Thyagarajan, *Engineering Physics-I*, McGraw-Hill Education (India) Pvt.Ltd. 2015.

I B.Tech. - II Semester

(16BT2BS01) TRANSFORMATION TECHNIQUES AND PARTIAL DIFFERENTIAL EQUATIONS

(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITE: Intermediate /Senior secondary mathematics

COURSE DESCRIPTION: Fourier series; Fourier integrals and transforms; Laplace transforms; z – transforms; partial differential equations.

COURSE OUTCOMES:

After completion of the course a successful student is able to

CO1: Acquire basic knowledge in
- (a) Fourier series and Fourier transforms
- (b) Fourier integrals
- (c) Laplace transforms and their applications
- (d) z- transforms and their applications
- (e) solving partial differential equations

CO2: Develop skills in analyzing the
- (a) Properties of Fourier series for a given function
- (b) Partial differential equations through different evaluation methods
- (c) Difference equations through z – transforms
- (d) Engineering systems and processes involving wave forms and heat transfer

CO3: Develop skills in designing mathematical models for
- (a) Problems involving heat transfer and wave forms
- (b) Engineering concepts involving, Fourier transforms, Fourier integrals, Laplace transforms, z-transforms and difference equations

CO4: Develop analytical skills in solving the problems involving
- (a) Fourier series and Fourier transforms
- (b) Laplace transforms
- (c) Z-transforms and difference equations
- (d) Heat transfer and wave motion

CO5: Use relevant transformation techniques for
- (a) Obtaining Fourier transforms for different types of functions
- (b) Laplace transforms
- (c) Z- transforms
- (d) Partial differential equations

DETAILED SYLLABUS

UNIT- I : FOURIER SERIES **(7 periods)**

Fourier series: Determination of Fourier coefficients, convergence of Fourier series (Dirichlet's conditions), Fourier series of even and odd functions, Half-range Fourier sine and cosine expansions.

UNIT- II: FOURIER INTEGRALS AND FOURIER TRANSFORMS **(8 periods)**

Fourier integral theorem (statement only), Fourier sine and cosine integrals, Fourier transform, Fourier sine and cosine transforms –properties, Inverse transform and finite Fourier transforms.

UNIT-III: LAPLACE TRANSFORMS **(12 periods)**

Laplace transforms of standard functions. Properties of Laplace transforms. First and second shifting Theorems. Laplace transforms of derivatives and integrals. Inverse transforms. Convolution theorem (without proof), inverse Laplace transforms by convolution theorem. Laplace transform of periodic functions, Applications of Laplace transforms to ordinary differential equations of first and second order with constant coefficients.

UNIT-IV: Z- TRANSFORMS **(9 periods)**

Z – transforms, inverse Z– transforms, damping rule, shifting rule, initial and final value theorems. Convolution theorem (without proof), solution of difference equations by Z– transforms.

UNIT – V: PARTIAL DIFFERENTIAL EQUATIONS **(9 periods)**

Formation of Partial differential equations – Solutions of first order linear equations by method of grouping. First and second order equations by method of separation of variables – Solutions of one dimensional Wave equation, Heat equation. **Total no. of periods: 45**

TEXT BOOKS:

1. T.K.V. Iyengar, B. Krishna Gandhi,S.Ranganadham and M.V.S.S.N. Prasad,***Engineering Mathematics, vol-1***, S. Chand & Company 13/e,2014.
2. T.K.V. Iyenger, B. Krishna Gandhi, S.Ranganadham and M.V.S.S.N.Prasad, ***Mathematical Methods,***S.Chand and Company, 8/e,2013.

REFERENCE BOOKS:

1. Grewal, B.S., ***Higher Engineering Mathematics***,Khanna publishers, Delhi, 42/e,2012.
2. Kreyszig, E., ***Advanced Engineering Mathematics***,John Wiley and Sons, Inc.,9/e,2013.

I B.Tech. - II Semester

(16BT20441) BASIC ELECTRONIC DEVICES AND CIRCUITS

(Common to CSE, CSSE & IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: A course on Engineering Physics.

COURSE DESCRIPTION:
Characteristics of general and special purpose electronic devices; Rectifiers; Biasing of BJT; FET, Feedback Amplifiers, Oscillator.

COURSE OUTCOMES: On successful completion of this course the students will be able to

CO1: Gain in-depth knowledge in
- *p-n* junction diode and its characteristics
- Zener diode and its characteristics
- Rectifiers and Filters
- Characteristics of BJT, FET, MOSFET and special purpose electronic devices.
- FET amplifiers
- Feedback amplifiers and Oscillators

CO2: Analyze numerical and analytical problems in
- Rectifiers using Filters
- Transistor biasing circuits
- FET biasing circuits and amplifiers
- Feedback amplifiers and oscillators

CO3: Design electronic circuits such as
- Rectifiers with and without filters
- BJT and FET biasing circuits
- FET amplifiers
- Feedback amplifiers and oscillators

CO4: Solve engineering problems and arrive at solutions pertaining to electronic circuits.

CO5: Select appropriate technique for transistor biasing.

DETAILED SYLLABUS

UNIT-I: *P-N JUNCTION DIODE AND RECTIFIERS* **(10 Periods)**

P-N JUNCTION DIODE

P-N Junction Diode Equation, Volt-Ampere (V-I) Characteristics, Temperature Dependence of V-I Characteristics, Ideal Versus Practical, Static and Dynamic Resistances, Diode Equivalent circuits, Junction capacitances, Break down mechanisms in semiconductor Diodes, Zener Diode Characteristics.

RECTIFIERS

Halfwave rectifier and Fullwave rectifiers (Qualitative and quantitative analysis), Harmonic components in a rectifier circuit, Inductor filter, Capacitor filter, L - section filter, ð - section filter, Problems on rectifier circuits.

UNIT-II: *BIPOLAR JUNCTION TRANSISTOR AND BIASING* **(11 Periods)**

CHARACTERISTICS:

Transistor construction, BJT Operation, Transistor as an amplifier, Transistor currents and their relations, Input and Output Characteristics of a Transistor in Common Emitter, Common Base and Common Collector Configurations, BJT specifications, transistor hybrid model for CE configuration – analytical expressions for transistor characteristics.

BIASING:

Transistor biasing, Operating Point, DC and AC Load Lines, Importance of Biasing, Fixed Bias, Emitter Feedback Bias, Collector to Emitter Feedback Bias, Voltage Divider Bias.

UNIT-III: *FIELD EFFECT TRANSISTOR* **(10 Periods)**

Construction, Principle of Operation and Characteristics of JFET and MOSFET (Enhancement & Depletion), Biasing of FET, Small Signal Model of JFET & MOSFET. Common Source and Common Drain Amplifiers using FET, Generalized FET Amplifier, FET as Voltage Variable Resistor, Comparison between BJT and FET.

UNIT-IV: *FEEDBACK AMPLIFIERS AND OSCILLATORS* **(8 Periods)**

Feedback Concepts, Types of Feedback Circuits (block diagram representation), General characteristics of negative feedback amplifier, Effect of Feedback on Amplifier characteristics. Barkhausen criterion, Hartley & Colpitts oscillators, Phase Shift Oscillators and Crystal Oscillator.

UNIT-V: *SPECIAL PURPOSE ELECTRONIC DEVICES* **(6 Periods)**

Principle of Operation and Characteristics of Tunnel Diode, Uni-Junction Transistor (UJT), Varactor Diode, Silicon Control Rectifier (SCR). Principle of operation of Schottky Barrier Diode.

Total Periods: 45

TEXT BOOKS:

1. J. Millman, Christos C. Halkias and Satyabrata Jit, *Electronic Devices and Circuits,* 3rd Edition, TMH, 2010.

REFERENCE BOOKS:

1. R.L. Boylestad and Louis Nashelsky, *Electronic Devices and Circuits,* 10th Edition, PHI, 2009.

2. S. Salivahana, N. Suresh Kumar, *Electronic Devices and Circuits*, 3rd Edition, Mc-Graw Hill, 2013.
3. David A. Bell, *Electronic Devices and Circuits*, 5th Edition, Oxford University press, 2014.

I B.Tech. - II Semester

(16BT21201) OBJECT ORIENTED PROGRAMMING THROUGH C++

(Common to CSE, CSSE & IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	4	1	-	4

PREREQUISITES: A Course on "Programming in C".

COURSE DESCRIPTION:

Introduction to Object Oriented concepts and Fundamental Concepts of C^{++}; Decision Making Statements, Looping Statements and Functions; Arrays, Pointers & References and Strings; Classes & Objects and Overloading Operators; Composition & Inheritance, Templates, Iterators & Generics and File Handling;

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

- **CO1:** Demonstrate knowledge on object oriented programming concepts - Object, Class, Inheritance, Polymorphism, Encapsulation, Abstraction and Message passing.
- **CO2:** Identify object oriented concepts for code reusability and optimization.
- **CO3:** Design and develop solutions for given specifications.
- **CO4:** Demonstrate problem solving skills to provide software solutions to real world problems.
- **CO5:** Develop C^{++} programming to provide solutions to complex engineering problems using object oriented concepts.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION AND FUNDAMENTAL CONCEPTS (Periods: 10)

An introduction to object technology: Objects and methods, Object: A practical example, Classes, Declaring classes and objects.

Key Object Orientation concepts and Elementary C++ programming: Abstraction, Encapsulation, Aggregation/composition, Inheritance, Some simple programs, The output operator, Characters and literals, Variables and their declarations, Program tokens, Initializing variables, Objects, variables and constants, The input operator.

Fundamental types: Numeric data types, The Boolean types, Enumeration types, Character types, Integer types, Arithmetic operators, The increment and decrement operators, composite Assignment operators, Floating –point types, Type conversions, Numeric overflow, Round-off error, The format for floating –point values, Scope.

UNIT-II:DECISION MAKING STATEMENTS, LOOPING STATEMENTS AND FUNCTIONS (Periods:10)

Decision making statements: The if statement, The if-else statement, Keywords, Comparison operators, Statement blocks, Compound Conditions, Short- circuiting, Boolean expressions, Nested selection statements, The else-if statement, The switch statement, The conditional expression operator.

Looping Statements: The while statements, Terminating a loop, the do-while statement, the for statement, the break statement, the continue statement, the goto statement, Generating pseudo-random numbers

Functions: Introduction, Standard c++ library functions, User-defined functions, Test drivers, function declarations and definitions, Local variables and functions, void functions, Boolean functions, I/O functions, passing by reference, passing by constant reference, Inline functions, Scope, Overloading, The main () function, Default arguments

UNIT-III: ARRAYS, POINTERS & REFERENCES AND STRINGS (Periods: 12)

Arrays: Introduction, processing arrays, initializing an array, Array index out of bounds, passing an array to a function, the linear search algorithm, the bubble sort algorithm, the binary search algorithm, Using arrays with enumeration types, Type definitions, Multidimensional arrays.

Pointers and References: The reference operator, References, Pointers, the dereference operator, Derived types, Objects and lvalues, Returning a reference.

C++ Strings: Introduction, working with strings in C++, String manipulation, Strings and arrays, miscellaneous string functions, String streams

UNIT-IV: CLASSES & OBJECTS AND OVERLOADING OPERATORS (Periods: 12)

Classes and objects: Introduction, Class declarations, Constructors, Constructor initialization lists, Access functions, Private member functions, The copy constructor, The class destructor, Constant Objects, Structures, Pointers to object, Static data members, static function members, predefined classes, Data hiding and encapsulation, Exception handling

Overloading Operators: Introduction, Overloading the assignment operator, The this operator, Overloading Arithmetic operator, Overloading the arithmetic assignment operator, Overloading the relational patterns, Overloading the stream operators, Conversion operators, Overloading the increment and decrement operators, Overloading the subscript operator

UNIT-V: COMPOSITION & INHERITANCE, TEMPLATES, ITERATORS & GENERICS AND FILE HANDLING (Periods: 11)

Composition and inheritance: Introduction, Composition, Inheritance, protected class members, Overriding and dominating inherited members, private access versus protected access, virtual functions and polymorphism, virtual destructors, Virtual functions, pure virtual functions, Abstract classes, object-oriented programming.

Templates, iterators and Generics: Introduction, Function templates, Class templates, Container classes, Subclass templates, passing template classes to template parameters, Iterator classes, Generic programming **C++ File Handling:** File I/O **(Total Periods: 55)**

TEXT BOOKS:

1. John R Hubbard, *Programming with C^{++}*, 3rd Edition, Tata McGraw-Hill, 2010.

2. P. B. Mahapatra, "Thinking in C++", 1st Edition, Galgotia Publications Pvt. Ltd, 2005.

REFERENCE BOOKS:

1. Sourav Sahay, Object Oriented Programming with C++, 2nd Edition, Oxford University Press, 2012.

I B.Tech. - II Semester

(16BT21501) DIGITAL LOGIC DESIGN

(Common to CSE, CSSE & IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -NIL-

COURSE DESCRIPTION: Introduction to number systems; logic gates; Boolean Algebra; simplification of Boolean functions; Design of combinational circuits; Design of sequential circuits, Memory and Programmable Logic

COURSE OUTCOMES:

On Successful completion of this course student will be able to:

CO1. Demonstrate knowledge on Boolean algebra, Minimization of Boolean functions using Map Reduce method.

CO2. Identify appropriate simplification techniques for Boolean functions.

CO3. Design combinational and sequential logic circuits, memory and programmable logic for digital systems.

CO4. Select and Apply Boolean algebra and gate level minimization techniques for designing combinational and sequential logic circuits.

CO5. Learn independently new concepts, new techniques and advanced subject knowledge in the area of combinational and sequential logic circuits.

DETAILED SYLLABUS:

UNIT I – BINARY SYSTEMS AND BOOLEAN ALGEBRA (10 periods)

Digital Systems, Binary Numbers, Number base conversions, Octal and Hexadecimal Numbers, Signed binary numbers, other binary codes, complements. Boolean Algebra, Boolean functions, Canonical and standard forms, Digital logic gates

UNIT II – GATE LEVEL MINIMIZATION (9 periods)

The K-map method - Four-variable map, Five-Variable map, product of sums and sum of products simplification, Don't-care conditions, NAND and NOR implementations, other Two-level implementations, Exclusive – OR function

UNIT III – COMBINATIONAL LOGIC (9 p*eriods*)

Combinational Circuits, Analysis procedure, Design procedure, Binary Adder-Subtractor, BCD Adder, Carry- Look- ahead adder, Binary multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers, De-Multiplexers.

UNIT IV – SEQUENTIAL LOGIC (9 periods)

Latches, Flip-Flops, Analysis of clocked sequential circuits, Design of synchronous sequential circuits, registers, shift registers, Ripple counters, Synchronous counters, Ring Counter and Johnson Counter.

UNIT V–MEMORY AND PROGRAMMABLE LOGIC (8 p*eriods*)

Random-Access Memory, Memory Decoding, Error Detection and Correction, Read-only memory, Programmable logic Array, programmable Array logic, Sequential Programmable Devices.

Total Periods: *45*

TEXT BOOK:

1. M. Morris Mano, "Digital Design", Third Edition, Pearson Education/PHI, 1999.

REFERENCE BOOKS:

1. David J Comer, "Digital Logic and State Machine Design", Third Edition, Oxford University Press, 2012.
2. Charles H.Roth Jr, "Fundamentals of Logic Design", Fifth edition, Cengage Learning, 2008.
3. A. Anand Kumar, "Switching Theory and Logic Design", Prentice-Hall of India Pvt. Limited, 2010.

I B.Tech. - II Semester
(16BT1BS32) ENGINEERING PHYSICS LAB
(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Intermediate / senior secondary Physics.

COURSE DESCRIPTION:

Characteristics of p-n junction diode, Photodiode, LED, and semiconductor laser diode. Experimental determination of carrier concentration and energy gap of a semiconductor material, wave length of a laser source, size of fine particle, numerical aperture and acceptance angle of optical fiber. Determination of frequency of electrically vibrating tuning fork and A.C source using A.C sonometer, magnetic field along axial line of a current carrying coil and rigidity modulus of material of a wire using torsional pendulum.

COURSE OUTCOMES:

After completion of the course, a successful student will be able to:

CO1: Acquire basic knowledge about semiconductor materials, magnetic materials and lasers.

CO2: Acquire analytical skills in the estimation of carrier concentration of semiconductor materials and characterization of p-n junction.

CO3: Develop skills in designing electronic circuits using semiconductor components.

CO4: Acquire skills to use instrumental techniques in A.C sonometer and Melde’s experiment.

CO5: Apply diffraction techniques for determination of size of tiny particles and wave length of lasers.

ENGINEERING PHYSICS LAB

Conduct a minimum of any **Ten** of the following experiments.

1. Determination of wavelength of a laser source using Diffraction Grating.
2. Determination of particle size by using a laser source.
3. Determination of Numerical aperture and acceptance angle of an optical fiber.
4. Melde’s experiment - transverse & longitudinal modes.
5. Magnetic field along the axis of a current carrying coil- Stewart and Gee’s method.
6. Calculation of A.C frequency using sonometer.
7. I-V Characteristics of a p-n Junction diode.
8. Energy gap of a material of a p-n Junction.
9. Characteristics of LED source.
10. Characteristics of Photo diode.
11. Hall Effect.
12. Determination of rigidity modulus of the material of the wire using torsional pendulum.

I B.Tech II semester

(16BT20451) ANALOG AND DIGITAL ELECTRONICS LAB

(Common to CSE, CSSE & IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Courses on "Basic Electronic Devices & Circuits and Digital Logic Design"

COURSE DESCRIPTION: Identification and testing of active and passive components; RPS, DMM, Function Generator, CRO; Diode characteristics; Rectifiers; BJT and FET characteristics; UJT and SCR characteristics; BJT Amplifiers; Realization of FFs, Combinational Circuits, sequential Circuits; Demonstration on VHDL Programme.

COURSE OUTCOMES: On successful completion of this course, the student will be able to:

CO1. Demonstrate knowledge in different electronic devices, analog and digital circuits

CO2. Analyze the characteristics of different electronic devices and circuits like

- Diodes p-n Junction Diodes, Zener Diodes, SCR
- Transistors-BJT,FET,UJT
- Flip Flops-JK FF, D FF
- Combinational Circuits-HA, FA
- Sequential Circuits -Counters

CO3. Design electronic circuits like FET Amplifiers, Feedback amplifiers, Oscillators, Combinational Circuits and Sequential Circuits.

CO4. Solve engineering problems by proposing potential solutions through Design of better electronic circuits.

CO5. Model an electronic circuit which fulfil the needs of the society.

CO6: Function effectively as an individual and as a member in a group

CO7: Communicate effectively in verbal and written form.

DETAILED SYLLABUS:

PART A

ELECTRONIC WORKSHOP PRACTICE (Only for Viva-Voce)

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards. Identification, Specifications and Testing of Active Devices: Diodes, BJTs, Low-power JFETs, MOSFETs, LEDs, LCDs, SCR, UJT, Linear and Digital ICs.

PART B

ANALOG DEVICES AND CIRCUITS (Minimum seven experiments to be conducted)

1. p-n Junction and Zener diodes characteristics
2. Ripple Factor and Load Regulations of Rectifier with and without filters (Full wave or Half wave)
3. Input and Output characteristics of Transistor in CE configuration
4. Drain and Transfer Characteristics of JFET
5. Gain and Frequency response of FET Amplifier
6. Gain and Frequency response of Feedback Amplifier (Voltage series or current series)
7. Frequency of oscillations of Hartley and Colpitts Oscillator
8. UJT relaxation oscillator
9. SCR characteristics

PART C

DIGITAL CIRCUITS

Realization of

1. Flip Flops using Logic Gates
2. Two Problems on Combinational Circuits
3. Asynchronous Counter
4. Synchronous Counter

Demonstration of

I B.Tech. - II Semester
(16BT21231) IT Workshop

(Common to IT & CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: —Nil—

COURSE DESCRIPTION:

Practice sessions on PC hardware, Internet, World Wide Web, LibreOffice Suite. Demonstrations on installations of system software such as MS-Windows, Linux and device drivers, hardware and software troubleshooting, and protecting the personal computer from viruses and other cyber attacks are include.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Demonstrate analytical skills in:
   - Identification of functional parts of PC
   - Internet and World Wide Web.
   - Computer security issues and preventive measures.
   - Operating Systems.
2. Design document and presentations effectively.
3. Apply modern tools to develop IT based applications.
4. Demonstrate effective communication skills through IT tools.
5. Update knowledge and skills in PC maintenance and usage of latest Operating Systems and Office automation tools.

LIST OF EXERCISES:

1. PC Hardware

a. Identify the peripherals of a personal computer, components in a Central Processing Unit (CPU) and its functions, block diagram of CPU along with the configuration of each peripheral.

b. Demonstrating assembling and disassembling of the Personal Computer.

c. Introduction to Operating Systems, components of OS, installation of Microsoft Windows-XP Operating System.

2. Operating System

a. Introduction to LINUX OS, installation of LINUX OS, Basic commands in LINUX - cat, ls, pwd, rm, rmdir, cd, cp, mv, who, date, cal, clear, man, wc

b. Introduction to DOS, Basic DOS commands – mkdir, cd, cls, del, copy, attrib, date, path, type, format, exit.

3. Hardware & Software Troubleshooting: Diagnosis of PC malfunction, types of faults, common issues and how to fix them. Basic Hardware & Software troubleshooting steps, PC diagnostic tools.

4. Libre Office:

a. Libre Writer

Introduction to Writer, importance of Writer as Word Processor, overview of toolbars , saving, accessing files, using help and resources.

i). Create a document using the features: Formatting fonts, drop cap, bullets and numbering, text effects, character spacing, borders and shading, tables, text direction, hyperlink, headers and footers, date and time.

ii). Create a document in using the features: picture effects, clipart, auto shapes & grouping, page setup, paragraph indentation, wrap text, footnote and equations.

5. Libre Calc

a. Introduction to Calc as a spreadsheet tool, overview of toolbars, accessing, saving Calc files, using help and resources.

i). Create a spreadsheet using the features: gridlines, format cells, auto fill, formatting text, formulae, table and charts.

ii). Create a spreadsheet using the features: split cells, text to columns, sorting,filter, conditional formatting, freeze panes, pivot tables, data validation.

6. Libre Impress:

a. Demonstration on Impress, utilities, overview of toolbars, PPT orientation, slide layouts, types of views.

i). Create a Presentation using the features: slide layouts, inserting text, formatting text, bullets and numbering, auto shapes, hyperlinks, pictures, clip art, audio, video, tables and charts.

ii). Create a Presentation using the features: slide design, slide hiding, slide transition, animation, rehearse timings and custom slideshow.

7. Libre Draw: Draw vector graphics and flowcharts using Libre draw tools.

8. LibreBase: Create a sample database using Libre Base(Ex: Student database).

9. Introduction LaTeX Tool. Create a document using the features: formatting fonts, applying text effects, insert pictures and images, using date and time option.

10. Internet & Computer Security

    Introduction to computer networking, demonstration on network components, drivers loading and configuration settings, mapping of IP addresses, configuration of Internet and Wi-Fi.

11. Search Engines and Cyber Hygiene:

    Working of search engine, Awareness of various threats on Internet, types of attacks and how to overcome. Installation of antivirus software, configuration of personal firewall and Windows update on computers.

12. Students should implement exercises 6 to 9 using MS- Office tool.

REFERENCES:

1. Vikas Gupta, *Comdex Information Technology Course Tool Kit,* 2nd Edition, WILEY Dreamtech, New Delhi, 2006.
2. ITL Education, *Introduction to Information Technology,* 2nd Edition, Pearson Education, New Delhi, 2005.
3. Leslie Lamport, *A Document preparation system LATEX users guide and reference manual,* 2rd Edition.
4. IT Workshop Laboratory Manual, 2014.
5. www.libreoffice.org.

I B.Tech. - II Semester
(16BT21232) **OBJECT ORIENTED PROGRAMMING LAB**

(Common to CSE, CSSE & IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: A Course on "OOPS through C++".

COURSE DESCRIPTION:
Hands-on experience on creating Virtual machines on Windows and Linux platforms, Development of Service based web applications & their deployment and Mobile app development.

COURSE OUTCOMES:
On successful completion of this course, the students will be able to:
1. Demonstrate practical knowledge on Object oriented programming concepts - Object, Class, Inheritance, Polymorphism, encapsulation, Abstraction, message passing.
2. Apply object oriented programming concepts to develop real world applications.
3. Demonstrate Problem solving skills using basic and advanced concepts of C++.
4. Work individually and in teams collaboratively in implementing the applications.
5. Demonstrate communication skills both oral and written for preparing and presenting reports.

LIST OF EXERCISES:
1. a. Write a C++ program that takes length as input in feet and inches. The program should then convert the lengths in centimeters and display it on screen. Assume that the given lengths in feet and inches are integers.
   b. Write a C++ program to find the sum for the given variables using function with default arguments.
2. Implement the Number Guessing Game in C++ with the given instructions. In this game the computer chooses a random number between 1 and 100, and the player tries to guess the number in as few attempts as possible. Each time the player enters a guess, the computer tells him whether the guess is too high, too low, or right. Once the player guesses the number, the game is over.
3. Write a program to perform arithmetic operations on two numbers. The program must be menu driven, allowing to select the operation (+, -, *, or /) and input the numbers. Furthermore, the program must consist of following functions:
   i) Function showChoice: This function shows the options and must explain how to enter data.
   ii) Function add: This function accepts two number as arguments and returns sum.
   iii) Function subtract: This function accepts two number as arguments and returns their difference.
   iv) Function multiply: This function accepts two number as arguments and returns product.
   v) Function divide: This function accepts two number as arguments and returns quotient.
4. Write a menu driven C++ program with following option
   a. Accept elements of an array
   b. Display elements of an array
   c. Sort the array using bubble sort method
   Write C++ functions for all options. The functions should have two parameters name of the array and number of elements in the array.
5. X. Y, Z are arrays of integers of size M, N, and M + N respectively. The numbers in array X and Y appear in descending order. Write a user-defined function in C++ to produce third array Z by merging arrays X and Y in descending order.
6. a. Write a program to enter any number and find its factorial using constructor.
   b. Write a program to generate a Fibonacci series using copy constructor.
7. Write a program to perform addition of two complex numbers using constructor overloading. The first constructor which takes no argument is used to create objects which are not initialized, second which takes one argument is used to initialize real and imaginary parts to equal values and third which takes two argument is used to initialized real and imaginary to two different values.
8. a. Write a program to overload unary increment (++) operator.
   b. Write a program to overload binary + operator.
9. a. Define a class TEST in C++ with following description:

Private Members

TestCode of type integer
Description of type string
NoCandidate of type integer
CenterReqd (number of centers required) of type integer
A member function CALCNTR() to calculate and return the number of centers as (NoCandidates/100+1)

Public Members

- A function SCHEDULE() to allow user to enter values for TestCode, Description, NoCandidate & call function CALCNTR() to calculate the number of Centres
- A function DISPTEST() to allow user to view the content of all the data members

b. Define a class REPORT with the following specification:

Private members :

adno	4 digit admission number
name	20 characters
marks	an array of 5 floating point values
average	average marks obtained
GETAVG()	a function to compute the average obtained in five subject

Public members:

READINFO()	function to accept values for adno, name, marks. Invoke the function GETAVG()
DISPLAYINFO()	function to display all data members of report on the screen.

You should give function definitions.

10. a.Create a base class basic_info with data members name ,rollno, gender and two member functions getdata and display. Derive a class physical fit from basic_info which has data members height and weight and member functions getdata and display. Display all the information using object of derived class.
    b. Create a class called LIST with two pure virtual function store() and retrieve().To store a value call store and to retrieve call retrieve function. Derive two classes stack and queue from it and override store and retrieve.
11. a. Write a program to define the function template for swapping two items of the various data types such as integer, float, and characters.
    b. Write a program to define the class template for calculating the square of given numbers with different data types.
12. a. Write a C++ program to write number 1 to 100 in a data file NOTES.TXT.
    b. Write a program to read a set of lines from the keyboard and to store it on a specified file.
    Any one of the following mini projects are to be implemented by a group of 4-5 students.

1. Mini Project : Banking System
   Develop an application on BANKING SYSTEM which has account class with data members like account number, name, deposit, withdraw amount and type of account. Customer data is stored in a binary file. A customer can deposit and withdraw amount in his account. Must support the features of creation, modifying and deletion account any time.
2. Mini Project : Library Management System
   Develop an application on LIBRARY MANAGEMENT SYSTEM which has book and student class with data members like book no, bookname, authorname. Books records is stored in a binary file. A student can issue book and deposit it within 15 days. Student is allowed to issue only one book. Student Records are stored in binary file. Administrator can add, modify or delete record.
3. Mini Project : Supermarket Billing System
   Develop a simple console application for SUPERMARKET BILLING SYSTEM which has product class with data members like product no, product name, price, quantity, tax, discount. Product details is stored in a binary file. A customer can purchase product and his invoice generated. Administrator can create, modify, view and delete product record.

REFERENCE BOOKS:

1. John R Hubbard, *Programming with C++*, 3rd Edition, Tata McGraw-Hill, 2010.
2. Sourav Sahay, *Object Oriented Programming with C++,* 2nd Edition, Oxford University Press, 2012.

II B.Tech. - I Semester

(16BT3BS01) PROBABILITY DISTRIBUTIONS AND STATISTICAL METHODS

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate/senior secondary mathematics.

COURSE DESCRIPTION: Random variables; Mathematical expectations; Probability distributions; Correlation and regressions; Statistical quality control; Sampling distributions; Tests for small and large samples and their significances.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Acquire basic knowledge on:
- Probability distributions, correlation and regressions.
- Statistical quality control and testing of hypotheses.
- Simple linear regression.
- Tests of significance for small and large samples.

C02 Develop skills for analyzing the data with:
- Mathematical expectations for realistic results.
- Probability distributions for practical situations.
- Control charts of statistical quality control. Correlation and regression concepts.
- Suitable tests of significance for practical situations.

C03 Develop skills in designing:
- Probability distributions.
- Limitations of statistical quality control.
- Control charts.
- X, R, np, and c charts

CO4. Develop analytical skills for solving problems involving:
- Probability distributions, means, variances and standard deviations.
- Statistical techniques employed for quality.
- Sampling techniques for decision making.
- Tests of significances for small and large samples.

CO5. Use relevant probability and statistical techniques for:
- Mathematical expectations of desired results.
- Fitting probability distributions for experimental data.
- Quality control and testing of hypothesis.

DETAILED SYLLABUS:

UNIT I – RANDOM VARIABLE AND MATHEMATICAL EXPECTATIONS (10 periods)

Random Variables: Discrete and Continuous random variables, Distribution function of random variable, Properties, Probability mass function, Probability density function, Mathematical expectation, Properties of Mathematical expectation, Mean and Variance.

UNIT II – PROBABILITY DISTRIBUTIONS (9 periods)

Discrete Distributions: Binomial and Poisson Distributions, Mean, variance and standard deviations.

Continuous Distributions: Normal Distribution, Mean, Variance and properties.

UNIT III – CORRELATION, REGRESSION AND STATISTICAL QUALITY CONTROL (9 periods)

Definition of correlation, correlation coefficient, Rank correlation. Simple linear regression, regression lines and properties.

Introduction, advantages and limitations of statistical quality control, Control charts, specification limits,, R, np and c charts.

UNIT IV – SAMPLING DISTRIBUTIONS AND TEST OF SIGNIFICANCE FOR LARGE SAMPLES (9 periods)

Population and Sample, Parameter and Statistic, Sampling Distribution of Statistic, Standard Error of Statistic, Null and Alternative Hypothesis, Type I and II errors, Level of Significance, Critical region, Degrees of freedom. Tests of significance for proportions and means.

UNIT V–TEST OF SIGNIFICANCE FOR SMALL SAMPLES (9 periods)

Student's t-test: single mean, difference of means, F-test for equality of population variance, Chi-Square Test for Goodness of fit, contingency table, Chi-Square Test for Independence of Attributes.

Total Periods: 45

TEXT BOOKS:

1. T. K. V. Iyengar, B. Krishna Gandhi, S. Ranganatham and M. V. S. S. N. Prasad, Probability and Statistics, S. Chand and Company, Fourth Edition,2013.
2. S. P. Gupta, Statistical Methods, Sultan and Chand, New Delhi, Twenty Eighth Edition, 2005.

REFERENCE BOOKS:

1. S. C. Gupta and V. K. Kapoor, Fundamentals of Applied Statistics, Sultan and Chand, New Delhi, Eleventh Edition, 2004.
2. Shahnaz Bathul, A text book of Probability and Statistics, Ridge Publications, Second Edition, 2007.

II B.Tech. - I Semester

(16BT30501) COMPUTER ORGANIZATION

(Common to CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Digital Logic Design".

COURSE DESCRIPTION: Basic structure and operation of a digital computer; Organization and functional principles of the arithmetic and logic unit, control unit, memory unit and I/O unit; Concepts of pipelining and parallel processing techniques.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Computer Arithmetic units
- Register Transfer and Computer Instructions
- Design of Control Unit
- Input Output Organization and Memory system
- Pipelining and Multiprocessing.

CO2. Analyze the functional units of a digital computer.

CO3. Design the functional modules in a digital computer - Arithmetic Units, Memory and I/O.

CO4. Investigate the performance of memory, I/O, and pipelined processors.

CO5. Select appropriate techniques of I/O, Pipelining and Multiprocessing to solve computing problems.

CO6. Apply contextual knowledge of computer systems development to societal applications.

DETAILED SYLLABUS:

UNIT-I: REGISTER TRANSFER and MICROOPERATIONS AND COMPUTER ARITHMETIC (9 Periods)

Register Transfer and Microoperations: Register transfer, Bus and memory transfers, Arithmetic microoperations, Logic microoperations, Shift microoperations, Arithmetic logic shift unit.

Computer Arithmetic: Fixed point representation, Floating point representation, Addition and subtraction, Binary multiplication algorithms, Binary division algorithms.

UNIT-II: BASIC COMPUTER ORGANIZATION AND DESIGN AND MICRO PROGRAMMED CONTROL (9 Periods)

Basic Computer Organization and Design: Instruction codes, Computer registers, Computer instructions, Instruction formats, Addressing modes, Timing and control, Instruction cycle, Memory reference instructions, Input - Output and Interrupt.

Micro Programmed Control: Control memory, Address sequencing, Design of control unit, Hardwired control, Microprogrammed control.

UNIT-III: INPUT-OUTPUT ORGANIZATION (8 Periods)

Peripheral devices, Input-Output interface, Modes of transfer, Priority interrupt, Direct Memory Access, Input-Output Processor (IOP).

UNIT-IV: THE MEMORY SYSTEM (10 Periods)

Semiconductor RAM memories - Internal organization, Static memories, Synchronous and Asynchronous DRAMs, Structure of larger memories; Read-Only memories, Cache memories - Mapping functions; Secondary Storage - Magnetic Disks, Optical Disks.

UNIT-V: PIPELINE and VECTOR PROCESSING AND MULTIPROCESSORS (9 Periods)

Pipeline and Vector Processing: Parallel processing, Pipelining, Arithmetic pipeline, Instruction pipeline, Vector processing, Array processors.

Multiprocessors: Characteristics of multiprocessors, Interconnection structures, Inter-processor arbitration, Inter-processor communication and synchronization. **Total Periods: 45**

TEXT BOOKS:

1. Morris Mano, *Computer System Architecture,* Pearson Education, Third Edition, 2007.
2. Carl V. Hamacher, Zvonko G. Vranesic and Safwat G. Zaky, *Computer Organization,* McGraw-Hill, Fifth Edition, 2002.

REFERENCE BOOKS:

1. William Stallings, *Computer Organization and Architecture: Designing For Performance,* Pearson Education, Seventh Edition, 2007.
2. John P. Hayes, *Computer Architecture and Organization,* McGraw-Hill. Third Edition.

II B.Tech. - I Semester

(16BT30502) DATA STRUCTURES

(Common to CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Programming in C".

COURSE DESCRIPTION: Linked Lists; Type of lists; Operations and Applications; Stacks and Queues; Operations and Applications; Trees, Search trees and Heaps; Multiway Trees and Graphs; Searching and Hashing.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Principles of Data Structures.
- Linear and Non-linear Data Structures.
- Sorting and hashing techniques.

CO2. Analyze and Identify suitable data structure for computational problem solving.

CO3. Design solutions for complex engineering problems using linear and non-linear data structures.

CO4. Develop solutions for Complex computational problems by conducting explorative analysis.

CO5. Apply appropriate data structure to provide solutions for real time problems by using C Language.

CO6. Apply contextual knowledge of data structures to design applications for societal applications like payroll systems, web applications, banking and financial systems.

DETAILED SYLLABUS:

UNIT-I: LINKED LISTS **(8 Periods)**

Pointers, Operations, Linked List definition, Single Linked Lists, Circular Linked List, Doubly Linked List, Circular Doubly Linked List, Application of Linked Lists.

UNIT-II: STACKS AND QUEUES **(8 Periods)**

Stacks: Stack operations, Stack Linked List, Implementation, Stack applications.

Queues: Queue operations, Queue Linked List design, Queue applications.

UNIT-III: TREES, SEARCH TREES AND HEAPS **(10 Periods)**

Trees: Tree concepts, Binary Trees.

Binary Search Trees (BST): Basic concepts, BST operations, BST applications.

AVL Search Trees: Basic concepts, AVL Tree implementations.

Heaps: Basic concepts, Heap implementation, Heap applications.

UNIT-IV: MULTIWAY TREES AND GRAPHS **(10 Periods)**

Multiway Trees: B-Trees, Simplified B-Trees, B-Tree variations.

Graphs: Basic concepts, Operations, Graph storage structures, Graph algorithms - Create graph, Insert vertex, Delete vertex, Retrieve vertex, Depth-first traversal, Breadth-first traversal.

UNIT-V: SORTING AND HASHING **(9 Periods)**

Internal Sorting: Quick Sort, Shell Sort, Merge Sort, Heap Sort.

External Sorting: Introduction, External storage device and sorting with tapes, Balanced Merge.

Hashing: Introduction, Hash Table structure, Hash functions, Linear Open Addressing, Chaining, Applications.

Total Periods: 45

TEXT BOOKS:

1. Richard Gileberg and Behrouz A. Forouzan, *Data Structures: A Pseudocode Approach with C,* Cengage Learning, Second Edition, 2007.
2. G.A.V. Pai, *Data Structures and Algorithms,* Tata McGraw Hill, Second Edition, 2009.

REFERENCE BOOKS:

1. Debasis Samanta, *Classic Data Structures,* PHI Learning, Second Edition, 2009.

2. Aaron M. Tenenbaum, Yedidyah Langsam, and Moshe J. Augenstein, *Data Structures Using C,* Pearson Education, 2005.

II B.Tech. - I Semester

(16BT31201) DISCRETE MATHEMATICAL STRUCTURES

(Common to CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Multivariable Calculus and Differential Equations".

COURSE DESCRIPTION: Mathematical Logic; Predicates; Functions and Relations; Algebra Structures; Mathematical Reasoning; Recurrence Relations; Graphs; Graph Theory and its Applications.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on mathematical logic, algebraic structures, relations, recurrence relations and mathema-tical reasoning.

CO2. Analyze and prove given statement by contradiction and automatic theorem.

CO3. Design network applications using Prim's and Kruskal's algorithms.

CO4. Solve tree traversal problems using Graph Theory.

CO5. Apply permutation, combinations, counting principle, Lagrange's theorem and graph theory in solving real-time problems.

DETAILED SYLLABUS:

UNIT-I: MATHEMATICAL LOGIC AND PREDICATES (9 Periods)

Mathematical Logic: Statements and notations, Connectives, Well formed formulae, Truth tables, Tautology, Equivalence of formulae, Normal forms.

P**redicates:** Predicate calculus, Free and bound variables, Rules of inference, Consistency, Proof of contradiction and automatic theorem proving.

UNIT-II: FUNCTIONS AND RELATIONS (8 Periods)

Relations: Properties of binary relations, Equivalence relations, Compatibility relations, Partial ordering relations, Hasse diagram and related applications.

Functions: Inverse functions, Composition of functions, Recursive functions, Lattice and its properties.

UNIT-III: ALGEBRAIC STRUCTURES (8 Periods)

Algebraic System: Examples and general properties, Semi groups and monoids, Groups, Subgroups, Homomorphism and isomorphism, Lagrange's theorem.

UNIT-IV: MATHEMATICAL REASONING AND RECURRENCE RELATIONS (10 Periods)

Mathematical Reasoning: Methods of proof, Mathematical induction, Basics of counting, The inclusion- exclusion principle, The pigeon hole principle, Permutations and combinations, Generalized permutations and combinations.

Recurrence Relations: Generating functions of sequences, Calculating coefficients of generating function, Recurrence relation, Solving recurrence relations by substitution and Generating functions, Methods of characteristic roots, Solutions of inhomogeneous recurrence relation.

UNIT-V: GRAPH THEORY AND ITS APPLICATIONS (10 Periods)

Graphs: Introduction to graphs, Types of graphs, Graph basic terminology and special types of simple graphs, Representation of graphs and graph isomorphism, Euler paths and circuits, Hamiltonian paths and circuits, Planar graphs, Euler's formula and graph coloring, 4-color theorem.

Trees: Introduction to trees, Properties of trees, Applications of trees, Spanning trees, Counting trees, Depth-first search, Breadth-first search, Minimum spanning trees, Kruskal's algorithm and prim's algorithm.

Total Periods: 45

TEXT BOOKS:

1. J.P. Trembly and R. Manohar, *Discrete Mathematical Structures with Applications to Computer Science,* Tata McGraw Hill, Thirty Seventh Edition, 2008.
2. R. K. Bisht and H. S. Dhami, *Discrete Mathematics,* Oxford Higher Education, 2015.

REFERENCE BOOKS:

1. Joe L.Mott and Abraham Kandel, *Discrete Mathematics for Computer Scientists and Mathematicians,* Prentice Hall of India Private Limited, Second Edition, 2004.
2. Ralph P. Grimaldi and B.V.Ramana, *Discrete and Combinatorial Mathematics- an Applied Introduction,* Pearson Education, Fifth Edition, 2006.

3. Kenneth H. Rosen, *Discrete Mathematics and its Applications,* Tata McGraw Hill, Sixth Edition, 2007.

II B.Tech. - I Semester

(16BT50502) **LINUX PROGRAMMING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Operating Systems".

COURSE DESCRIPTION: Concepts on Linux Programming; Shell Programming; Process, Signals and File System Structure; Inter process Communications and Socket Programming for Client-Server Interaction.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Shell programming
- File Structure and System Calls
- Processes management and handling signals,
- IPC and Sockets

CO2. Analyze shell scripts and system calls related to Linux Environment.

CO3. Design shell scripts and system calls for specified computational problems.

CO4. Use appropriate shell scripts and system calls for solving complex problems.

CO5. Provide appropriate Linux solutions for real time applications.

CO6. Apply contextual knowledge to solve problems related to societal issues.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO LINUX AND LINUX ENVIRONMENT (9 Periods)

The GNU Project and the Free Software Foundation, Linux Distributions, Programming Linux - Linux Programs, Text Editors, The C Compiler; Program Arguments - getopt, getopt_long. Environment Variables - Use of Environment Variables, The environ Variable, Time and Date, User Information, Host Information.

UNIT-II: SHELL PROGRAMMING (9 Periods)

Necessity of Shell Programming, Pipes and Redirection - Redirecting Output, Redirecting Input, Pipes, The Shell as a Programming Language - Interactive Programs, Creating a Script, Making a Script Executable, Shell Syntax - Variables, Conditions, Control Structures, Functions, Commands, Command execution.

UNIT-III: FILE SYSTEM STRUCTURE AND SYSTEM CALLS (9 Periods)

Linux File Structure and Commands: File Structure - Directories, Files and Devices, System Calls and Device Drivers; Library Functions - Low-Level File Access, write, read and open commands, Initial Permissions, Other System Calls for Managing Files; File and Directory Maintenance Commands - chmod, chown, unlink, link, symlink, mkdir, rmdir, chdir, getcwd.

Input-Output Commands: The Standard I/O Library Commands - fopen, fread, fwrite, fclose, fflush, fseek, fgetc, getc, and getchar, fputc, putc and putchar, fgets and gets; Formatted Input and Output Commands - printf, fprintf, sprintf, scanf, fscanf, sscanf.

UNIT-IV: PROCESS AND SIGNALS (8 Periods)

Process Structure - The Process Table, Viewing Processes, System Processes, Process Scheduling; Starting New Processes - Waiting for a Process, Zombie Processes, Input and Output Redirection, Threads; Signals - Sending Signals, Signal Sets.

UNIT-V: INTER-PROCESS COMMUNICATION AND SOCKETS (10 Periods)

Inter-Process Communication: Pipe definition, Process pipes, Sending output to popen - Passing more data, popen, implementation, The pipe call; Parent and child processes - Reading closed pipes, pipes used as standard input and output; Named pipes - FIFOs, Accessing a FIFO, Client/Server using FIFOs.

Socket Connections: Socket attributes, Creating a socket, Socket addresses, Naming a socket, Creating a socket queue, Accepting connections, Requesting connections, Closing a socket, Socket communications, Host and network byte Ordering. **Total Periods: 45**

TEXT BOOK:

1. Neil Matthew and Richard Stones, *Beginning Linux Programming,* Wiley Dreamtech, Fourth Edition, 2008.

REFERENCE BOOKS:

1. Richard Petersen, *Linux: The Complete Reference,* Tata McGraw-Hill, Sixth Edition, 2007.

2. Sumitabha Das, *Your UNIX: The Ultimate Guide, T*ata McGraw-Hill, 2007.

II B.Tech. - I Semester

(16BT31501) OPERATING SYSTEMS

(Common to CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Operating systems operations, scheduling; Critical section problem, deadlocks; Paging, segmentation; File Concept, Disk scheduling; I/O interface; concepts of protection.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on Operating system operations, services, file management, disk management, I/O management and protection.

CO2. Identify the functionality involved in process management concepts like scheduling and synchronization.

CO3. Design models for handling deadlock and perform memory management.

CO4. Synthesize and apply programming API's to perform Process management.

CO5. Use appropriate protection tools to provide access control to Operating system users.

DETAILED SYLLABUS:

UNIT-I: OPERATING SYSTEMS OVERVIEW AND PROCESS MANAGEMENT (8 Periods)

Operating systems, operations, Distributed systems, Special purpose systems, Operating systems services, Systems calls, Operating system structure.

Process Management: Process scheduling, Process Control Block, Inter process communication, Signals, Forks, Multithreading models, Threading issues, Scheduling criteria, Scheduling algorithms, Multilevel queue, Multilevel feedback queue.

UNIT-II: SYNCHRONIZATION AND DEADLOCKS (10 Periods)

Synchronization: The critical-section problem, Peterson's Solution, Synchronization hardware, Semaphores, Classic problems of synchronization, Monitors.

Deadlocks: System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock detection, Deadlock avoidance, Deadlock recovery.

UNIT-III: MEMORY MANAGEMENT (9 Periods)

Memory-Management Strategies: Swapping, Contiguous memory allocation, Paging, Structure of the page table, Segmentation.

Virtual Memory Management: Demand paging, Copy-on-Write, Page replacement Algorithms, Thrashing.

UNIT-IV: STORAGE MANAGEMENT (10 Periods)

File System: File Concept, Access methods, Directory structure, File system structure, i-node, File Descriptors, File system implementation, Directory implementation, Allocation methods.

Secondary Storage Structure: Disk structure, Disk attachment, Disk scheduling, Swap-space management, Stable-storage implementation, Tertiary storage structure.

UNIT-V: I/O SYSTEMS AND PROTECTION (8 Periods)

I/O Systems: I/O Hardware, Application I/O interface, Kernel I/O subsystem.

Protection: Goals of protection, Principles of protection, Domain of protection, Access matrix, Implementation of access matrix, Access control, Revocation of access rights.

Total Periods: 45

TEXT BOOK:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, *Operating System Principles,* Wiley India Edition, Seventh Edition, 2011.

REFERENCE BOOKS:

1. William Stallings, *Operating Systems, Internals and Design Principles,* Pearson Education, Seventh Edition, 2013.

2. Andrew S. Tanenbaum, *Modern Operating Systems,* PHI, Third Edition, 2009.

II B.Tech. - I Semester
(16BT30531) DATA STRUCTURES LAB

(Common to CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on "Data Structures".

COURSE DESCRIPTION: Hands on practice on Linked Lists; Type of lists; Stacks and Queues; Trees and Search trees; Graphs; Searching and Hashing.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate practical knowledge on Stacks, Queues, Linked lists, Trees Sorting and Hashing Techniques.
CO2. Analyze suitable data structure to solve real world computing problems.
CO3. Design solutions for complex computational problems using linear and non-linear data structures.
CO4. Solve for Complex computational problems by conducting explorative analysis.
CO5. Use C language for implementing linear and non-linear data structures.
CO6. Apply contextual knowledge of data structures to design applications for societal requirements.
CO7. Communicate effectively using data structures with engineering community, being able to comprehend and write effective programs and Prepare Reports.

LIST OF EXERCISES:

1. Write program to implement the following data structures:
   (a) Single Linked List
   (b) Double Linked List
   (c) Circular Linked List
2. Write a program to implement Stack and Queue using Linked List.
3. Write a program to evaluate a given postfix expression using Stack.
4. Write a program to convert a given infix expression to postfix form using Stack.
5. Write a program to implement
   (a) Stack using two Queues
   (b) Queue using two Stacks
6. Write a program to implement In-order, pre-order, post-order tree traversal of Binary Trees.
7. Write a program to perform operations on a Binary Search Tree (BST).
8. Write programs for implementation of graph traversals by applying:
   (a) Breadth First Search
   (b) Depth First Search
9. Implement the following sorting algorithms:
   (a) Merge Sort
   (b) Heap Sort
   (c) Quick Sort
10. Write a program to implement hashing with
    (a) Separate Chaining Method
    (b) Open Addressing Method

REFERENCE BOOKS:

1. Richard Gilberg and Behrouz A. Forouzan, Data Structures: A Pseudocode Approach with C, Cengage Learning, Second Edition, 2007.
2. G.A.V. Pai, Data Structures and Algorithms, Tata McGraw Hill, Second Edition, 2009.

II B.Tech. - I Semester

(16BT50532) LINUX PROGRAMMING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on "Linux Programming".

COURSE DESCRIPTION: Hands on Practice with - Shell Programs; System Calls; Environment Variables; Inter Process Communication; File System and Socket Programming.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate practical knowledge on
- Shell programming
- File Structure and System Calls
- Processes management and handling signals,
- IPC and Sockets

CO2. Analyze shell scripts and system calls in Linux operating system.
CO3. Design shell scripts for specified computational problems.
CO4. Use appropriate shell scripts and system calls for solving complex problems.
CO5. Create shell scripts and system calls for real time Linux applications.
CO6. Apply contextual knowledge to solve problems related to societal issues.
CO7. Communicate effectively using Linux with engineering community being able to comprehend and write effective programs and prepare reports.

LIST OF EXERCISES:

1. Create two files source.txt and dest.txt using vi editor which contains some text and practice the following commands on that files. cat, tail, head , sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, pg, comm., cmp, diff, cp, mv, ln, rm, unlink, tty, script, clear, date, cal, mkdir, rmdir, du, df, find, umask, ps,who.

1. a) Write a shell script that takes a command line argument and reports on whether it is directory, a file, or something else.
   b) Write a shell script that accepts one or more file names as arguments and converts all of them to uppercase, provided they exist in the current directory.

2. a)Write a shell script that accepts a file name, starting and ending line numbers as arguments and displays all the lines between the given line numbers.
b) Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.

4. a)Write a shell script to list all of the directory files in a directory.
   b) Write a shell script to find factorial of a given number.

5. a) Write an interactive file-handling shell program. Let it offer the user the choice of copying, removing, renaming, or linking files. Once the user has made a choice, have the program ask the user for the necessary information, such as the file name, new name and so on.
   b) Write a shell script that takes a login name and reports when that person logs in.

6. a) Simulate uniq command using C.
   b) Simulate grep command using C.

7. Write a C program that takes one or more file or directory names as input and reports the following information on the file:
   i) File type
   ii) Number of links
   iii) Read, write and execute permissions
   iv) Time of last access
   (Note: Use stat/fstat system calls)

8. a) Write a C Program to display Environment variables.
b) Write a C Program to implement Different types of exec functions.

9. a) Write a Program to create a Zombie Process.
b) Create a Process using fork() and display Child and Parent Process Id's.

10. Implement the Following IPC Forms a) FIFO b) PIPE

11. Perform client and server socket Programming for exchanging of data Using System calls.

12. a) Write a program user.c, which extracts some user information from the password database (Hint: Use getuid() function to obtain the UID of the current user and use UID to obtain detailed password file information).
    b) Write a program host.c, which extracts some host computer information (Hint: Use gethostname() function to obtain the network name of the host computer).

REFERENCE BOOK:

1. Neil Matthew and Richard Stones, *Beginning Linux Programming,* Wiley Dreamtech, Fourth Edition, 2008.

II B.Tech. - I Semester
(16BT31531) OPERATING SYSTEMS LAB

(Common to CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on "Operating Systems".

COURSE DESCRIPTION: Hands on practice in simulating algorithms for CPU Scheduling, Memory Management, I/O Management, Deadlock Handling mechanisms; Implementing Synchronization problems; practice on UNIX commands.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate of the following algorithms to solve problems:
- CPU Scheduling
- Memory Management
- I/O Management

CO2. Formulate and analyze solutions to problems pertaining to Memory and I/O.

CO3. Designing models for deadlock handling mechanisms.

CO4. Develop skills in basic UNIX commands.

CO5. Use appropriate APIs' available in modern operating systems (such as threads, system calls, semaphores, etc.) for software development.

CO6. Communicate effectively on complex operating system problems with implication to User-friendliness.

CO7. Develop and demonstrate user defined libraries to communicate with the kernel for effective implementation of projects across multidisciplinary environments.

LIST OF EXERCISES:

1. Write a program to implement the following system calls:
   a) fork b) exec c) getpid d) wait
2. a) Write a program to demonstrate File Permissions.
   b) Write a program to implement named and unnamed pipes.
3. Implement the following CPU Scheduling Algorithms:
   a) FCFS b) SJF (Preemptive) c) Round Robin d) Priority.
   Use the following set of processes, compare the performance of above scheduling policies

Process Name	Arrival Time	Processing Time	Priorities
A	0	3	2
B	1	5	4
C	3	2	1
D	9	5	5
E	12	5	3

4. Implement the following synchronization problems:
   a) Producer Consumer Problem
   b) Dining Philosopher's Problem.
5. Implement Banker's Algorithm for Deadlock Avoidance and Detection. Find the safe sequence. If Max. request of any one process is changed, detect whether deadlock is occurred or not. Consider number of resources are three and Jobs are five as shown in the table:

Process	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P0	0	1	0	7	5	3	3	3	2
P1	2	0	0	3	2	2			
P2	3	0	2	9	0	2			
P3	2	1	1	2	2	2			
P4	0	0	2	4	3	3			

6. Implement the following Algorithms:
   a) First Fit b) Best Fit c) Worst Fit
7. Implement multiprogramming with fixed number of tasks and variable number of tasks. The size of the memory is 1000K. Operating system size is 200K. Number of processes are P1, P2, P3 with sizes 150K, 100K and 70K.
8. Implement the following Page Replacement Algorithms:
   a) FIFO b) LFU c) LRU d) Optimal
   Consider number of frames are three and Reference string is 2 3 2 1 5 2 4 5 3 2 4 2 4 5
9. Develop user-defined libraries to implement input-output functionalities.

II B.Tech. - II Semester

(16BT3HS01) ENVIRONMENTAL STUDIES

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	3	-	-	3

PRE-REQUISITES: A course on "Engineering Chemistry".

COURSE DESCRIPTION: Multidisciplinary nature of environment; Natural resources; Ecosystems; Biodiversity; Environment pollution and control; Social issues and environment; Human population and environment; Field studies.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Acquire knowledge on nature of environment, natural resources, ecosystems, biodiversity, environmental pollution and control, social issues and human population.

CO2. Analyze natural resources, ecosystems, biodiversity, environmental pollution and control, social issues and human population.

CO3. Develop strategies for environmental pollution control and natural resource management.

CO4. Solve environmental problems through proper analysis and interpretation of environmental data.

CO5. Choose appropriate techniques in environmental pollution control and natural resource management.

CO6. Understand the impact of social issues and population on environment.

CO7. Provide solutions to individuals, industries and government for environmental sustainable development.

CO8. Follow environmental protection laws for sustainable development.

CO9. Communicate effectively on environmental issues in the form of reports.

DETAILED SYLLABUS:

UNIT-I:MULTIDISCIPLINARY NATURE OF ENVIRONMENTAND NATURAL RESOURCES (11 Periods)

Multidisciplinary Nature of Environment: Multidisciplinary nature of environment, Segments of environment - Lithosphere, Hydrosphere, Atmosphere, Biosphere; Need for public awareness.

Natural Resources: Renewable and non-renewable resources and associated problems - (a) Forest resources: Use and over exploitation, Deforestation-causes, effects and remedies, Case studies, (b) Water resources: Use and over utilization of surface and groundwater, Conflicts over water, Benefits and problems of large dams, Case studies, (c) Mineral resources: Mining, Adverse effects, Case studies, (d) Food resources: World food problems, Changes caused by agriculture and overgrazing, Effects of modern agriculture, Water logging and salinity, Case studies, (e) Energy resources: Growing needs, Renewable energy resources - Solar, Wind, Hydropower, Hydrogen fuel; Non-renewable energy resources - Coal, Natural gas, Nuclear energy, Role of an individual in conservation of natural resource and equitable use of resources for sustainable lifestyles.

UNIT-II: ECOSYSTEMS AND BIODIVERSITY (10 Periods)

Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem - Producers, Consumers, Decomposers; Food chains, Food webs, Ecological pyramids - Types; Characteristic features, Structure and functions of forest ecosystem, Desert ecosystem, Aquatic ecosystem, Energy flow in the ecosystem, Ecological succession.

Biodiversity: Concept and value of biodiversity, Role of biodiversity in addressing new millennium challenges, Hot spots of biodiversity, Threats to biodiversity, Man-wild life conflicts, Endemic, Endangered and extinct species of India, Conservation of biodiversity - In-situ and ex-situ.

UNIT - III: ENVIRONMETAL POLLUTION AND CONT (8 Periods)

Causes, Adverse effects and control measures of pollution - Air pollution, Water pollution, Soil pollution, Noise pollution, Thermal pollution, Nuclear pollution; Solid waste management - Causes, Effects and control measures of urban and industrial wastes; Hazards and disaster management - Floods, Earthquakes, Tsunamis, Case studies.

UNIT - IV: SOCIAL ISSUES AND THE ENVIRONME (8 Periods)

Sustainable development, Urba n problems related to energy, Environmental ethics -Issues, Solutions; Global warming, Acid rain, Ozone layer depletion, Nuclear accidents and case studies, Wasteland reclamation, Consumerism and waste products, Concept of green technologies, Environment protection act, Air act, Water act, Wildlife protection act, Forest conservation act, Issues involved in enforcement of environmental legislation, Public environmental awareness.

UNIT - V: HUMAN POPULATION AND THE ENVIRONMENT (8 Periods)

Population growth, Population characteristics and variation among nations, Population explosion, Family welfare programme, Environment and human health, Human rights, Value education, HIV/AIDS, Women and child welfare, Role of information technology in environment and human health, Case studies, Field Work/Assignment/Seminar: Environmental assets - Pond/Forest/Grassland/Hill/ Mountain/Environment impact assessment procedures for local environmental issues.

Total Periods: 45

TEXT BOOKS:

1. A. Kaushik and C. P. Kaushik, *Environmental Studies,* New Age International (P) Ltd Publications, Fourth Edition, 2014.
2. Erach Barucha, *Environmental Studies,* Orient Blackswan, Second Edition, 2013.

REFERENCE BOOKS:

1. R. Rajagopalan, *Environmental Studies,* Oxford University Press, Second Edition, 2011.

2. Benny Joseph, *Environmental Studies,* Tata McGraw-Hill, Second Edition, 2009.
3. B. S. Chauhan, *Environmental Studies,* University Science Press, 2008.
4. M. Anji Reddy, *Text Book of Environmental Sciences and Technology,* BS Publications, 2007.

II B.Tech. - II Semester

(16BT41204) THEORY OF COMPUTATION

(Common to IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Discrete Mathematical Structures".

COURSE DESCRIPTION: Fundamentals of Computation; Finite State Automaton; Regular Expressions; Grammars; Push Down Automaton; Turing Machine.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on Formal languages and automata.

CO2. Analyze the classification of languages, automata's and their computing power.

CO3. Design grammars and automata (recognizers) for regular expressions and formal languages.

CO4. Solve computational problems using automata.

CO5. Apply theorems to translate automata's and identify the class of languages.

DETAILED SYLLABUS:

UNIT-I: FINITE AUTOMATA (10 Periods)

Introduction to Finite automata, The central concepts of automata theory, Deterministic finite automata, Nondeterministic Finite automata, The equivalence of DFA and NDFA, Finite automata with epsilon-transitions, Conversion of epsilon-NFA to NFA and DFA, Mealy and Moore models.

UNIT-II: REGULAR EXPRESSIONS AND LANGUAGE (9 Periods)

Regular expressions, Identity rules, Finite automata and Regular expressions, Applications of regular expressions, Pumping lemma for regular languages, Applications of the pumping lemma, Closure properties of regular languages, Equivalence of two regular expressions, Equivalence of two finite automata and minimization of automata.

UNIT-III: CONTEXT-FREE GRAMMARS (9 Periods)

Context-free grammars, Parse trees, Applications of context-free grammars, Ambiguity in grammars and languages, Normal forms for context-free grammars, The pumping lemma for context-free languages.

UNIT-IV: PUSH DOWN AUTOMATA (7 Periods)

Definition of the pushdown automaton, The languages of a PDA, Equivalence of PDA's and CFG's, Deterministic pushdown automata, Chomsky hierarchy of languages, The model of linear bounded automaton.

UNIT-V: TURING MACHINES (10 Periods)

Turing machine model, Representation of turing machines, Language acceptability by turing machine, Design of turing machines, Programming techniques for turing machines, Turing machines with semi-infinite tapes, Multi stack machines and counter machines, Universal turing machines.

Total Periods: 45

TEXT BOOKS:

1. John E. Hopcroft, Rajeev Motwani and Jeffrey D Ullman, *Introduction to Automata Theory, Languages and Computation,* Pearson Education, Third Edition, 2011.
2. K.L.P. Mishra and N.Chandrasekaran, *Theory of Computer Science: Automata Languages and Computation,* PHI Learning, Third Edition, 2009.

REFERENCE BOOK:

1. John C Martin, *Introduction to Languages and the Theory of Computation,* TMH, Third Edition, 2009.

II B.Tech. - II Semester
(16BT40502) DATABASE MANAGEMENT SYSTEMS

(Common to CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Database Systems; Database Design; Relational Model; SQL Queries, Constraints and Triggers; Schema Refinement and Normal Forms; Transaction Management; Concurrency Control; Overview of Storage and Indexing.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Data models and Database Languages
- Database design
- Normal forms
- Storage and Indexing

CO2. Analyze databases using normal forms to provide solutions for real time applications.

CO3. Design solutions for database problems using database design, view design and framing queries.

CO4. Use database techniques for designing databases, managing databases and its security.

CO5. Select SQL, Hash based Indexing and Tree based Indexing to manage data in databases.

CO6. Apply contextual knowledge to develop database applications related to societal applications like Information Retrieval Systems, Banking and Financial systems.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO DATABASE SYSTEMS AND DATABASE DESIGN (9 Periods)

Database Systems: Database system applications, Purpose of database systems, View of data-Data abstraction, Instances and Schemas, Data models; Database languages - DDL, DML; Database architecture, Database users and administrators.

Database Design: ER diagrams, Beyond ER design, Entities, Attributes and entity sets, Relationships and relationship sets, Additional features of ER model, Conceptual design with ER model.

UNIT-II: THE RELATIONAL MODEL and RELATIONAL ALGEBRA AND CALCULUS (8 Periods)

Relational Model : Integrity constraints over relations, Enforcing integrity constraints, Querying relational data, Logical database design, Introduction to views, Destroying/altering tables and views.

Relational Algebra and Calculus: Preliminaries, Relational Algebra operators; Relational Calculus - Tuple and Domain Relational Calculus; Expressive power of Algebra and calculus.

UNIT-III: SQL AND SCHEMA REFINEMENT (10 Periods)

SQL: Form of basic SQL query- Examples of basic SQL queries; Nested queries- Introduction to nested queries, Correlated nested queries, Set-comparison operators; Aggregate operators, NULL values-Comparison using NULL values, Logical connectives AND, OR and NOT, Impact on SQL constructs, Outer joins, Disallowing NULL values; Complex integrity constraints in SQL ,Triggers and active databases.

Schema Refinement: Problems caused by redundancy, Decompositions, Problem related to decomposition, Functional dependencies, Reasoning about FDS, Normal forms - First, second and third normal forms, BCNF; Multi valued dependencies, Fourth normal form, Join dependencies, Fifth normal form.

UNIT-IV: TRANSACTIONS AND CONCURRENCY CONTROL (9 Periods)

Transactions: Transaction concept, Transaction state, Implementation of atomicity and durability, Concurrent executions, Serializability, Recoverability, Implementation of isolation, Testing for serializability.

Concurrency Control: Lock based protocols, Timestamp based protocols, Validation based protocols, Multiple granularity, Deadlock handling.

UNIT-V: STORAGE AND INDEXING (9 Periods)

Storage and Indexing: Data on external storage, File organization and indexing - Clustered indexes, Primary and secondary indexes; Index data structures - Hash based indexing, Tree based indexing; Comparison of file organizations.

Tree Structured Indexing: Intuition for tree indexes, Indexed Sequential Access Method (ISAM), B+ Trees- A dynamic index structure; Search, Insert, Delete; B-Tree index files. **Total Periods: 45**

TEXT BOOKS:

1. Raghu Ramakrishnan and Johannes Gehrke, *Database Management Systems,* Tata McGraw Hill, Third Edition, 2014.
2. A. Silberschatz, H.F.Korth and S. Sudarshan, *Database System Concepts,* Tata McGraw Hill, Fifth Edition, 2006.

REFERENCE BOOKS:

1. Ramez Elmasri and Shamkant B. Navathe, *Database Systems,* Pearson Education, Sixth Edition, 2013.

2. Peter Rob and Carlos Coronel, *Database Systems Design, Implementation and Management,* Cengage Learing, Seventh Edition, 2009.

II B.Tech. - II Semester

(16BT41201) DESIGN AND ANALYSIS OF ALGORITHMS

(Common to CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Data Structures".

COURSE DESCRIPTION: Introduction to Algorithms and Asymptotic Notations; Disjoint Sets and Graphs; Divide and Conquer, Greedy Method; Dynamic Programming, Back Tracking; Branch and Bound.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Algorithm Complexities and Asymptotic notations.
- Algorithm Design techniques-Divide and Conquer, Greedy Method, dynamic programming, Back tracking, Branch and Bound.

CO2. Analyze the performance of algorithms with respect to Time and Space complexities.

CO3. Design the algorithms for solving real world problems.

CO4. Solve sorting and searching problems using Divide and Conquer method.

CO5. Use dynamic programming and backtracking in finding shortest paths.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO ALGORITHMS (8 Periods)

Algorithm, Algorithm Specifications-Pseudocode conventions; Performance Analysis-Space complexity, Time complexity; Asymptotic Notations - Big Oh, Omega, Theta, Little oh, and Little omega; Recurrences.

UNIT-II: DISJOINT SETS AND GRAPHS (9 Periods)

Disjoint Sets: Operations, union and find algorithms.

Graphs: Breadth first search and Traversal, Depth first search and Traversal, Introduction to spanning trees, connected components and Bi-connected components.

UNIT-III: DIVIDE AND CONQUER AND GREEDY METHOD (10 Periods)

Divide and Conquer: General method, Applications - Analysis of binary search, Quick sort, Merge sort, Strassen's matrix multiplication.

Greedy Method: General method, Applications-Job sequencing with deadlines, knapsack problem, Minimum cost spanning trees, Single source shortest paths.

UNIT-IV: DYNAMIC PROGRAMMING AND BACK TRACKING (10 Periods)

Dynamic Programming: General Method, Applications - Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem.

Back Tracking: General Method, Applications - N Queen problem, Sum of subsets problem, Graph coloring, Hamiltonian cycles.

UNIT-V: BRANCH AND BOUND TECHNIQUES (8 Periods)

General method, Applications - Travelling sales person problem, 0/ 1 knapsack problem; LC Branch and Bound solution, FIFO Branch and Bound solution.

Total Periods: 45

TEXT BOOK:

1. Ellis Horowitz, Satraj Sahni and Rajasekharam, *Fundamentals of Computer Algorithms,* Galgotia Publications Pvt. Ltd, New Delhi, Second Edition, 2007.

REFERENCE BOOKS:

1. M. T. Goodrich and R. Tomassia, Algorithm Design: Foundations, *Analysis and Internet Examples,* John Wiley and Sons, 2002.
2. S. Sridhar, *Design and Analysis of Algorithms,* Oxford Press, 2015.
3. Harsh Bhasin, *Algorithms: Design and Analysis,* Oxford University Press, 2015.

II B.Tech. - II Semester
(16BT41202) JAVA PROGRAMMING

(Common to CSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Object Oriented Programming through C++".

COURSE DESCRIPTION: Introduction of Java, Classes and Objects; Inheritance, Packages, Interfaces; Exception handling, Multithreading; Event handling, AWT, Collection Classes; Applets, Servlets.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Object Oriented Programming concepts - classes, objects, inheritance, polymorphism, encapsulation and abstraction.
- Packages, interfaces, multithreading, exception handling, event handling.

CO2. Analyze complex engineering problems using object oriented concepts.

CO3. Design and develop reusable code to provide effective solutions for real world problems using inheritance and polymorphism.

CO4. Apply AWT and Applets to create interactive Graphical User Interfaces.

CO5. Use advanced programming languages to develop web applications.

CO6. Build Java Applications suitable for societal requirements.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION (10 Periods)

Data types, Variables, Arrays, Operators, Control statements.

Classes and Objects: Concepts of Classes, Objects, Constructors, Methods, this keyword, Garbage collection, Overloading Methods and Constructors, Parameter passing, Access control, Recursion, String Class.

UNIT-II: INHERITANCE, PACKAGES AND INTERFACES (9 Periods)

Inheritance: Inheritance basics, Super keyword, Multi-level hierarchy, Abstract classes, final keyword with inheritance.

Packages: Definition, Creating and accessing a package, Understanding CLASSPATH, Importing packages.

Interfaces: Definition, Implementing interfaces, Nested interfaces, Applying interfaces, Variables in interface and Extending interfaces.

UNIT-III: EXCEPTION HANDLING AND MULTITHREADING (8 Periods)

Exception Handling: Concepts of exception handling, Exception types, Usage of Try, Catch, Throw, Throws and Finally, Built in exceptions, Creating own exception sub classes.

Multithreading: Java thread model, Creating threads, Thread priority, Synchronizing threads, Inter-thread communication.

UNIT-IV: COLLECTION CLASSES, THE APPLET CLASS AND AWT (10 Periods)

Collection Classes: ArrayList Class, LinkedList Class, Hashset Class, LinkedHashSet Class, TreeSet Class, PriorityQueue Class, EnumSet Class.

The Applet Class: Types of applets, Applet basics, Applet architecture, Applet skeleton, Passing parameters to applets.

AWT Control Fundamentals: User interface components, Layout managers.

UNIT-V: EVENT HANDLING AND SERVLETS (8 Periods)

Delegation event model: Event classes, Event Listener Interfaces - Mouse and Key; Adapter classes.

Servlets: Life cycle of a servlet, Using Tomcat for Servlet development, Create and compile the servlet source code, Servlet API, Javax.Servlet package. **Total Periods: 45**

TEXT BOOK:

1. Herbert Schildt, *Java the Complete Reference,* Oracle Press, Ninth Edition, 2014.

REFERENCE BOOK:

1. Sachin Malhotra and Saurab Choudhary, *Programming in Java,* Oxford University Press, Second Edition, 2014.

II B.Tech. - II Semester

(16BT41203) SOFTWARE ENGINEERING

(Common to CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Concepts of Software Engineering; Software Process Models; Conventional and Agile Process Models; Software Requirements Engineering Process; System Analysis; Architectural Design; User Interface Design and Re-engineering; Software Testing; Risk and Quality Management.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Fundamental concepts of software engineering.
- Process models.
- Software development life cycle.

CO2. Analyze software requirements and process models required to develop a software system.

CO3. Design and develop a quality software product using design engineering principles.

CO4. Develop software product as per user and societal requirements.

CO5. Follow standards for software development and quality management.

CO6. Demonstrate skills in applying risk and quality management principles for effective management of software projects.

DETAILED SYLLABUS:

UNIT I: SOFTWARE ENGINEERING AND SOFTWARE PROCESS (11 Periods)

A Generic View of Process: The nature of software, Software engineering- Software engineering layers; The software process, Software engineering practice, Software myths.

Process Models: A Generic process model, Incremental process models, Evolutionary Process models; The unified process, Agile Development-Agility, Agile process, Scrum, Agile modeling (AM), Agile Unified Process (AUP), The Cleanroom strategy.

UNIT II: REQUIREMENTS ENGINEERING AND MODELING (7 Periods)

Requirements Engineering: Functional and non-functional requirements, The software requirements document, Requirements specifications, Requirements engineering processes, Requirements elicitation and analysis, Requirements validation, Requirements management.

Requirements Modeling: Data modeling concepts, Flow-oriented modeling, Case study on requirements modeling for WebApps.

UNIT III: DESIGN ENGINEERING AND METRICS (8 Periods)

Design Engineering: Design within the context of software engineering, The Design process, Design concepts, Software architecture, Architectural styles, Architectural design.

Process and Project Metrics: Metrics in the process and project domains, Software measurement, Metrics for software quality.

UNIT IV: SOFTWARE TESTING STRATEGIES AND APPLICATIONS (9 Periods)

Testing Strategies: A strategic approach to software testing, Strategic issues, Test strategies for conventional software, Test strategies for object oriented software, Validation testing, System testing, The art of debugging.

Testing Conventional Applications: Software testing fundamentals, Basis path testing, White box and Black box testing, Object oriented testing methods.

UNIT V: RISK, QUALITY MANAGEMENT AND REENGINEERING (10 Periods)

Risk and Quality Management: Reactive and proactive risk strategies, Software risks, Risk Mitigation Monitoring and Management (RMMM), RMMM plan, Software quality factors, Defect amplification Model, Formal Technical Reviews (FTR), Software Quality Assurance (SQA)-Tasks, Goals and metrics; Software reliability.

Reengineering: Introduction, Business Process Reengineering (BPR), Software reengineering, Restructuring, Reverse engineering, Forward engineering. **Total Periods: 45**

TEXT BOOKS:

1. Roger S. Pressman, *Software Engineering-A Practitioner's Approach,* McGraw-Hill International Edition, Seventh Edition, 2010.
2. Ian Sommerville, *Software Engineering,* Pearson Education, Ninth Edition, 2011.

REFERENCE BOOKS:

1. K. K. Aggarwal and Yogesh Singh, *Software Engineering, New Age International Publishers,* Third Edition, 2007.
2. Shely Cashman Rosenblatt, *Systems Analysis and Design, Thomson Publications,* Sixth Edition, 2006.

II B.Tech. - II Semester

(16BT40531) DATABASE MANAGEMENT SYSTEMS LAB

(Common to CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on "Database Management Systems".

COURSE DESCRIPTION: Hands on experience on - DDL, DML commands; Query processing using operators; Joins, Views, Single Row functions, Group Functions and SET functions; PL/SQL concepts - Basic Programs, Triggers, Functions, Cursors and Stored Procedures.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate practical knowledge on creation and alteration of tables, insertion and Querying of data.

CO2. Analyze and evaluate the databases using SQL DML/DDL commands.

CO3. Design database schemas for the sales database, customer database and product database.

CO4. Develop solutions for database problems using stored procedures, stored functions, cursors and triggers.

CO5. Implement DDL and DML commands in SQL and PL/SQL, ORACLE to manage data in databases.

CO6. Apply contextual knowledge to develop database applications related to societal issues.

CO7. Demonstrate communication skills, both oral and written for preparing and presenting reports on databases.

DESCRIPTION OF SALES DATABASE:

ABC is a company operating in the country with a chain of shopping centers in various cities. Everyday large numbers of items are sold in different shopping centers. The Sales database comprises of various tables like CUST, PROD, SALES_DETAIL, STATE_NAME with the following schemas.

CUSTOMERS

Name	**Type**	**Remark**
CID	VARCHAR2(6)	PRIMARY KEY
CNAME	VARCHAR2(10)	
CCITY	VARCHAR2(8)	

PRODUCTS

Name	**Type**	**Remark**
PID	VARCHAR2(6)	PRIMARY KEY
PNAME	VARCHAR2(6)	
PCOST	NUMBER(5,2)	
PROFIT	NUMBER(3)	

SALES DETAILS

Name	**Type**	**Remark**
CID	VARCHAR2(6)	COMPOSITE PRIMARY KEY
PID	VARCHAR2(6)	COMPOSITE PRIMARY KEY
SALE	NUMBER(3)	
SALEDT	DATE	COMPOSITE PRIMARY KEY

STATES

Name	**Type**	**Remark**
CCITY	VARCHAR2(8)	PRIMARY KEY
STATE	VARCHAR2(15)	

LIST OF EXERCISES:

1. **Execute: Data Definition Language (DDL) commands**

a. Create the tables in sales database.

b. View the structure of the each table.

c. Change the structure of the table like add new column, change the width of a data type, change the data type of a column, delete column from the table, rename the column name and table names.

d. Delete all records stored in a table, but the structure of the table is retained.

e. Remove a table from the database.

2. Execute: Data Manipulation Language (DML) commands

STATES

CCITY	STATE
Mysore	Karnataka
Kolkata	Westbengal
Pune	Maharashtra
Tirupathi	Andhrapradesh
Chennai	Tamilnadu

CUSTOMERS

CID	CNAME	CCITY
c1	Gopal	Mysore
c2	Haitvik	Kolkata
c3	Rohan	Pune
c4	Rajini	Chennai
c5	Mohan	Tirupathi
c6	Sanjay	Mysore
c7	samhita	Kolkata

SALES DETAILS

PID	PNAME	PCOST	PROFIT
p1	Pen	100.00	10
p2	Pencil	15.50	2
p3	pendrive	950.00	50
p4	DVD	35.00	5
p5	Mouse	500.50	Null

PRODUCTS

a) Write a query to display all customers.

b) Write a query to display pname of all products.

c) Write a query to display cname and ccity of all customers.

d) Write a query to display cname, ccity of all customers who lives in mysore.

e) Write a query to display cname and ccity of all customers who live in Kolkata or Chennai.

f) Find the cost of pencil.

g) Display CID as Customer_Id, CNAME as Name for all customers.

h) Change the name of the product p3 from 'pendrive' to 'modem'.

i) Find the product ids in sales detail table (eliminating duplicates).

j) Remove the record from sales detail table whose sale value is 5.

3. Implement table level and Column level constraints like NOT NULL, UNIQUE, PRIMARY KEY, FOREIGN KEY, CHECK, DEFAULT.

4. Operators

a) Display the sum of pcost and profit of all products.

b) Display the column heading as "Selling Price" instead of PCOST+PROFIT.

c) Find out what percent of pcost is profit for all products.

d) List the cids of customers who purchased products on '14-jul-2017'.

e) List only the products whose cost is more than 50.00.

f) List all the customers who are not belongs to 'pune'.

g) Write a query to display the pname and pcost of all the products where pcost lies between 5 and 25.

h) Write a query to display distinct customer id where product id is p3 or sale date is '18-mar-2017'.

i) Write a query to display cname, ccity of those customers whose cid is in c1 or c2 or c4 or c5 (using IN operator).

j) List customers whose name starts with 'h'.

k) Write a query to display all records of prod table in which first and third character of pname is any character and second character is 'e'.

l) Write a query to display all cname which includes two 'a' in the name.

m) List the products with unknown profit.

n) Display the profit of products as zero if unknown.

5. Joins and Views

a) Write a query to display cname, pname, sale, saledt for all customers.

b) Write a query to display cname who have purchased Pen.

c) Write a query to display cname, pname, sale for all customers who sold after '01-sep-2016'.

d) Write a query to display cname,ccity,state of all customers.

e) Write a query to display cname,ccity of all customers who belongs to Karnataka.

f) Create a view on product table which includes pid, pname and pcost of products.

g) Insert a row into the view.

h) Update the rows in a view.

i) Delete the rows from view.

6. Order by, group by and having clauses.

a) Write a query to display pname of all records. Sort all records by pname. (use order by clause)

b) Write a query to display cname and ccity of all records. Sort by ccity in descending order.

c) Write a query to display saledt and total sale on the date.

d) Write a query to display saledt and total sale on the date labeled as sale of all items.

e) Write a query to display saledt and total sale on the date sold after 01-sep-2016.

f) Write a query to display saledt and total sale on the date labeled as sale of all items other than DVD.

g) Write a query to display total number of customers who purchase pen.

7. **Single Row Functions:** Date Function, Numeric and Character Function

a) Write a query to display system date

b) Write a query to display the system date by rounding it to next month.

c) Write a query to display the system date by rounding it to next year.

d) Write a query to display the last date of the system date.

e) Write a query to display the next date of system date which is Friday.

f) Write a query to display sale date and date after 02 months from sale date.

g) Write a query to display system date, sale date and months between two dates.

h) Write a query to display the greatest date between sale date and system date, name it as BIG, also display sale date and SYSDATE.

i) Write a query to display the least date between sale date and system date name it as SMALL, also display sale date and SYSDATE.

j) Write a query to display the product name along with the rounded value of product cost for product name is "Pencil".

k) Write a query to display product cost along with MOD value if divided by 5.

l) Write a query to display cname in uppercase, lowercase, titlecase from cust table where customer name is "rohan".

m) Write a query to display all concatenated value of cname, ccity by converting cname into titlecase and ccity into uppercase.

n) Write a query to display the first 3 characters of cname.

o) Write a query to display the position of 'm' in the cname of the customer whose name is "samhita".

p) Write a query to display the length of all customer names.

q) PAD # character in left of product cost to a total width of 5 character position.

8. Group Functions and Set Functions

a) Write a query to display the total count of customer.

b) Write a query to display the minimum cost of product.

c) Write a query to display average value of product cost rounded to 2nd decimal places.

d) Write a query to display product name with total sale detail in descending order.

e) Write a query to display product name, sale date and total amount collected for the product.

f) Write a query to display sale date and total sale date wise which was sold after "14-jul-2016".

g) Write a query to display the customer name who belongs to those places whose name is having 'i' or 'p'.

h) Write a query to display customer name who belongs to a city whose name contains characters 'c' and whose name contains character 'a'.

i) Write a query to display the customer name who does not belong to 'pune'.

9. PL/SQL basic programs

a) Write a PL/SQL program to find largest number among three. (Hint: Use Conditional Statement)

b) Write a PL/SQL program to display the sum of numbers from 1 to N using for loop, loop…end and while…loop.

10. SQL Cursor based programs

a) Write a PL/SQL program to display the costliest and cheapest product in PROD table.

b) Write a PL/SQL program which will accept PID and display PID and its total sale value i.e. sum.

11. Functions

a) Write a function that accepts two numbers A and B and performs the following operations.

i. Addition

ii. Subtraction

iii. Multiplication

iv. Division

b) Write a function that accepts to find the maximum PCOST in PROD table.

12. Procedures

a) Write a procedure that accepts two numbers A and B, add them and print.

b) Write procedures to demonstrate IN, IN OUT and OUT parameter.

13. Triggers

a) Develop a PL/SQL program using BEFORE and AFTER triggers.

b) Create a row level trigger for the PROD table that would fire for INSERT or PDATE or DELETE operations performed on the PROD table. This trigger will display the profit difference between the old values and new values.

REFERENCE BOOKS:

1. Satish Asnani, *Oracle Database 11g: Hands-on SQL and PL/SQL,* PHI Publishers, 2010.
2. Pranab Kumar Das Gupta, *Database Management System Oracle SQL and PL/SQL,* PHI Learning Private Limited, 2009.

II B.Tech. - II Semester

(16BT31231) **JAVA PROGRAMMING LAB**

(Common to CSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on "Java Programming".

COURSE DESCRIPTION: Hands-on experience on Polymorphism; Inheritance and Interfaces; Exception Handling; Multithreading; Event Handling; AWT; Applets; Servlets.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on basic concepts of Java programming.

CO2. Design and develop efficient programs with multitasking ability and handle exceptions.

CO3. Demonstrate independent problem solving skills in developing interactive applications.

CO4. Apply object oriented approach to develop user friendly interface and learn how to communicate with systems over the network.

CO5. Build Java applications suitable for societal requirements.

CO6. Work effectively as an individual and as a member in team for case studies implementation.

CO7. Demonstrate communication skills, both oral and written for preparing and presenting reports.

LIST OF EXERCISES:

1. a. Write a Program to accept two integers through the command line arguments and print the sum of the two numbers.
   b. Write a Program to accept a String as a Command line argument and the program should print a Welcome message.
2. Write a program that displays a menu with options (i) Add (ii) Sub. Based on the options chosen, read 2 numbers and perform the relevant operation. After performing the operation, the program should ask the user if he wants to continue. If the user presses y or Y, then the program should continue displaying the menu else the program should terminate.[Use Scanner class]
3. a. Write a program to print the element of an array that has occurred highest number of time.
   b. Write a program to find greatest number in a 3*3 array. The program is supposed to receive 9 integer numbers as command line arguments.
4. a. Create a class "AmountInWords" to convert the amount into words. (Consider the amount to be not more than 100000.)
   b. Write a Program to count tokens- number of words and characters in a string.
5. Implement any one of the case study with the specifications given below:
   a) Create classes, objects and their properties.
   b) Add methods to classes and implement them.
   c) Refine the objects by adding constructors and local variables.
   d) Show communication between the objects by calling instance of one object from another class.
   e) Handle Exceptions and Implement relationships like inheritance.

Case study 1: Banking Application:

The banking application consists of five divisions. They are customer details, creating a new account, withdrawing money, loan details and depositing money. The customer details consist of customer name, address, phone number, account number. To withdraw money checks the balance in the account and then get the money. The loan details consist of loan types like home loans, car loans, education loans etc. To deposit money enter the account number and give the account to be deposited.

Case study 2: Library Application:

The Library Application consists of Student, faculty and book details, Issue book, and return book. The student and faculty details consist of name, ID, Branch and maximum number of books can be issued to them. The book details consist of ID, Book name and Author name. To Issue a book to members, the librarian checks the availability of book and if the book is not available, then an error message will be displayed. To return the book, the librarian verifies the validity and if the validity is expired then the fine amount message will be displayed. The student and faculty can view the book details issued to them and also can check the count of remaining books that can be taken for issue.

6. a. Write a program that correctly implements producer consumer problem using the concept of inter-thread communication.
   b. Write a program that demonstrates time slicing among equal priority threads, show that a lower priority thread's execution is deferred by the time slicing of higher-priority threads.
7. Develop an Applet that receives an integer in one text field, and computes its factorial value and returns it in another text field, when the button named "Compute" is clicked.
8. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -, *, % operations. Add a text field to display the result.
9. Create a Servlet that recognizes first time visitor to web application and responds by saying "Welcome to new user" otherwise "welcome back".

REFERENCE BOOKS:

1. Herbert Schildt, *Java the Complete Reference,* Oracle Press, Ninth Edition, 2014.

2. Sachin Malhotra and Saurab Choudhary, *Programming in Java,* Oxford University Press, Second Edition, 2014.

II B.Tech. - II Semester

(16BT4HS31) SOFT SKILLS LAB

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: English Language Laboratory in I B.Tech.

COURSE DESCRIPTION: This course covers Body Language; Assertiveness; Goal Setting; Creative Thinking; Interpersonal Skills; Team Work; Conflict Management; Etiquette; Report Writing; Group Discussions; Interviewing Skills.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Acquire knowledge on
- Goal Setting
- Creative Thinking
- Leadership Skills and
- Team Work

CO2. Analyze the situations and develop skills for
- Body Language
- Personality Development and
- Stress Management

CO3. Apply the techniques of soft skills in a problem situation enhanced through multimedia software.

CO4. Function effectively as an individual and as a member in diverse teams.

CO5. Communicate effectively in public speaking in formal and informal forums.

LIST OF EXERCISES:

1. Body Language
2. Assertiveness
3. Goal Setting
4. Creative Thinking
5. Interpersonal Skills
6. Team Work
7. Conflict Management
8. Etiquette
9. Report Writing
10. Resume Writing
11. Group Discussions
12. Interviewing Skills

Total Lab Slots: 10

REFERENCE BOOKS:

1. R. C. Sharma and Krishna Mohan, *Business Correspondence and Report Writing,* Tata McGraw-Hill Publishing Company Limited, Third Edition, New Delhi, 2012.
2. Gopalswamy Ramesh and Mahadevan Ramesh, T*he Ace of Soft Skills,* Pearson, Noida, 2010.
3. Jeff Butterfeild, *Soft Skills for Everyone,* Cengage learning, Delhi, 2011.
4. Barun K. Mitra, P*ersonality Development and Soft Skills,* Oxford University Press, Noida, 2012.

SUGGESTED SOFTWARES:

1. ETNL Language Lab Software Version 4.0
2. GEMS - Globarena E- Mentoring System
3. Speech Solutions.
4. English Pronunciation Dictionary by Daniel Jones.
5. Learning to Speak English 8.1, The Learning Company - 4 CDs.
6. Mastering English: Grammar, Punctuation and Composition.
7. English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
8. Dorling Kindersley Series of Grammar, Punctuation, Composition etc.
9. Language in Use 1, 2 and 3.
10. Cambridge Advanced Learner's Dictionary - 3rd Edition.
11. Centronix - Phonetics.
12. Let's Talk English, Regional Institute of English South India.
13. Ultimate English Tutor.

III B.Tech. - I Semester

(16BT51201) COMPUTER GRAPHICS AND MULTIMEDIA

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Matrices and Numerical Methods".

COURSE DESCRIPTION: Introduction to Computer Graphics, Output Primitives; 2D Geometric Transformations and Viewing; 3D object representation and Visible Surface Detection Methods; Introduction to Multimedia, Audio and Video; Multimedia Data Compression.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Graphical interactive devices
- Viewing transformations
- 3-D object representations
- Surface detection methods
- Image, audio, video representations and standards.

CO2. Analyze multimedia compression issues using image, audio and video compression techniques.

CO3. Design algorithms to generate points, lines, polygons for 2-D, 3-D objects.

CO4. Apply Transformations and Clipping algorithms for 2-D and 3-D objects, various lossy / lossless coding techniques on text and images for compression and decompression.

CO5. Build multimedia applications for societal requirements.

UNIT -I: INTRODUCTION TO GRAPHICS AND OUTPUT PRIMITIVES (9 Periods)

Introduction: Raster-Scan systems, Random Scan systems, Graphics monitors, Work stations and Input devices.

Output Primitives: Points and Lines, Line Drawing algorithms, Mid-point Circle and Ellipse algorithms.

Filled area primitives: Scan Line Polygon Fill algorithm, Boundary-fill algorithms and Flood-Fill algorithms.

UNIT -II: 2-D GEOMETRICAL TRANSFORMS AND 2-D VIEWING (9 Periods)

2-D Transforms: Translation, Scaling, Rotation, Reflection and Shear transformations, Homogeneous coordinates, Composite Transforms, Transformations between coordinate systems.

2-D Viewing: The Viewing Pipeline, Viewing coordinate reference frame, Window to View-Port coordinate Transformation, Cohen-Sutherland line clipping algorithms.

UNIT -III: 3-D OBJECT REPRESENTATION AND VISIBLE SURFACE DETECTION METHODS (9 Periods)

3-D Object representation: Polygon Surfaces, Quadric surfaces, Spline Representation, Hermite Curve, Bezier Curve and B-Spline Curves, Bezier and B-Spline Surfaces.

Visible Surface Detection Methods: Classification, Back-Face detection, Depth-Buffer, Scan-Line, Depth Sorting, BSP-Tree methods, Area Sub-Division and Octree methods.

UNIT-IV: INTRODUCTION TO MULTIMEDIA, AUDIO AND VIDEO (9 Periods)

Introduction: Definition of Multimedia, Multimedia and Hypermedia, Multimedia Software tools, Graphics and Image Data representations-Graphics and Image Data types, File Formats, Color models in images, Color models in video.

Audio and Video: Definition of sound, Digitization, Nyquist Theorem, Signal to Noise ratio, Signal to Quantization-Noise ratio; Types of video signals, Analog video, Digital video.

UNIT-V: MULTIMEDIA DATA COMPRESSION (9 Periods)

Lossless compression algorithms- Introduction, Basics of Information Theory, Run Length Coding, Variable Length coding, Dictionary Based coding, Arithmetic coding; Lossy Compression algorithms-Quantization; Introduction to Transform Coding-DCT, DFT; Image compression techniques-JPEG standard, JPEG 2000; Introduction to video compression- Video compression based on Motion Compensation, MPEG-1, MPEG-2.

Total Periods: 45

TEXT BOOKS:

1. Donald Hearn and M. Pauline Baker, Computer *Graphics C version,* Pearson Education, Second Edition, 2006.
2. Ze-Nian Li and Mark S. Drew, *Fundamentals of Multimedia,* Pearson Education, Second Edition, 2008.

REFERENCE BOOKS:

1. James D. Foley, Andries van Dam, Steven K. Feiner and John F. Hughes, *Computer Graphics: Principles and Practice in C,* Addison Wesley Professional, Second Edition, 2013.

2. Nigel Chapman and Jenny Chapman, *Digital Multimedia,* Wiley Dreamtech, Second Edition, 2004.

III B.Tech. - I Semester
(16BT50501) COMPUTER NETWORKS

(Common to ECE, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A Course on "Operating Systems".

COURSE DESCRIPTION: Introduction to Computer Networks; The Physical Layer; The Data Link Layer; The Medium Access Control Sublayer; The Network Layer; The Transport Layer; The Application Layer.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Functionalities of Various OSI and TCP/IP layers
- 3G Mobile phone networks, 802.11
- TCP,UDP and SMTP

CO2. Analyze the issues related to data link, medium access and transport layers by using channel allocation and connection management schemes.

CO3. Design and compute subnet masks and addresses for networking requirements.

CO4. Solve problems related to Flow control, Error control, congestion control and Network Routing.

CO5. Apply Network Standards - 802.3 and 802.11 for developing computer Networks.

CO6. Assess the impact of wired and wireless Networks in the context of societal applications like VoIP, Multi-user Network Games, Internet of Things.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION AND PHYSICAL LAYER (9 Periods)

Introduction: Network hardware, Network software, Reference models - OSI, TCP/IP; Example networks - Internet; Wireless LANs - 802.11.

Physical Layer: Guided transmission media, Wireless transmission.

UNIT-II: DATA LINK LAYER AND MEDIUM ACCESS CONTROL SUBLAYER (10 Periods)

Data Link Layer: Data link layer design issues, Error detection and correction-CRC, Hamming codes, Elementary data link protocols, Sliding window protocols.

Medium Access Control Sublayer: ALOHA, Carrier sense multiple access protocols, Collision-free protocols, Ethernet, Data link layer switching-Repeaters, Hubs, Switches, Routers, and Gateways.

UNIT-III: NETWORK LAYER (10 Periods)

Network layer design issues, Routing algorithms - Shortest path, Flooding, Distance vector, Link state routing, Hierarchical, Broadcast, Multicast, Anycast; Congestion control algorithms, Network layer in the internet - The IP version 4 protocol, IP addresses, IP version 6, Internet control protocols.

UNIT-IV: TRANSPORT LAYER (9 Periods)

UDP - Segment header, Remote procedure call, Real-time transport protocols; TCP - service model, Protocol, Segment header, Connection establishment, Connection release, Sliding window, Timer management, Congestion control.

UNIT-V: APPLICATION LAYER (7 Periods)

Domain Name System (DNS)-Name space, Domain resource records, Name servers; Electronic mail-Architecture and services, User agent, Message formats, Message transfer, Final delivery; The World Wide Web- Architectural overview, HTTP.

Total Periods: 45

TEXT BOOK:

1. Andrew S. Tanenbaum and David J. Wetherall, *Computer Networks,* Pearson Education, Fifth Edition, 2015.

REFERENCE BOOKS:

1. Behrouz A. Forouzan, *Data Communication and Networking,* Tata McGraw-Hill, Fourth Edition, 2010.

2. James F. Kurose and Keith W. Ross, *Computer Networking: A Top-Down Approach Featuring the Internet,* Pearson Education, Second Edition, 2012.

III B.Tech. - I Semester

(16BT51501) COMPILER DESIGN

(Common to IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Theory of Computation".

COURSE DESCRIPTION: Lexical analysis; Parsers; Run Time Environments; Syntax Directed Translation; Type checking; Code Optimization; Code Generation and Compiler tools.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on the phases involved in design of compilers.

CO2. Analyze code optimization Techniques.

CO3. Design experiments for implementing parsing techniques.

CO4. Synthesize rules in compiler to demonstrate semantic attribution during Parsing.

CO5. Use compiler construction tools such as LEX and YACC for designing a Parser.

CO6. Apply ethical principles for usage of stack and other storage memory.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO COMPILER AND LEXICAL ANALYSIS (9 Periods)

Structure of a compiler, Interpretation- Interpreters, Recursive interpreters, Iterative interpreters**.**

Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Specification of Tokens, The Lexical-Analyzer Generator LEX.

UNIT-II: SYNTAX ANALYSIS (9 Periods)

The Role of the Parser, Eliminating Ambiguity, Eliminating of Left Recursion and Left Factoring.

Top-Down Parsing: Recursive descent parsing, Non Recursive Predictive parsing, LL (1) Grammars, A traditional top-down parser generator-YACC

Bottom-Up Parsing: Shift reduce parsing, LR parsers - Simple LR parser, Canonical LR parser, LALR parser, Using Ambiguous Grammars.

UNIT-III: SYNTAX DIRECTED TRANSLATION AND TYPE CHECKING (9 Periods)

Syntax directed definition, S-attributed and L-attributed definitions, Construction of syntax trees.

Type Checking: Type Expressions, Type Equivalence, Rules for Type Checking, Type Conversions, Overloading of Functions and Operators.

UNIT-IV: INTERMEDIATE CODE GENERATOR AND RUN TIME ENVIRONMENTS (9 Periods)

Preprocessing the intermediate code, Preprocessing of expressions, Preprocessing of if-statements and goto statements, Preprocessing of routines, Variants of Syntax Trees, Three Address Code, Boolean expressions, Flow-of-Control Statements, Control- Flow Translation of Boolean Expressions.

Run time Environments: Storage organization, Stack Allocation of Space, Access to Nonlocal Data on the Stack.

UNIT-V: CODE OPTIMIZATION AND CODE GENERATION (9 Periods)

Basic Blocks and Flow Graphs, Optimization of Basic Blocks, The principal sources of optimization, Introduction to data flow analysis.

Code Generation: Issues in the Design of a Code Generator, The Target Language, Simple Code Generator, Peephole optimization, Register allocation and assignment.

Total Periods: 45

TEXT BOOK:

1. Alfred V. Aho, Monica S.Lam, Ravi Sethi and Jeffrey D. Ullman, *Compilers-Principles, Techniques and Tools,* Pearson Education, Second Edition, 2012.

REFERENCE BOOKS:

1. Dick GruneKees van Reeuwijk Henri, *Modern Compiler Design,* Springer, Second Edition, 2012.
2. David Galles, *Modern Compiler Design,* Pearson Education Asia, 2007.

III B.Tech. - I Semester
(16BT51202) OBJECT ORIENTED ANALYSIS AND DESIGN

(Common to CSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on "Software Engineering" and "Object Oriented Programming through C++".

COURSE DESCRIPTION: Introduction to UML, Basic structural modeling; Advanced structural modeling, Class and object diagrams; Basic behavioral modeling; Advanced behavioral modeling; Architectural modeling.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on principles of object oriented analysis and design through UML Diagrams.
CO2. Analyze user requirements and identify suitable structural and behavioral modeling components.
CO3. Design and develop UML models for real time software applications.
CO4. Solve real world problems by applying structural and behavioral modeling techniques.
CO5. Use unified modeling language in preparing blue prints for software solutions.
CO6. Design and develop UML models to solve societal problems.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO UML AND BASIC STRUCTURAL MODELING (11 Periods)

Introduction to UML: Importance of modeling, Principles of modeling, Object oriented modeling, An overview of UML, Conceptual model of the UML, Architecture, Software development life cycle.

Basic Structural Modeling: Classes-Terms and concepts, Common modeling techniques; Relationships-Modeling simple dependencies, Single inheritance and structural relationships; Common mechanisms, Diagrams.

UNIT-II: ADVANCED STRUCTURAL MODELING, CLASS AND OBJECT DIAGRAMS (7 Periods)

Advanced Structural Modeling: Advanced classes, Advanced relationships, Interfaces, Types and roles, Packages, Instances.

Class and Object Diagrams: Terms and concepts, Modeling techniques for class diagram-Modeling simple collaboration, Logical database schema, Forward and reverse engineering; Introduction to object diagrams.

UNIT-III: BASIC BEHAVIORAL MODELING (9 Periods)

Basic Behavioral Modeling-I: Interactions-Terms and concepts, Modeling a flow of control; Interaction diagrams-Terms and concepts, Modeling flows of control by time ordering and control by organization, Forward and reverse engineering.

Basic Behavioral Modeling-II: Use cases-Terms and concepts, Modeling the behavior of the element; Use case Diagrams-Terms and concepts, Modeling the context of a system, Requirement of a system, Forward and reverse engineering; Activity Diagrams-Terms and concepts, Modeling a workflow, modeling an operation, Forward and reverse engineering.

UNIT -IV: ADVANCED BEHAVIORAL MODELING (7 Periods)

Events and signals-Modeling a family of signals, exceptions; State machines-Modeling the lifetime of an object; Introduction to processes and threads, Time and space-Modeling timing constraints, Distribution of objects and objects that migrate; State chart diagrams-Modeling reactive objects, Forward and reverse engineering.

Unit-V: ARCHITECTURAL MODELING (11 Periods)

Component-Terms and concepts, Modeling executables and libraries, Modeling tables, Files and documents, Modeling an API; Deployment-Modeling processors and devices, Modeling the distribution of components; Component diagrams-Modeling source code, Executable release, Physical database, Adaptable systems, Forward and reverse engineering; Deployment diagrams-Modeling an embedded systems, Client/Server system, Fully distributed systems, Forward and reverse engineering.

Case Studies: Online student course registration system for university, Hospital Management.

Total Periods: 45

TEXT BOOK:

1. Grady Booch, James Rumbaugh and Ivar Jacobson, *The Unified Modeling Language User Guide,* Pearson Education, Second Edition, 2009.

REFERENCE BOOKS:

1. Magnus Penker, Brian Lyons, David Fado and Hans-Erik Eriksson, *UML 2 Toolkit,* WILEY-Dreamtech India Pvt. Ltd., 2006.
2. Pascal Roques, *Modeling Software Systems Using UML2,* WILEY-Dreamtech India Pvt. Ltd, 2004.

III B.Tech. - I Semester

(16BT51203) WEB TECHNOLOGIES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Java Programming".

COURSE DESCRIPTION: Hyper Text Markup Language (HTML); Features of HTML5; Cascading Style Sheets (CSS); JavaScript; JQuery; Bootstrap; Hypertext Preprocessor (PHP); MySQL.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on web page design elements, dynamic content and database interaction.

CO2. Analyze user requirements to develop web applications.

CO3. Design client-server applications using web technologies.

CO4. Demonstrate problem solving skills to develop enterprise web applications.

CO5. Use HTML, CSS, JavaScript, JQuery, Bootstrap and PHP technologies for device independent web application development.

CO6. Apply Web Technologies to develop interactive, dynamic and scalable web applications for societal needs.

DETAILED SYLLABUS:

UNIT-I: HTML (11 Periods)

Introduction: Fundamentals of HTML, Working with text, Organizing text in HTML, Working with links and URLs, Creating tables, Working with images, Canvas, Forms, Frames and Multimedia.

HTML5: Introduction, HTML5 document structure, Creating editable content, Checking spelling mistakes, Exploring custom data attributes, Client-Side storage, Drag and drop feature, Offline web applications, Web communications, Cross-Document messaging and desktop notifications.

UNIT-II: CSS AND JAVASCRIPT (8 Periods)

CSS: Introduction, CSS selectors, Inserting CSS in an HTML document, Backgrounds, Fonts, and Text styles, Creating boxes, Displaying, Positioning and floating elements, Features of CSS3, Media queries.

Javascript: Overview of JavaScript, JavaScript functions, Events, Image maps and animations, JavaScript objects, Working with browser and document objects.

UNIT-III: JQUERY and BOOTSTRAP (9 Peirods)

JQuery: Introduction, JQuery selectors, Events, Methods to access HTML elements and attributes, Introduction to AJAX.

Bootstrap: Getting started with Bootstrap, Creating responsive layouts using Bootstrap CSS - Basic HTML structure for Bootstrap, Responsive classes, Rendering images, the grid system, Constructing data entry forms.

UNIT-IV: INTRODUCTION TO PHP (9 Periods)

Introduction, Data types, Variables, Constants, Expressions, String interpolation, Control structures, Functions, Arrays, Embedding PHP code in web pages, Object Oriented PHP.

UNIT-V: PHP WEB FORMS AND MYSQL (8 Periods)

PHP Web forms: PHP and web forms, Sending form data to a server, Working with cookies and session handlers

PHP with MySQL: Interacting with the database, Prepared statement, Database transactions.

Total Periods: 45

TEXT BOOKS:

1. Kogent Learning Solutions Inc, *HTML 5 Black Book: Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP and JQuery,* Dreamtech Press, Second Edition, 2016.
2. W. Jason Gilmore, B*eginning PHP and MySQL,* APress, Fourth Edition, 2011.

REFERENCE BOOKS:

1. Snig Bahumik, *Bootstrap Essentials,* PACKT Publishing, 2015 (e-book).
2. Thomas A. Powell, T*he Complete Reference: HTML and CSS,* Tata McGraw Hill, Fifth Edition, 2010.

3. Andrea Tarr, *PHP and MySQL,* Willy India, 2012.

III B.Tech. - I Semester
(16BT50341) OPTIMIZATION TECHNIQUES

(Interdisciplinary Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Multi Variable Calculus and Differential Equations".

COURSE DESCRIPTION: Introduction to optimization; classical optimization techniques; classification of optimization problems; linear programming; transportation and assignment problem; non-linear programming; un-constrained non-linear programming; constrained non-linear programming; dynamic programming.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on Optimization techniques for Linear, Non linear and Dynamic programming problems.

CO2. Analyze and quantify a system architecture or product design problem for selecting appropriate objective function, design variables, parameters and constraints.

CO3. Develop mathematical models for real time optimization problems.

CO4. Conduct investigations on complex problems and make recommendations based on solutions, analysis and limitations of models.

CO5. Use optimization techniques for solving complex problems of real time applications.

CO6. Optimize the resources in organizations for sustainable development.

DETAILED SYLLABUS:

UNIT -I: CLASSICAL OPTIMIZATION TECHNIQUES (9 Periods)

Introduction, Engineering applications of optimization, tatement of an optimization problem, Design vector, Design constraints, Constraint surface, Objective function, lassification of optimization problems, Single variable optimization, Multi variable optimization without constraints, Multi variable optimization with equality constraints - Lagrange multipliers method; Multi variable optimization with inequality constraint - Kuhn Tucker conditions.

UNIT -II: LINEAR PROGRAMMING (9 Periods)

Introduction, Formulation, Graphical solution, Simplex method, Big M-method, Two-phase method, Duality principle, Dual simplex method.

UNIT -III: TRANSPORTATION AND ASSIGNMENT PROBLEMS (9 Periods)

Transportation problems: Formulation, Initial basic feasible solution - North-West corner rule, Least cost method, and Vogel's approximation method; Optimal solution using Modified distribution method - Unbalanced transportation problem, Degeneracy.

Assignment problems: Formulation, Solution of assignment problem and its variants, Traveling salesman problem.

UNIT -IV: NON-LINEAR PROGRAMMING (9 Periods)

One dimensional minimization methods, classification - Fibonacci method, quadratic interpolation method; classification of unconstrained minimization methods - Powell's method, steepest descent method (Cauchy's method); classification of constrained optimization techniques - interior and exterior penalty function methods.

UNIT -V: DYNAMIC PROGRAMMING (9 Periods)

Multistage decision processes, Concept of sub optimization and Principle of optimality, Computational procedure in dynamic programming - calculus method, Tabular method; Linear Programming problem by dynamic programming approach, Applications - reliability problem, shortest path problem, and capital budgeting problem. **Total Periods: 45**

TEXT BOOKS:

1. Singiresu S Rao, *Engineering Optimization: Theory and Practice,* New Age International, Third Edition, 2010.
2. A.Ravindran, K.M.Ragsdell, G.V.Reklaitis, *Engineering Optimization: Methods and applications,* Wiley India Pvt. Ltd., Second Edition2006.

REFERENCE BOOKS:

1. C Mohan and Kusum Deep, *Optimization Techniques,* New Age International Publishers, 2010.
2. Hamdy A. Taha, *Introduction to Operations Research,* PHI, Ninth Edition, 2013.

III B.Tech. - I Semester

(16BT50442) MICROPROCESSORS AND INTERFACING

(Interdisciplinary Elective-1)
(Common to CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on "Digital Logic Design" and "Computer Organization".

COURSE DESCRIPTION: INTEL 8086 and 8051- Architectures; Instruction set; Programmable Interfacing Concepts; ADC, DAC, 8255, 8257,8259 ,8279,8251, Advanced peripheral Interfacing; Applications.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on
- Internal Hardware details of Intel 8086, 8051 and programming devices like 8255, 8257, 8259, 8279 and 8251.
- Interfacing various peripherals to build standalone systems.

CO2: Analyze various peripherals and interfacing techniques.

CO3: Design application based Microcomputer system using 8086 and 8051.

CO4: Solve problems by providing microcomputer-based real time solutions.

CO5: Apply programming tools, appropriate techniques and resources to complex engineering activities for microprocessor and microcontroller based systems with understanding of limitations.

C06: Solving societal problems by applying concepts of microprocessors and microcontrollers.

DETAILED SYLLABUS:

UNIT I - INTEL 8086 ARCHITECTURE AND PROGRAMMING (9 Periods)

Evolution of Microprocessors, Architecture of 8086 microprocessor, Register organization, Physical Memory Organization, Signal description of 8086, General Bus Operation Minimum and Maximum mode operation of 8086, Timing diagram, Addressing modes.

UNIT II - ASSEMBLY LANGUAGE PROGRAMMING WITH 8086 AND INTERRUPTS (10 Periods)

Instruction set of 8086, Assembler directives and Operators; Interrupts and Interrupt service routines, Interrupt Cycle of 8086, Non Maskable interrupt, Maskable interrupt (INTR), Interrupt Programming, Passing Parameters to procedures, MACROS.

UNIT III-BASIC PERIPHERALS AND THEIR INTERFACING WITH 8086 (8 Periods)

Semiconductor memory Interfacing, Dynamic RAM interfacing, Interfacing I/O ports, Programmable Input-Output Port (PIO) 8255, Modes of operations of 8255, Interfacing analog to digital and digital to analog converters, stepper motor interfacing.

UNIT IV - SPECIAL PURPOSE PROGRAMMABLE PERIPHERAL DEVICES (9 Periods)

Programmable Interrupt Controller 8259A; The keyboard/Display Controller 8279-Architecture, Signal Description, Modes of operations; Programmable Communication Interface 8251 USART; DMA Controller 8257, DMA Transfers and Operations.

UNIT V - INTRODUCTION TO 8051 MICROCONTROLLER (9 Periods)

Microprocessors Vs Microcontrollers, The 8051 Architecture: Introduction, 8051 Microcontroller Hardware, input/output pins, Ports and circuits, External Memory, Counters and Timers, Serial Data Input / Output, Interrupts; Addressing Modes, Instruction set of 8051, simple programs on arithmetic operations using 8051.

Total Periods: 45

TEXT BOOKS:

1. A.K. Ray and K.M.Bhurchandi, *Advanced Microprocessors and Peripherals- Architecture, Programming and Interfacing,* TMH, 2002.
2. Kenneth J. Ayala, *The 8051 Microcontroller-Architecture, Programming and Applications,* Third Edition, Cengage learning, 2004.

REFERENCE BOOKS:

1. Douglas V.Hall, *Microprocessors and Interfacing: Programming and Hardware,* Revised Second Edition, TMH.
2. Yu-cheng Liu, Glenn A. Gibson, *Microcomputer systems: The 8086/8088 Family Architecture, Programming and Design,* PHI, 2006.

3. Mazidi and Mazidi, *The 8051 Microcontroller and Embedded Systems,* PHI, 2000.

III B.Tech. - I Semester

(16BT60404) IMAGE PROCESSING

(Interdisciplinary Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Fundamentals of image processing; Image transforms; Image enhancement techniques in spatial and frequency domains; Restoration techniques; Image segmentation techniques; Image compression techniques.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on
- Image Fundamentals
- Image Enhancement and Restoration Techniques
- Image Segmentation and Compression Techniques
- Color image processing

CO2. Analyze different images using various processing techniques.

CO3. Design and Develop various image processing algorithms to process the images in various Real Time Applications.

CO4. Solve problems related to images for feasible and optimal solutions in the core area of Image Processing.

CO5. Apply appropriate techniques to complex engineering activities in the field of image processing.

CO6. Understand the impact of the image processing for societal needs.

DETAILED SYLLABUS:

UNIT-I: IMAGE FUNDAMENTALS (10 Periods)

Fundamental steps in Image Processing, Image sampling and quantization, some basic relationships between pixels, Arithmetic operations, Logical operations, Spatial operations.

IMAGE TRANSFORMS: 2D-DFT and properties, Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Haar-Transform, Slant Transform, Hotelling Transform.

UNIT-II: IMAGE ENHANCEMENT (11 Periods)

Basic Intensity transformation functions, Histogram processing, Fundamentals of Spatial Filtering, Smoothing spatial filters, Sharpening spatial filters, Combining spatial Enhancement methods.

Basics of filtering in frequency domain, Correspondence between filtering in the spatial and frequency domains, Image smoothing using frequency domain filters, Image sharpening using frequency domain filters, Homomorphic filtering.

UNIT-III: IMAGE RESTORATION (7 Periods)

Image degradation/Restoration model, Noise models, Restoration in the presence of Noise only-spatial filtering - mean, order- statistic and adaptive filters. Estimating the degradation function, Inverse filtering, Weiner filtering, Constrained least squares filtering.

UNIT-IV: IMAGE COMPRESSION (8 Periods)

Classification of redundancy in Images, Image Compression models, Run length coding, Arithmetic coding, Dictionary based compression, bit-plane coding, Transform based coding, Fidelity Criteria, Image compression standards.

UNIT-V: IMAGE SEGMENTATION AND COLOR IMAGE PROCESSING (9 Periods)

Detection of discontinuities- Point, line and edge Detection. Thresholding- global thresholding, adaptive thresholding. Region based Segmentation. Color image fundamentals - RGB, HSI models, conversions, Pseudo Color Image Processing, Color transformations.

Total Periods: 45

TEXT BOOKS:

1. Rafael C. Gonzalez and Richard E. Woods, *Digital Image Processing,* Pearson Education, Third Edition, 2008
2. S.Sridhar, *Digital Image Processing,* Oxford University, Second Edition, 2016

REFERENCE BOOKS:

1. William K. Pratt, *Digital Image Processing,* John Wiley and Sons, Third Edition, 2002.

2. Anil K.Jain, *Fundamentals of Digital Image processing,* Prentice Hall, 2007.

III B.Tech. - I Semester

(16BT60503) **WIRELESS NETWORKS**

(Interdisciplinary Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Computer Networks".

COURSE DESCRIPTION: Generations of Wireless Networks; Voice and Data Processing; Wireless Network Topology; GSM; TDMA; CDMA; Wireless LANs; Wireless WANs; Wireless PAN.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on
- Wireless Medium Access methods.
- Network Topology
- Wireless LAN, HIPERLAN
- GSM, CDMA, GPRS

CO2. Analyze the network topologies in Wireless Networks.

CO3. Design solutions for network communications at physical and transport layers.

CO4. Solve complex problems related to network communications and wireless networks.

CO5. Apply GSM, CDMA, GPRS and Bluetooth to create Home Access Networks and wireless Personal Area Network.

CO6. Apply contextual knowledge to solve problems using societal applications like health care devices, Internet of Things.

DETAILED SYLLABUS:

UNIT-I: OVERVIEW OF WIRELESS NETWORKS AND WIRELESS MEDIUM ACCESS ALTERNATIVES (9 Periods)

Overview of Wireless Networks: Different generations of wireless networks.

Wireless Medium Access Alternatives: Fixed assignment access for voice-oriented networks - Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), Code Division Multiple Access (CDMA); Random access for data-oriented networks - Access methods for wireless LANs; Integration of voice and data traffic.

UNIT-II: NETWORK PLANNING AND WIRELESS NETWORK OPERATIONS (9 Periods)

Network Planning: Wireless network topologies - Infrastructure of network topology, Ad hoc network topology; Cellular topology, Cellular concept, Cellular hierarchy; Cell fundamentals.

Wireless Network Operations: Mobility management - Location management, Handoff management, Mobile IP; Security in wireless networks - Security requirements for wireless networks, Overview of network security, Identification schemes.

UNIT-III: INTRODUCTION TO WIRELESS LANS AND IEEE 802.11 Wireless LANS (9 Periods)

Introduction to Wireless LANs: Historical overview of the LAN industry, Wireless home networking-Home Access Networks (HAN), Needs of HAN, HAN technologies**.**

IEEE 802.11 WLANs: IEEE 802.11 - Overview of IEEE 802.11, Reference architecture, Layered protocol architecture; The PHY Layer - FHSS, DSSS, DFIR, IEEE 802.11a, IEEE 802.11b; MAC sublayer - General MAC frame format; MAC management sublayer - Registration, Handoff, Security.

UNIT-IV: GSM TECHNOLOGY, CDMA TECHNOLOGY AND MOBILE DATA NETWORKS (10 Periods)

GSM Technology: GSM - Reference architecture; Mechanisms to support a mobile environment - Registration, Call establishment, Handoff, Security.

CDMA Technology: CDMA - IS-95 CDMA forward channel, IS-95 CDMA reverse channel, Packet and frame formats in IS-95.

Mobile Data Networks: GPRS - Reference architecture in GPRS, Mobility support in GPRS, Protocol layers in GPRS; SMS - Overview of SMS Operation; Mobile application protocols - Wireless application protocol, i-Mode.

UNIT-V: WIRELESS ATM, HIPERLAN AND WIRELESS PAN (8 Periods)

Wireless ATM and HIPERLAN: Wireless ATM - Reference model, Protocol entities, PHY and MAC layer alternatives, Mobility support; HIPERLAN - HIPERLAN-1, Requirements and architecture, PHY and MAC layers; HIPERLAN-2 - Architecture and reference model, PHY layer, DLC layer, Convergence layer, Security, Overall comparison with 802.11.

Wireless PAN: IEEE 802-15 WPAN, Home RF - Architecture; Bluetooth - Overall architecture, Protocol stack, Physical connection, Security. **Total Periods: 45**

TEXT BOOK:

1. Kaveh Pahlavan and Prashant Krishna Murthy, *Principles of Wireless Networks,* PHI Learning Pvt. Ltd., 2009.

REFERENCE BOOKS:

1. William Stallings, *Wireless Communications and Networks,* Pearson Education, Second Edition, 2012.
2. C. Sivaram Murthy and B.S. Manoj, A*d-hoc Wireless Networks Architectures and Protocols,* Pearson Education, Second Edition, 2007.

III B.Tech. - I Semester

(16BT51231) CASE TOOLS AND COMPUTER NETWORKS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Courses on "Object Oriented Analysis and Design", "Computer Networks" and "Java Programming".

COURSE DESCRIPTION: Modeling case studies -Online Ticket Reservation system; Point of sales; Hands-on Experience on data link Framing methods; CRC; Routing algorithms; Congestion Control Algorithms; Substitution Techniques and Network Simulation using NS-2.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- UML architecture
- Routing algorithms
- Error detection and correction techniques.

CO2. Analyze real world problems and study the applicability of UML design.

CO3. Apply Unified Modeling Language to design software and design routing algorithms Shortest path using Dijkstra's, and Distance vector.

CO4. Demonstrate independent problem solving skills in designing and developing software solutions.

CO5. Use NS-2 tool for simulating computer network processes.

CO6. Build network models and UML models suitable for societal needs.

CO7. Work effectively as an individual and as a member in team for mini-project implementation.

CO8. Demonstrate communication skills, both oral and written for preparing and presenting reports.

LIST OF EXERCISES:

Case studies given below should be Modeled using Visual Modeling tools in different views i.e. Use case view, logical view, component view, Deployment view.

1. Case Study : Online Ticket Reservation for Railways

Problem Statement:

Computer play an integral part of the day in today's life. It makes the entire job easier and faster, every job is computerized so as the ticket reservation we can book over the online ticket reservation system. During the booking of the ticket reservation passenger has to select origin, date of journey, destination, class of train etc. The reservation counter keeps track of passenger's information. Thus the system will have all the details about the trains and facilities provided by them. There are various trains with the different level of convenience for the passengers. The whole database will be maintained by database administrator. There are varieties of trains where the passengers can select the train according to the convenience for their destination journey. The journey could be within the state or across the India. Each train has the three types of classes i.e. Sleeper class, First class and the AC compartment. Design the application for the above problem description.

2. Case Study : A Point of Sale (PoS) System

Problem Statement:

A POS System is a computerized application used to record sales and handle payments; it is typically used in a retail store. It includes hardware components such as a computer and bar code scanner, and software to run the system. It interfaces to various service applications, such as a third-party tax calculator and inventory control. These systems must be relatively fault tolerant; that is, even if remote services and temporarily unavailable they must still be of capturing sales and handling at least cash payments. A POS system must support multiple and varied client - side terminals and interfaces such as browser, PDA's, touch - screens.

3. Case Study : Recruitment Procedure for Software Industry

Problem Statement:

In the software industry the recruitment procedure is the basic thing that goes in the hand with the requirement as specified by the technical management team. HR first gives an advertisement in leading Newspapers, Journals, Weeklies and Websites. The job seekers can apply for it through by Post or by e-mail to the company. The technical skill and the experience of the candidates are reviewed and the short listed candidates are called for the interview. There may be different rounds for interview like the written test, technical interview, and HR interview. After the successful completion of all rounds of interview, the selected candidates' names are displayed. Meanwhile HR gives all the details about the salary, working hours, terms and conditions and the retirement benefit to the candidate.

4. Case Study : Online Auction Sales

Problem Statement:

The online auction system is a design about a website where sellers collect and prepare a list of items they want to sell and place it on the website for visualizing. To accomplish this purpose the user has to access the site. Incase it's a new user he has to register. Purchaser's login and select items they want to buy and keep bidding for it. Interacting with the purchasers and sellers through messages does this. There is no need for customer to interact with the sellers because every time the purchasers bid, the details will be updated in the database. The purchaser making the highest bid for an item before the close of the auction is declared as the owner of the item. If the auctioneer or the purchaser doesn't want to bid for the product then there is fixed cutoff price mentioned for every product. He can pay that amount directly and own the product. The purchaser gets a confirmation of his purchase as an acknowledgement from the website. After the transition by going back to the main menu where he can view other items.

5. Case Study : Two Floor Elevator Simulator

Problem Statement:

The elevator has the basic function that all elevator systems have, such as moving up and down, open and close doors, and of course, pick up passengers. The elevator is supposed to be used in a building having floors numbered from 1 to MaxFloor, where the first floor is the lobby. There are car call buttons in the car corresponding to each floor. For every floor except for the top floor and the lobby, there are two hall call buttons for the passengers to call for going up and down. There is only one down hall call button at the top floor and one up hall call button in the lobby. When the car stops at a floor, the doors are opened and the car lantern indicating the current direction the car is going is illuminated so that the passengers can get to know the current moving direction of the car. The car moves fast between floors, but it should be able to slow down early enough to stop at a desired floor. When an elevator has no requests, it remains at its current floor with its doors closed.

In order to certificate system safety, emergency brake will be triggered and the car will be forced to stop under any unsafe conditions.

6. Case Study : Home Appliance Control System

Problem Statement:

A home appliance control system (HACS) is a system which provides various services to remotely operate on home appliances, such as microwave oven, TV, and garage door etc through remote devices such as mobile phone, desktop and palm-top. A home appliance control system (HACS) is a system which is controlled by a remote system such as a mobile phone or a palm-top, and at the same time controls, monitors and coordinates home appliances such as air conditioner, microwave oven, garage doors, TV set, VCR, audio controller, indoor/outdoor lights, water sprinkler, home security system, bath tub controller, etc. In order to activate home appliances and to allow for different ways of cooking, the HACS needs mechanisms for communication between the different devices in the system, and for coordination among the various processes running on such devices. The system administrator of the HACS system has the ability to add a new appliance or delete an existing one. The system administrator has the ability to add a new remote device and configure it with HACS or delete an existing one when it is not used. Also the system administrator can create an account for a new user or delete existing account if it is no longer used.

7. Implement the following data link layer framing methods:

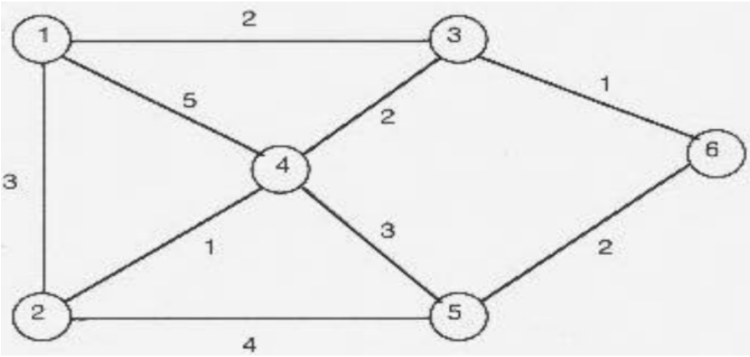
a. Character Count.

b. Character stuffing.

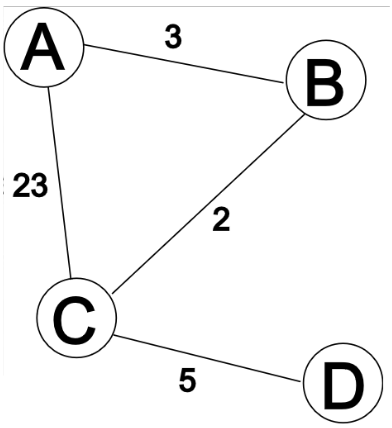
c. Bit stuffing.

8. Design a program to compute checksum for the given frame 1101011011 with the generator Polynomial of CRC 12, CRC 16 and CRC CCIP. Display the actual bit string transmitted. Suppose the third bit from the left is inverted during transmission. Show that this error is detected at the receivers end.

9. Implement Dijkstra's algorithm to compute the Shortest path through the following graph.



10. Design a program to obtain routing table for each node using distance vector routing algorithm by considering the given subnet with weights indicating delay between nodes.



11. Write a java program to implement RPC (remote procedure call).
12. a. Explain the Installation procedure of NS-2 on Windows using VMware.
    b. Creation of Link between nodes and transmission of data between nodes using NS-2.
13. Mini project-1:Implement Dijkstra's algorithm to compute the Shortest path using NS-2.
14. Mini project-2: A program to obtain Routing table for each node using Distance vector routing Algorithm using NS-2.

REFERENCE BOOKS:

1. Grady Booch, James Rum Baugh and Ivar Jacobson, *The Unified Modeling Language User Guide,* Pearson Education, Second Edition, 2009.
2. Hans-Erik Eriksson, Magnus Penker, Brian Lyons and David Fado, *UML 2 Toolkit,* WILEY-Dreamtech India Pvt. Ltd., 2003.
3. Andrew S.Tanenbaum and David J.Wetherall, *Computer Networks,* Pearson Education, Fifth Edition, 2012.
4. Behrouz A. Forouzan, D*ata communication and Networking,* Tata McGraw-Hill, Fourth Edition, 2006.

III B.Tech. - I Semester

(16BT51232) COMPUTER GRAPHICS AND MULTIMEDIA LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Courses on "Computer Graphics and Multimedia" and "Java Programming".

COURSE DESCRIPTION: Hands on experience in developing graphics, Animating Flash Movies and Developing Applications using a Flash Tool.

COURSE OUTCOMES:
On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on creation of 2D, 3D objects and compression techniques.
CO2. Analyze real world problems and identify solutions based on computer graphics and multimedia concepts.
CO3. Design and develop various algorithms for graphics, user authoring applications and animation movies.
CO4. Demonstrate independent problem solving in developing multimedia applications.
CO5. Apply various programming principles to implement graphics and to animate interactive flash movies for presenting multimedia content.
CO6. Build multimedia applications suitable for societal requirements.
CO7. Work effectively as an individual and as a member in team for mini-project implementation.
CO8. Demonstrate communication skills, both oral and written for preparing and presenting reports.

LIST OF EXERCISES:

1. Write a program for the implementation of Bresenham's line drawing algorithm.
2. Write a program to implement Bresenham's circle drawing algorithm.
3. Write a program to implement Bresenham's ellipse drawing algorithm.
4. Write a program to implement DDA line drawing algorithm.
5. Write a program to implement 2D Transformation.
6. Write a program to implement Window Viewport Mapping.
7. Write a program to implement Cohen-Sutherland 2D Clipping.
8. Write a program to convert between color models.
9. Write a program to implement text compression algorithm
10. Write a program to implement image compression algorithm
11. Case study1: Create an animation using flash tool.
12. Case study2: Apply basic operations on image using Adobe Photoshop.

Note: 1 to 10 programs can be implemented using C

REFERENCE BOOKS:

1. Herbert Schildt, *Java the complete reference,* TMH, Seventh Edition, 2007.
2. Macromedia Flash8 tutorial, http://www.teacherclick.com/flash8.
3. Donald Hearn and M. Pauline Baker, *Computer Graphics C version,* Prentice-Hall, Second Edition, 2006.

III B.Tech. - I Semester

(16BT51233) WEB TECHNOLOGIES LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on "Web Technologies".

COURSE DESCRIPTION: Hands-on experience on HTML, HTML5, CSS, JavaScript, JQuery, Bootstrap, PHP and MySQL.

COURSE OUTCOMES:

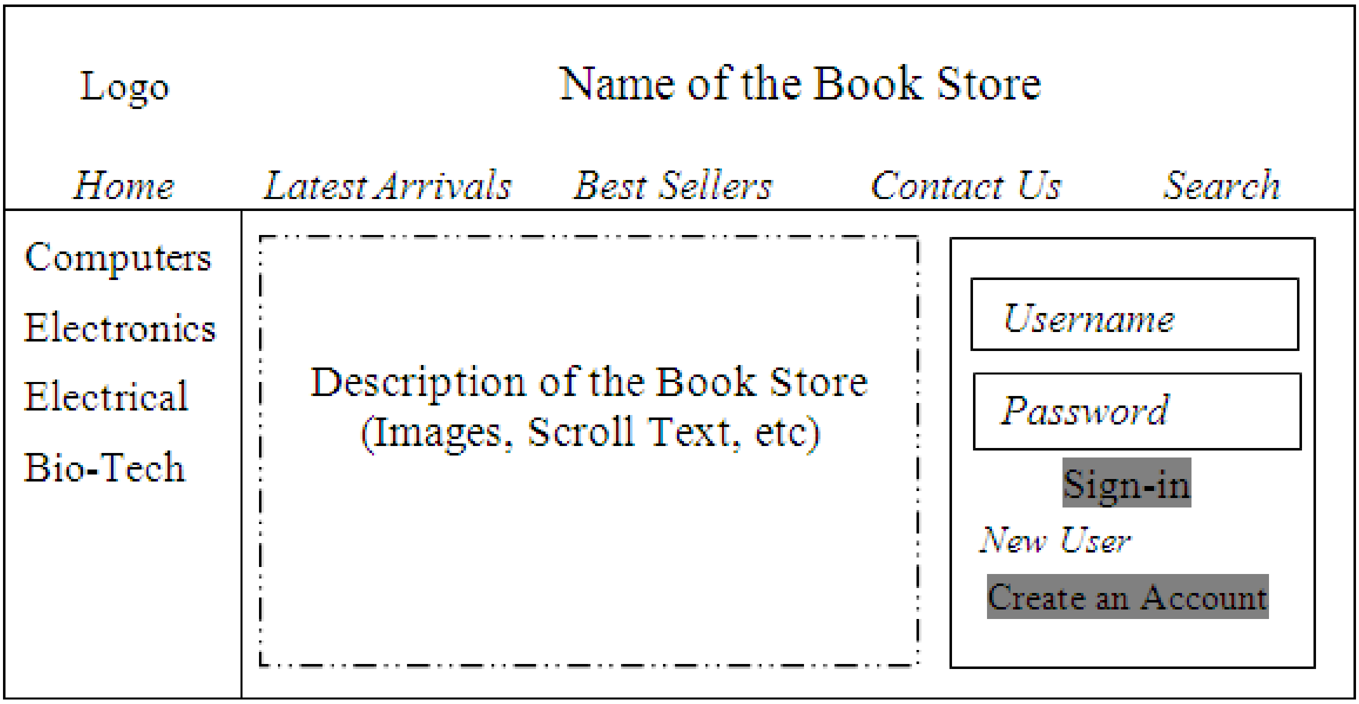
On Successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on web page design elements, dynamic content and database Interaction.
CO2. Analyze user requirements to develop web applications.
CO3. Design client-server applications using web technologies.
CO4. Demonstrate problem solving skills to develop enterprise web applications.
CO5. Use HTML, CSS, JavaScript, JQuery, Bootstrap and PHP technologies for device independent web application development.
CO6. Apply web technologies to develop interactive, dynamic and scalable web applications for societal needs.
CO7. Work effectively as an individual and as a member in team for mini-project implementation.
CO8. Demonstrate communication skills, both oral and written for preparing and presenting reports.

LIST OF EXERCISES:

1. Design the following static web pages of an online book store web application.

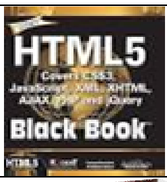
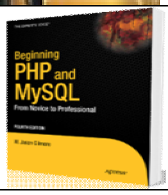
a. Home Page:



b. Catalogue Page:

The catalogue page should display the following details of available books.

i. Snap shot of cover page   ii. Title of the text book   iii. Author name
iv. Publisher   v. Price   vi. More details link.

Logo	Name of the Book Store			
Home	*Latest Arrivals*	*Best Sellers*	*Contact Us*	*Search*
Computers Electronics Electrical Bio-Tech		**HTML5 Black Book** Kogent Learning Solutions Dreamtech Press Rs. 570/-	More Details	
		**Beginning PHP and MySQL** 4th Edition W Jason Gilmore Apress Rs. 520/-	More Details	

c. Registration Page:

Design the Registration page with the following fields and navigate it with create an account link.

i. First Name   ii. Last Name
iii. Gender   iv. Date of Birth
v. Username   vi. Password
vii. Confirm Password   viii. Address
ix. Postal Code   x. Mobile No.
xi. Email-Id

2. a. Design a web page to store username and password information using the local storage concept.

   b. Design a web page to store employee information including Name, Emp. Id, Department, Salary and Address on a client's machine using a real SQL database.

3. Apply the following styles to all web pages of online book store web application.

   a. Fonts and Styles: font-family, font-style, font-weight and font-size.

   b. Backgrounds and colors: color, background-color, background-image and background-repeat.

   c. Text: text-decoration, text-transformation, text-align and text-indentation, text-align

   d. Borders: border, border-width, border-color and border-style

   e. Styles for links: A: link, A: visited, A:active, A:hover

   f. Selectors, Classes, Layers and Positioning elements.

4. Write a JavaScript/JQuery code to validate the following fields of the Registration web page.

   a. First Name/Last Name - should contain only alphabets and the length should not be less than 8 characters.

   b. Username - It should contain combination of alphabets, numbers and underscore. It should not allow spaces and special symbols.

   c. Password - It should not less than 8 characters in length and it contains one uppercase letter and one special symbol.

   d. Date of Birth - It should allow only valid date; otherwise display a message stating that entered date is invalid. Ex. 29 Feb. 2009 is an invalid date.

   e. Postal Code: It must allow only 6 digit valid number.

   f. Mobile No. - It should allow only numbers and total number of digits should be equal to 10.

   g. e-mail id - It should allow the mail id with the following format: Ex. mailid@domainname.com

5. Design a web page with the following features using HTML5, JavaScript and JQuery
    a. Displaying of images with Custom animated effects
    b. Playing of selected video from the list of videos
    c. Showing the animated text in increasing and decreasing font size
    d. Changing the size of the area in a web page using DIV tag
    e. Hiding and Showing elements in a web page.
6. Design a web page with the following features using Bootstrap and Media Query.
    a. Components
    b. Responsive tables

c. Responsive images and videos

7. a. Deploy and navigate web pages of online book store using WAMP/XAMPP web server.

b. Write a PHP program to read user name and favorite color from the HTML form. Display the name of the user in green color and sets user favorite color as a background for the web page.

8. Write a PHP code to read the username and password entered in the Login form of the online book store and authenticate with the values available in cookies. If user enters a valid username and password, welcome the user by username otherwise display a message stating that, entered details are invalid.
9. Write a PHP code to read user details entered through the registration web page and store the same into MySQL database.
10. Write a PHP code for storing books details like Name of the book, author, publisher, edition, price, etc into MySQL database. Embed a PHP code in catalogue page of the online book store to extract books details from the database.
11. a. Mini Project - 1: Design a web application for selling products online with the following features.

Mobile website option - The online store should be built on a responsive design template and its features need to be available to all users, at any time, from anywhere and in any device.

Image options - The photos should also be taken from different points of view to give you a clearer idea of the product. Image options should include viewing angles, zoom, multiple images, and more.

Detailed product description - The description should often include the important details, such as the expiration date, size dimensions, weight, manufacturers date, and practical uses must be included in a good product description.

Order Tracking - The customers should be able to track their ordered products by logging into an account created upon registration.

Payment Options - An online website should allow credit card/debit card/net banking for payment.

b. Mini Project - 2: Design a social website with the following features

Build Profile - Members allow to build their profiles.

Upload content - The Social Networking Sites allow members to upload text messages, photographs, audio and video files. All posts are arranged in descending order with the last post coming first.

Build conversations - Content posted by members can be browsed and commented upon by all members who form part of the community. Content can also be tagged from third party sites on subjects that interest the group.

REFERENCE BOOKS:

1. Kogent Learning Solutions Inc, *HTML 5 Black Book: Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP and JQuery,* Dreamtech Press, Second Edition, 2016.
2. W. Jason Gilmore, *Beginning PHP and MySQL,* APress, Fourth Edition, 2011.
3. Snig Bahumik, *Bootstrap Essentials,* PACKT Publishing, 2015. (e-book).

III B.Tech. - II Semester

(16BT3HS02) MANAGERIAL ECONOMICS AND PRINCIPLES OF ACCOUNTANCY

(Common to ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Managerial Economics; Demand and Elasticity of Demand; Production Functions; Markets and Pricing Policies; Basic concepts of Accounting (Journal, Ledger and Trial balance); Trading Account, Profit and Loss Account and Balance sheet with simple adjustments; Computerized Accounting.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Acquire knowledge on:
- Tools and concepts of Micro Economics.
- Basic Principles and concepts of Accountancy.
- Provides life skills for effective utilization of scarce resources.
- Financial Accounting.
- Significance of Economics and Accountancy

CO2. Develop skills in managerial decision making of an organization.

CO3. Apply the Economic theories i.e., Demand, Production, Cost, Markets and Price.

CO4. Develop effective communication in Business and Accounting transactions.

CO5. Ascertain the profitability and soundness of an organization.

CO6. Practice Financial Accounting.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO MANAGERIAL ECONOMICS, DEMAND ANALYSIS (9 Periods)

Definition, Nature and Scope of Managerial Economics. Demand: Determinants of demand - Demand function - Law of demand, assumptions and exceptions - Elasticity of demand - Types of elasticity of demand - Demand forecasting and methods of demand forecasting.

UNIT - II: THEORY OF PRODUCTION AND COST ANALYSIS (9 Periods)

Production Function: Isoquants and Isocosts - Input-output relationship - Law of returns. Cost Concepts: Total, Average and Marginal Cost - Fixed vs. Variable costs - Opportunity Costs Vs Outlay Costs- Separable Costs Vs Joint Costs, Urgent Costs Vs Postponable Costs- Avoidable Costs Vs Unavoidable Costs - Break Even Analysis (BEA) - Assumptions, Merits and demerits - Determination of Break Even Point (Simple problems).

UNIT - III: INTRODUCTION TO MARKETS AND PRICING (9 Periods)

Market Structure: Types of Markets - Features of perfect competition - Monopoly and monopolistic competition - Price and Output determination in perfect competition, monopoly and monopolistic Markets.

Pricing : Objectives and policies of pricing - Sealed bid pricing - Marginal cost pricing - Cost plus pricing - Going rate pricing - penetration Pricing -skimming Pricing - Block pricing - Peak load pricing - Cross subsidization.

UNIT - IV: INTRODUCTION TO PRINCIPLES OF ACCOUNTING AND CAPITAL (9 Periods)

Accountancy: Introduction - Concepts - Conventions - Double Entry Book Keeping - Journal - Ledger - Trial Balance (Simple problems).

Capital : Significance - Types of capital - Sources of Capital.

UNIT - V: FINAL ACCOUNTS - COMPUTERIZATION OF ACCOUNTING SYSTEM (9 Periods)

Introduction to Final Accounts - Trading account - Profit and Loss account and Balance Sheet with simple adjustments (Simple problems).

Computerization of Accounting System: Manual Accounting Vs Computerized Accounting - Advantages and Disadvantages of Computerized Accounting. **Total Periods: 45**

TEXT BOOKS:

1. A.R. Aryasri, *Managerial Economics and Financial Analysis,* Tata Mc- Graw Hill, New Delhi, Third Edition, 2007.
2. R.Cauvery, U.K. Sudhanayak, M. Girija and R. Meenakshi, *Managerial Economics,* S. Chand and Company, New Delhi, Second Edition, 2010.

REFERENCE BOOKS:

1. Varshaney and Maheswari, *Managerial Economics,* Sultan Chand and Sons, New Delhi, Nineteenth Edition, 2005.
2. Ms. Samba Lalita, *Computer Accounting Lab Work,* Kalyani Publishers, Ludhiana, 2009.

3. S.P. Jain and K.L. Narang, *Financial Accounting,* Kalyani Publishers, Ludhiana, Sixth Edition, 2002.

III B.Tech. - II Semester

(16BT61501) DATA WAREHOUSING AND DATA MINING

(Common to CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Database Management Systems".

COURSE DESCRIPTION: Data Mining Fundamentals; Data Preprocessing; Operational Database Systems and Data Warehouses; Mining Frequent Patterns; Classification and Prediction; Clustering; New Trends and Research Frontiers.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate Concepts of knowledge in data warehousing and data mining.

CO2. Analyze using data mining techniques to find useful and potential Knowledge.

CO3. Design Data Warehouse for OLAP applications for deployment.

CO4. Evaluate the usage of association mining techniques on complex data objects.

CO5. Select appropriate techniques to measure the interesting patterns from heterogeneous databases.

CO6. Apply appropriate evolutionary data mining algorithms to find solutions of Real time Applications.

DETAILED SYLLABUS:

UNIT I: DATA WAREHOUSING AND ONLINE ANALYTICAL PROCESSING (9 Periods)

Data Warehouse, Operational Database Systems versus Data Warehouses, A Multi tired Architecture, A Multidimensional Data Model, Stars, Snowflakes and Fact Constellations: Schemas, Role of Concept hierarchies, Measures, OLAP Operations, From online Analytical processing to Multidimensional Data Mining, Indexing OLAP Data.

UNIT II: DATA MINING AND DATA PREPROCESSING (8 Periods)

Introduction to Data Mining, kinds of data, kinds of patterns, major issues in Data Mining, Data Pre-processing, Data Cleaning, Data Integration , Data Reduction, Data Transformation and Discretization.

UNIT III: ASSOCIATIONS AND CLASSIFICATION (10 Periods)

Basic Concepts , Frequent itemset Mining Methods, pattern evaluation methods- From Association Mining to Correlation Analysis ,Classification, Decision Tree Introduction, Bayesian Classification Methods, Rule Based Classification, Prediction: Linear Regression.

UNIT IV: CLUSTER ANALYSIS (9 Periods)

Cluster Analysis: Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods -k-Means and K-Medoids , Hierarchical methods-Agglomerative and divisive method, Density-Based Method-DBSCAN, Grid-Based Method-STING, Outlier Analysis.

UNIT V: DATA MINING TRENDS (9 Periods)

Mining Complex Data Types: Mining sequence data, Mining other kinds of data: Spatial, Text, Multimedia and Web data, Data Mining Trends.

Total Periods: 45

TEXT BOOK:

1. Jiawei Han, Micheline Kamber and Jian Pei, *Data Mining: Concepts and Techniques,* Elsevier, Third Edition, 2013.

REFERENCE BOOKS:

1. K.P. Soman, Shyam Diwakar and V. Ajay, *Insight into Data mining Theory and Practice,* Easter Economy Edition, Prentice Hall of India, 2006.
2. G. K. Gupta, *Introduction to Data Mining with Case Studies,* Easter Economy Edition, Prentice Hall of India, 2006.
3. Tan P.N, Steinbach M.and Kumar V., I*ntroduction to Data Mining,* Addision-Weseley, 2006.

III B.Tech. - II Semester

(16BT61201) CLOUD COMPUTING

(Common to IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on "Computer Networks" and "Operating Systems".

COURSE DESCRIPTION: Virtualization, Virtualization Technologies; Cloud Computing Fundamentals, Deployment Models; Cloud Computing Architecture; Cloud Computing Mechanisms; Cloud Security, Cloud Disaster Recovery; Working with Clouds; and Case Studies.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on services, architecture, types of infrastructural models, disaster recovery and virtualization.

CO2. Analyze the issues in cloud computing Data, Network and Host security.

CO3. Apply API development skills in web applications for Cloud deployment.

CO4. Use research based knowledge to build cloud applications.

CO5. Use advanced programming languages to access cloud services.

CO6. Build cloud environment suitable for societal requirements.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION TO VIRTUALIZATION AND TECHNOLOGIES (9 periods)

Introduction to Virtualization: Definition, Objectives, Characteristics, Benefits of virtualization, Taxonomy of virtualization technologies, Pros and cons of virtualization.

Virtualization Technologies: VMware, Hyper-V, Zen and virtual iron.

UNIT II: FUNDAMENTAL CLOUD COMPUTING AND MODELS (9 Periods)

Cloud Computing: Origin and influences, Basic concepts and terminology, Goals and benefits, Risks and challenges.

Cloud Models: Roles and boundaries, Cloud characteristics, Cloud delivery models, Cloud deployment models.

UNIT III: CLOUD COMPUTING MECHANISMS AND ARCHITECTURE (9 Periods)

Cloud-Enabling Technology: Broadband networks and internet architecture, Data center technology, Virtualization technology, Web technology, Multitenant technology, Service technology.

Cloud Architectures: Architecture - Workload distribution, Resource pooling, Dynamic scalability, Elastic resource capacity, Service load balancing, Cloud bursting, Elastic disk provisioning, Redundant storage.

UNIT IV: CLOUD SECURITY AND DISASTER RECOVERY (9 Periods)

Cloud Security: Data, Network and host security, Cloud security services and cloud security possible solutions.

Cloud Disaster Recovery: Disaster recovery planning, Disasters in the cloud, Disaster management, Capacity planning and cloud scale.

UNIT V: CLOUD CASE STUDIES (9 Periods)

Case Studies: Software-as-a-Service (SaaS) - Salesforce.com, Facebook; Platform-as-a-Service (PaaS) - Google App Engine, MS-Azure and IBM Bluemix; Infrastructure-as-a- Service (IaaS) - Amazon EC2, Amazon S3 and Netflix.

Total Periods: 45

TEXT BOOKS:

1. Thomas Erl and RicardoPuttini, *Cloud Computing- Concepts, Technology and Architecture,* Pearson, 2013.
2. Ivanka Menken and Gerard Blokdijk, *Cloud Computing Virtualization Specialist Complete Certification Kit - Study Guide Book,* Lightning Source, 2009.

REFERENCE BOOKS:

1. Barrie Sosinsky, *Cloud Computing Bible,* Wiley India Pvt Ltd, 2011.
2. Rajkumar Buyya, James Broberg and Andrzej Goscinski, *Cloud Computing Principles and Paradigms,* John Wiley and Sons, 2011.

3. John W. Rittinghouse and James F. Ransome, *Cloud Computing Implementation, Management and Security,* CRC Press, Taylor and Francis Group, 2010.

III B.Tech. - II Semester
(16BT60441) **PATTERN RECOGNITION**
(Interdisciplinary Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Importance of pattern recognition; Baye's Decision Theory; Linear and non linear classifiers; Feature selection based on statistical hypothesis testing; Feature Generation; KL Transform; SVD; ICA; Clustering of features and clustering algorithms.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Apply the knowledge of engineering fundamentals on:
- Classifying the features and patterns.
- Feature selection and generation.
- Clustering patterns of objects.

CO2. Analyze numerical and analytical problems of features and patterns of object using pattern recognition algorithms.

CO3. Design and develop algorithms to optimize classification of patterns, feature selection and generation and clustering of objects.

CO4. Interpretation and synthesis the features of objects to validate the performances of pattern recognition algorithms.

CO5. Apply appropriate techniques and algorithms to identify patters of objects with an understanding of limitations.

CO6. Use pattern recognition techniques for societal needs.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO PATTERN RECOGNITION (10 Periods)

Importance of pattern recognition, Features, Feature Vectors and Classifiers, Supervised, Unsupervised and Semi Supervised Learning, Classifiers based on Baye's Decision Theory - Baye's decision theory, Discriminant Functions and decision surfaces, Bayesian classification for Normal Distributions, Estimation of Unknown probability density functions, The Nearest Neighbor Rule.

UNIT - II: LINEAR CLASSIFIERS (9 Periods)

Linear Discriminant functions and Decision Hyperplanes, The perceptron Algorithm, Least Squares Method- Mean Square Error Estimation, Stochastic Approximation and the LMS Algorithm, Sum of Error Squares Estimation Least Squares Method; Mean Square Estimation Revisited- Mean Square Error Regression; Support Vector Machine- Separable classes, Nonseparable classes.

UNIT - III: NON LINEAR CLASSIFIERS (9 Periods)

The XOR problem, The two layer perceptron, Three layer perceptrons, The Back propagation Algorithm, The cost function choice, choice of the network size, A simulation example, Networks with weight sharing, generalized linear classifiers, polynomial classifiers, Radial basis Function Networks.

UNIT - IV: FEATURE SELECTION AND GENERATION (9 Periods)

Feature Selection- Pre processing, The peaking phenomenon, Feature selection based on statistical hypothesis testing, ROC curve, class separability measures, feature subset selection; Feature Generation - Basis Vectors and Images, The KL Transform, The Singular Value Decomposition, Independent Component Analysis, Non negative Matrix Factorization, Regional features, Features for shape and size characterization.

UNIT-V: CLUSTERING (8 Periods)

Introduction, Types of Features, Definitions of Clustering, Proximity Measures-Proximity Measures between Two Points, Proximity Functions between a Point and a Set, Proximity Functions between Two Sets; Categories of Clustering Algorithms, Sequential Clustering Algorithms, A Modification of BSAS, A Two-Threshold Sequential Scheme Refinement Stages

Total Periods: 45

TEXT BOOK:

1. Sergios Theodoridis, Konstantinos Koutroumbas, *Pattern Recognition,* Academic Press, Second Edition, 2009.

REFERENCE BOOKS:

1. Richard Duda, Peter E Hart, David G Stork, *Pattern Classifi-cation,* John Wiley and Sons, Second Edition, 2001.
2. Christopher M.Bishop, *Pattern Recognition and Machine Learning,* Springer Publications 2006.

III B.Tech. - II Semester
(16BT70402) EMBEDDED SYSTEMS
(Interdisciplinary Elective - 2)
(Common to CSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on "Digital Logic Design" and "Computer Organization".
COURSE DESCRIPTION: Embedded system design approaches; MSP430 Architecture; Instruction Set; On-Chip Resources; Programming; Communication with peripherals; Internet of Things related Issues.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Apply knowledge on:
- MSP430 Architecture, Pin out, Instruction set
- High level programming
- Usage of On-chip resources like ADC, DAC, Timers
- Internet of Things related issues

CO2. Analyze various designing issues regarding:
- Usage of on chip resources
- Low power modes
- Communication support

CO3. Design embedded systems using MSP430 series microcontrollers to suit market requirements.
CO4. Solve engineering problems and arrive at solutions in designing embedded systems to support interconnectivity.
CO5. Apply techniques, program skills, On-Chip resources to design networked embedded systems with an understanding of limitations.
CO6. Reason out and practice professional engineering to deliver efficient and cost effective embedded based products to society.

DETAILED SYLLABUS:
UNIT - I: INTRODUCTION TO EMBEDDED SYSTEMS (9 Periods)
Embedded Systems - Definition, Approaches, Applications, Anatomy of microcontroller, Memory, Software; MSP430 Introduction- Pin out, Functional Block diagram, Memory, CPU, Memory mapped input and output, Clock generator; Exceptions- Interrupts and Resets.
UNIT - II: ARCHITECTURE OF MSP430 (9 Periods)
CPU, Addressing Modes, Constant Generator and Emulated Instructions, Instruction Set, Example programs, Reflections on CPU and Instruction set, Resets, Clock System.
UNIT - III: FUNDAMENTALS FOR PROGRAMMING (9 Periods)
Development Environment, C Programming Language, Assembly Language, Programming and Debugging, Sample programs- Light LEDs in C, Read input from a switch; Automatic Control-Flashing light by delay, use of subroutines, using Timer_A; Header files and issues, Functions, Interrupts and Low power modes.
UNIT - IV: TIMERS, MIXED SIGNAL SYSTEMS AND COMMUNICATION (9 Periods)
Timers - Watchdog Timer, RTC, Measurement in capture mode; Mixed-Signal Systems- Comparator_A, ADC10 Architecture and operation, ADC12, Sigma-Delta ADC Architecture and operation, DAC; Communication- Communication Peripherals in MSP430, SPI, Inter-integrated Circuit Bus, Asynchronous communication with the USCI_A.
UNIT - V: HARDWARE SOFTWARE CO-DESIGN AND INTERNET OF THINGS (9 Periods)
CO- Design Issues: Co-design Models, Architectures, Languages, a Generic Co-design Methodology**.**
IOT: Introduction, Origins, Drivers and Applications, IOT Communication Models - Device to Device, Device to Cloud, Device to Gateway, Back end Data Sharing Model; IPV6 and IOTs', IOT Issues, Security Issues-challenges; Privacy Considerations, Interoperability/Standards.

Total Periods: 45

TEXT BOOKS:

1. John H. Davies, *MSP430 Microcontroller Basics,* Newnes Publications, 2008.
2. Karen Rose, Scott Eldridge, Lyman Chapin, T*he Internet of Things: An Overview: Understanding the Issues and Challenges of a More Connected World,* Internet Society, Oct. 2015.
3. Jorgen Staunstrup, Wayne Wolf, *Hardware / Software co- design Principles and Practice,* Springer, 2009.

REFERENCE BOOKS:

1. Chris Nagy, *Embedded Systems Design using the TI MSP30 Series,* Newnes Publications, 2003.

III B.Tech. - II Semester
(16BT60502) SOFT COMPUTING
(Interdisciplinary Elective - 2)
(Common to CSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Concepts on Soft Computing Techniques; Artificial Neural Networks; Supervised Learning; Unsupervised Learning; Fuzzy logic; Genetic Algorithms.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Artificial Neural Networks
- Supervised Learning Networks
- Unsupervised Learning Networks
- Fuzzy sets, relations and measures
- Genetic Operators

CO2. Analyze neural network architectures, Fuzzy systems and Genetic algorithms.
CO3. Design soft computing solutions for real life computational problems.
CO4. Use soft computing techniques to solve complex computational problems.
CO5. Create algorithms using soft computing techniques.
CO6. Apply contextual knowledge to solve problems related to societal issues like Business Intelligence, Forecasting.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO SOFT COMPUTING AND ARTIFICIAL NEURAL NETWORKS (8 Periods)

Soft Computing: Neural Networks, Application Scope of Neural Networks, Hybrid Systems, Soft Computing, Applications of Soft Computing.

Artificial Neural Networks: Fundamentals, Evolution, Basic Models, Terminologies, Hebb Network.

UNIT-II: SUPERVISED LERANING NETWORKS (10 Periods)

Perceptron Networks: Theory, Perceptron Learning Rule, Architecture, Flowchart for Training Process, Perceptron Training Algorithm for Single and Multiple Output Classes, Perceptron Network Testing Algorithm.

Back-Propagation Networks: Theory, Architecture, Flowchart for Training Process, Training Algorithm, Learning Factors of Back-Propagation Networks, Testing Algorithm for Back-Propagation Networks.

UNIT-III: UNSUPERVISED LEARNING NETWORKS (9 Periods)

Unsupervised Learning Networks: Fixed Weight Competitive Nets, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter-propagation Networks, Adaptive Response Theory Network.

UNIT-IV: FUZZY LOGIC (10 Periods)

Classical Sets and Fuzzy Sets: Classical Sets- Operations, Properties, Function Mapping; Fuzzy Sets- Operations, Properties.

Classical Relations and Fuzzy Relations: Cartesian Product of Relation, Classical Relations, Fuzzy Relations, Tolerance and Equivalence Relations, Non-interactive Fuzzy Sets.

UNIT-V: FUZZY SYSTEMS AND GENETIC ALGORITHMS (8 Periods)

Fuzzy Arithmetic and Fuzzy Measures: Fuzzy Arithmetic, Extension Principle, Fuzzy Measures, Measures of Fuzziness.

Genetic Algorithms: Genetic Operators, Working Principle, Fitness Function, Reproduction.

Total Periods: 45

TEXT BOOK:

1. S. N. Sivanandan and S. N. Deepa, *Principles of Soft Computing,* Wiley India, Second Edition, 2011.

REFERENCE BOOKS:

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun and Eiji Mizutani, *Neuro-Fuzzy and Soft Computing,* Prentice-Hall India, 2003.
2. S. Rajasekaran and G. A. Vijayalakshmi Pai, *Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and Applications,* PHI Learning Private Ltd, 2011.

III B.Tech. - II Semester
(16BT61202) AD-HOC AND WIRELESS SENSOR NETWORKS

(Interdisciplinary Elective - 2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Computer Networks".

COURSE DESCRIPTION: Ad-hoc Wireless Networks, MAC Protocols; Routing Protocols; Transport Layer Protocols; Quality of Service and Energy Management; Wireless Sensor Networks.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Ad-hoc and sensor networks
- MAC Protocols and Routing Protocols
- TCP over Ad-hoc wireless networks
- QoS in Ad-hoc wireless networks.
- Sensor networks.

CO2. Analyze the issues in MAC, Routing and Transport Layer in Ad-hoc and wireless sensor networks.

CO3. Apply routing and energy management techniques in Ad-hoc wireless networks.

CO4. Demonstrate problem solving skills in the implementation of secured and optimum QoS wireless networks.

CO5. Use routing algorithms in ad-hoc wireless networks.

DETAILED SYLLABUS:

UNIT I- AD-HOC WIRELESS NETWORKS AND MAC PROTOCOLS (9 Periods)

Ad-hoc Wireless Networks: Introduction to ad-hoc wireless networks, Issues in ad-hoc wireless networks, ad-hoc wireless Internet.

MAC Protocols for Ad-hoc Wireless Networks: Introduction, Design issues, Design goals, Classification of MAC protocols, Contention-based protocols-MACAW (A Media Access Protocol for Wireless LANs), Busy tone multiple access protocols, Distributed packet reservation multiple access protocol, Distributed priority scheduling and medium access in ad-hoc Networks.

UNIT II - ROUTING PROTOCOLS FOR AD-HOC WIRELESS NETWORKS (10 Periods)

Routing in Ad-hoc Wireless Networks: Introduction, Design issues, Classification of routing protocols, Table driven routing Protocols-DSDV; On-Demand routing protocols-DSR, AODV; Hybrid routing protocols-ZRP; Hierarchical routing protocols-Hierarchical state routing protocol; Power-Aware routing protocols.

Multicast Routing in Ad-hoc Wireless Networks: Introduction, Design issues, Operation, Classification of multicast routing protocols, Tree-Based multicast routing Protocols-Bandwidth-efficient multicast routing protocol, Multicast routing protocol based on Zone routing; Mesh-Based multicast routing protocols-On-demand multicast routing protocol.

UNIT III -TRANSPORT LAYER PROTOCOLS FOR AD-HOC WIRELESS NETWORKS (8 Periods)

Introduction, Design issues, Design goals of a transport layer protocol for ad-hoc wireless networks, TCP over ad-hoc wireless networks- Traditional TCP, Feedback-based TCP; Security in ad-hoc wireless networks, network security requirements, Issues and challenges in security provisioning, Network security attacks, Key management, Secure routing in Ad hoc wireless networks.

UNIT IV - QUALITY OF SERVICE AND ENERGY MANAGEMENT IN AD-HOC WIRELESS NETWORKS (10 Periods)

Quality of Service in Ad-hoc Wireless Networks: Introduction, Issues and challenges in providing QoS in ad-hoc wireless networks, classification of QoS solutions.

Energy Management in Ad-hoc Wireless Networks: Introduction, Need for energy Management in ad-hoc **wir**eless networks, Classification of energy management Schemes, Battery management schemes, Transmission power management schemes, System power management schemes.

UNIT V - WIRELESS SENSOR NETWORKS (8 Periods)

Introduction, Sensor network architecture, Data dissemination, Data gathering, MAC protocols for sensor networks, Location discovery, Quality of a sensor network.

Total Periods: 45

TEXT BOOK:

1. C. Siva Ram Murthy and B.S.Manoj, *Ad-hoc Wireless Networks - Architectures and Protocols,* Pearson Education, 2011.

REFERENCE BOOKS:

1. C. K. Toh, *Ad-hoc Mobile Wireless Networks: Protocols and Systems,* Pearson Education, 2007.
2. Charles E. Perkins, *Ad-hoc Networking,* Pearson Education, 2008.

III B.Tech. - II Semester

(16BT30503) **PYTHON PROGRAMMING**

(Program Elective - 1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Object Oriented Programming through C++"

COURSE DESCRIPTION: Data types and Expressions; Control Statements; Strings; Text Files; Lists; Dictionaries; Functions; Objects and their use; Exception Handling; Design with Classes; Graphical User Interface.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Data Types, Variables, Expressions
- Control statements, Strings and Text files.
- Lists, Dictionaries and Functions.
- Objects and Design with classes
- Exception Handling and GUI

CO2. Analyze complex computational problems.
CO3. Design solutions for real life computational problems.
CO4. Solve complex problems using python scripting constructs.
CO5. Implement python scripts using Integrated Development Environment.
CO6. Apply Python programming knowledge to solve problems related to societal applications like Medical and Weather Forecasting.

DETAILED SYLLABUS:

UNIT- I: INTRODUCTION, DATA TYPES AND EXPRESSIONS (8 Periods)

Introduction: Computer science, Computer algorithms, Computer software, The Python programming language, First program in Python.

Data Types and Expressions: Literals, Variables and Identifiers, Operators, Expressions and Data types.

UNIT- II: CONTROL STRUCTURES, LISTS, DICTIONARIES AND SETS (8 Periods)

Control Structures: Control structures, Boolean expressions, Selection control and Iterative control.

Lists: List structures, Lists in Python, Iterations over lists, Assigning and copying lists, List comprehensions.

Dictionaries, Tuples and Sets: Dictionary types in Python, Implementation of Dictionary, Tuples, Set data type - the Set data type in Python, Implementation of sets.

UNIT-III: DESIGN WITH FUNCTIONS, STRINGS AND TEXT FILES (9 Periods)

Program routines, Functions, Recursion-Recursive functions, Recursive problem solving, Iteration Vs Recursion, A case study of Towers of Hanoi using recursion; Using text files, String processing, Exception handling, A Case study on cigarette Use/Lung cancer Correlation program.

UNIT-IV: OBJECTS AND THEIR USE, OBJECT ORIENTED PROGRAMMING (9 Periods)

Objects and Their Use: Software objects, Turtle graphics- Creating a turtle graphics window, The default turtle, Fundamental turtle attributes and behavior, Additional turtle attributes, Creating multiple turtles.

Object Oriented Programming: Encapsulation, Inheritance, and Polymorphism.

UNIT-V: GUI PROGRAMMING (11 Periods)

Tkinter Overview - tkinter pragmatics, Documentation, Extensions, structure; tkinter coding alternatives, adding buttons and callbacks-lambda, bound method, callable class object, Binding events; adding multiple widgets, Reusable GUI Components with classes, Dialogs, Entry, check buttons and Radio buttons, Scales, Menus.

Total Periods: 45

TEXT BOOKS:

1. Charles Dierbach, *Introduction to Computer Science using Python: A Computational Problem-Solving Focus,* Wiley India Edition, 2016.
2. Mark Lutz, *Programming Python,* O'Reilly Publications, Fourth Edition, 2011.

REFERENCE BOOK:

1. Kenneth Lambert and B.L. Juneja, *Fundamentals of Python,* Cengage Learning, Third Edition, 2012.

III B.Tech. - II Semester

(16BT61203) ADVANCED DATABASES

(Program Elective - 1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on "Database Management Systems" and "Computer Networks".

COURSE DESCRIPTION: Parallel Databases; Object based Databases; Distributed Databases; Distributed Transaction Management; Emerging Database Technologies and Applications.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Parallel databases.
- Object based and Object Relational databases.
- Distributed databases, horizontal and vertical data fragmentations.
- Mobile databases, Geographic Information Systems, Genome Data Management, Multimedia Database and NoSQL.

CO2. Demonstrate skills in Query optimization, Data Fragmentation, Transaction Management and Con-currency Control for Distributed Transactions.

CO3. Design Parallel, Object-Oriented, Object-Relational and NoSQL databases.

CO4. Solve Concurrency Problems in Distributed Transactions.

CO5. Use database techniques for Mobile, Geographic Information Systems, Genome Data Management, and Multimedia Data.

CO6. Create databases as per societal needs.

DETAILED SYLLABUS:

UNIT-I: PARALLEL DATABASES (9 Periods)

Introduction, I/O Parallelism, Inter query parallelism, Intra query parallelism, Intra operation parallelism, Interoperation parallelism, Query optimization, Design of parallel systems, Parallelism on multi-core processors.

UNIT-II: OBJECT-BASED DATABASES (9 Periods)

Overview, Complex data types, Structured types and inheritance in SQL, Table inheritance, Array and multi set types in SQL, Object-identity and reference types in SQL, Implementing O-R features, Persistent programming languages, Object-Relational mapping, Object-Oriented versus Object-Relational.

UNIT-III: DISTRIBUTED DATABASES (9 Periods)

Features of distributed versus centralized databases, Reference architecture for distributed databases, Types of data fragmentation, Integrity constraints in distributed databases, Distributed database design.

UNIT-IV: DISTRIBUTED TRANSACTION MANAGEMENT AND CONCURRENCY CONTROL (9 Periods)

Distributed Transaction Management: Framework for transaction management, Supporting atomicity of distributed transactions, Concurrency control for distributed transactions, Architectural aspects of distributed transactions; Concurrency Control: Foundation of distributed concurrency control, Distributed deadlocks, Concurrency control Based on timestamps.

UNIT-V: EMERGING DATABASE TECHNOLOGIES AND APPLICATION (9 Periods)

Mobile database, Geographic information systems, Genome data management, Multimedia database; NoSQL-An overview of NoSQL, Characteristics of NoSQL, NoSQL storage types. **Total Periods: 45**

TEXT BOOKS:

1. A. Silberschatz, H. F. Korth and S. Sudarshan, *Database System Concepts,* Tata McGraw hill, Sixth Edition, 2010.
2. Stefand Ceri and Giuseppe Pelagatti, *Distributed Databases Principles and Systems,* McGraw hill, 2008.

REFERENCE BOOKS:

1. Ramea Elmasri and Shamkant B.Navathe, *Fundamentals of Database Systems,* Pearson Education, Fifth Edition, 2007.

2. Gaurav Vaish, *Getting Started with NoSQL,* Packt Publishing, 2013 (e-book).

III B.Tech. - II Semester
(16BT61204) SEMANTIC WEB

(Program Elective - 1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Web Technologies"**.**

COURSE DESCRIPTION: Semantic web fundamentals; Semantic web technology; Ontology web language; Swoogle; Semantic web services.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Semantic web search
- RDF and SWOOGLE
- Semantic web services
- RDFS and OWL

CO2. Analyze layers of web architecture for describing web content.

CO3. Design semantic web search engine for capturing information on the current web.

CO4. Select RDF and SWOOGLE for search engine usage.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO SEMANTIC WEB (9 Periods)

The world of the semantic web: WWW, Internet usage, Meta data, Search engine for traditional web and semantic web.

UNIT-II: SEMANTIC WEB TECHNOLOGY (9 Periods)

Resource Description Framework (RDF), Rules of RDF, Aggregation-Distributed information, core elements of RDFS, Ontology and taxonomy, Inferencing based on RDF schema, RDF tools.

UNIT-III: WEB ONTOLOGY LANGUAGE -OWL (8 Periods)

Web ontology language (OWL), Define Classes: Localize global properties, Set operators and enumeration, Define properties; Ontology matching and distributed information, OWL ontology Header, Camera ontology in OWL, Three faces of OWL.

UNIT-IV: SWOOGLE (10 Periods)

Swoogle Architecture, FOAF, Semantic markup, Issues, Prototype system, Design of semantic web search engine, Discovery and indexation strategy, Need for Semantic Web services.

UNIT-V: SEMANTIC WEB SERVICES (9 Periods)

Semantic web services and applications, OWL-S: Upper ontology, WSDL-S, OWL-S to UDDI mapping, Design of the search engine and implementations.

Total Periods: 45

TEXT BOOK:

1. Liyang Yu, I*ntroduction to the Semantic Web and Semantic web services,* Chapman and Hall/CRC, Taylor and Francis group, 2007.

REFERENCE BOOKS:

1. Johan Hjelm, *Creating the Semantic Web with RDF,* Wiley, 2001
2. Grigoris Antoniou and Frank van Harmelen, *A Semantic Web Primer,* MIT Press, 2004.

III B.Tech. - II Semester

(16BT61503) SOFTWARE PROJECT MANAGEMENT

(Program Elective - 1)

(Common to IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Software Engineering".

COURSE DESCRIPTION: Conventional Software Management;Evolution of Software Economics; Improving Software Economics; Lifecycle Phases; Artifacts of the Process; Workflow of the Process; Checkpoints of the Process; Software Economics; Iterative Process Planning; Project Organization and Responsibilities; Project Control and Project Instrumentation; Agile Overview.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on software effort estimation techniques, Agile life cycle, project control and instru-mentation.

CO2. Analyze the major and minor milestones, artifacts, metrics from management and technical perspectives.

CO3. Design and develop software products using conventional and modern principles of software project management.

CO4. Effectively implement project management through appropriate planning of Work flows and Work Breakdown Structures of the process.

CO5. Select appropriate techniques to evaluate progress of software project in terms of milestones and check points.

CO6. Apply appropriate ethical principles to be followed in management of software economics.

DETAILED SYLLABUS:

UNIT - I: SOFTWARE MANAGEMENT (9 Periods)

Software management: The Waterfall Model, Conventional Software Management Performance. Evolution of Software **Economics:** Software Economics, Pragmatic Software Cost Estimation.

Improving Software Economics: Reducing Software Product Size, Improving Software Processes, Improving Team Effectiveness, Improving Automation, Achieving Required Quality.

UNIT - II: LIFE CYCLE PHASES (9 Periods)

Conventional and Modern Software Management: Principles of Modern Software Engineering, Principles of Modern Software Management, Transitioning to an Iterative Process.

Life Cycle Phases: Engineering and Production Stages, Inception, Elaboration, Construction, Transition Phases.

UNIT - III: ARTIFACTS, ARCHITECTURES AND WORKFLOWS (9 Periods)

Artifacts of The Process: The Artifact Sets, Management Artifacts, Engineering Artifacts.

Model Based Software Architectures: Architecture- Management Perspective, Technical Perspective.

Workflows of the Process: Software Process Workflows, Iteration Workflows.

UNIT - IV: CHECKPOINTS, PROCESS PLANNING AND PROJECT ORGANIZATION (9 Periods)

Checkpoints of a process: Major Milestones, Minor Milestones, Periodic Status Assessments.

Iterative Process Planning: Work Breakdown Structures, Planning Guidelines, The Cost and Schedule Estimating Process

Project Organizations and Responsibilities: Line of Business Organizations, Project organizations, Evolution of Organizations.

UNIT - V: PROJECT CONTROL AND AGILE MANAGEMENT (9 Periods)

Project control and process Instrumentation: The Seven Core Metrics, Management Indicators, Quality Indicators.

Agile Management: An Agile Overview, Role of a project manager, Benefits of Agile.

Total Periods: 45

TEXT BOOK:

1. Walker Royce, *Software Project Management,* Pearson Education, Third Edition, 1998.

REFERENCE BOOKS:

1. Michele Sliger and Stacia Broderick, *The Software Project Manager's Bridge to Agility,* Addison-Wesley, 2008.
2. Bob Hughes and Mike Cotterell, *Software Project Management,* Tata McGraw- Hill Edition, 2006.

III B.Tech. - II Semester

(16BT6HS01) **BANKING AND INSURANCE**

(Open Elective)

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Origin of Banking; Functions of Banking; Role & Functions of RBI; Bank-Customer Relationship; Deposit and Loan Services of Banks; Banking Procedures; Electronic Payment Mechanisms; Business Models; Concepts of Risk and Uncertainty; Fundamentals of Insurance; Principles of Insurance; Essentials of Insurance Contracts; Insurance players in India.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate Knowledge in
- Tools and concepts of Banking and Insurance.
- Basic Principles and concepts of Insurance and Banking.
- e-fund transfers, e-payments and e-business models.

CO2. Develop skills in providing solutions for
- Online banking and e – payments.
- Risk Management through insurance benefits the society at large.
- Money management by leveraging on technology, banking and insurance services.

CO3. Exhibit conceptual soundness about banking and insurance, this would contribute to More employment opportunities.

CO4. Provide life skills for effective utilization of Banking and Insurance facilities.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO BANKING (9 Periods)

Origin and growth of banking, meaning and functions of banking, importance of banking, Reserve Bank of India; functions, monetary policy, open market operations.

UNIT-II:BANK-CUSTOMER RELATIONSHIP (9 Periods)

Debtor-creditor relationship, anti-money laundering, deposit products or services, payment and collection of cheques. Accounts – Types of accounts, procedure for opening and closing an account. Loans and Advances- principles of lending, types of loans.

UNIT-III:BUSINESS MODELS AND ELECTRONIC PAYMENT SYSTEM (9 Periods)

Features, types of e-payment system, e-cash,NEFT, RTGS, Credit cards, Electronic purses and Debit cards.Business models- B2B, B2C, C2C, and B2G.

UNIT-IV:INTRODUCTION TO RISK AND INSURANCE (9 Periods)

Concept of risk, risk *Vs* uncertainty. Insurance definition, Insurance as risk mitigation mechanism, elements of insurance.

UNIT-V:INSURANCE OVERVIEW (9 periods)

Principles of insurance, insurance types, LIC & GIC insurance contract- nature, elements, functions, IRDA, Insurance Players in India.

Total Periods: 45

TEXT BOOKS:

1. A.V. Ranganadha Chary, R.R. Paul,*Banking and Financial system*, Kalyani Publisher, New Delhi, 2ndedition.
2. P.K.Gupta,*Insurance and Risk Management*, Himalaya Publishing House, New Delhi.

REFERENCE BOOKS:

1. Diwan, Praq and Sunil Sharma, *Electronic Commerce-A Manager's Guide to E-Business*, Vanity Books International, Delhi,2002.
2. Kalakota Ravi and Whinston Andrew B, *Frontiers of Electronic Commerce*, Pearson Education India, New Delhi, 1996.
3. Schneider, Grey P, *Electronic Commerce, Course Technology*, Cengage Learning, 8th edition, New Delhi, 2008.

III B.Tech. - II Semester

(16BT6HS02) **BUSINESS COMMUNICATION AND CAREER SKILLS**

(Open Elective)

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Nature and scope of communication; Corporate communication; Writing business documents; Careers and resumes; Interviews.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge in
- Corporate Communication
- Main Stages of Writing Messages
- Career Building

CO2. Analyze the possibilities and limitations of language in
- Communication Networks
- Crisis Management/Communication

CO3. Design and develop the functional skills for professional practice inBusiness Presentations & Speeches

CO4. Applywritten and oral communicationtechniques in preparing and presenting various documents in technical writing.

CO5. Function effectively as an individual and as a member in diverse teams.

CO6. Communicate effectively with the engineering community and society in formal and informal situations.

DETAILED SYLLABUS:

UNIT-I: NATURE AND SCOPE OF COMMUNICATION (9 Periods)

Introduction: Functions of Communication – Roles of a Manager – Communication Basics – Communication Networks – Informal Communication – Interpersonal Communication –Communication Barriers.

UNIT-II: CORPORATE COMMUNICATION (9 Periods)

Introduction: What is Corporate Communication? – Corporate Citizenship and Social Responsibility – Corporate Communication Strategy – Crisis Management/Communication – Cross-Cultural Communication.

UNIT-III: WRITING BUSINESS DOCUMENTS (9 Periods)

Introduction: Importance of Written Business Communication, Types of Business Messages – Five Main Stages of Writing Business Messages – Business Letter Writing – Effective Business Correspondence – Common Components of Business Letters – Strategies for Writing the Body of a Letter.

UNIT-IV: CAREERS AND RESUMES (9 Periods)

Introduction – Career Building – Business Presentations and Speeches – Resume Formats – Traditional, Electronic and Video Resumes – Sending Resumes – Follow-up Letters – Online Recruitment Process.

UNIT-V: INTERVIEWS (9 Periods)

Introduction – Fundamental Principles of Interviewing – General Preparation for an Interview – Success in an Interview – Types of Interviewing Questions – Important Non-verbal Aspects – Types of Interviews – Styles of Interviewing.

Total Periods: 45

TEXT BOOK:

1. Meenakshi Raman and Prakash Singh, *Business Communication*, Oxford University Press, New Delhi, Second Edition, 2012.

REFERENCE BOOKS:

1. Neera Jain and Sharma Mukherji, *Effective Business Communication*, Tata Mc Graw-Hill Education, Pvt. Ltd., New Delhi, 2012.
2. Courtland L.Bovee et al., *Business Communication Today*, Pearson, New Delhi, 2011.

3. Krizan, *Effective Business Communication*, Cengage Learning, New Delhi, 2010.
4. R.K. Madhukar, *Business Communication*, Vikas Publishing House Pvt. Ltd., New Delhi, 2005.

III B.Tech. – II Semester

(16BT6HS03) COST ACCOUNTING AND FINANCIAL MANAGEMENT

(Open Elective)

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Scope, Objectives and Elements ofcost Accounting; Cost Sheet and Tender quotations; Variance Analysis: Material variances, Labor variances; Meaning and Scope, Liquidity, Profitability Ratios: concept of Risk and Return on Investment.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Acquire Knowledge in
- Elements of Costing.
- Basic concepts of Financial Management.
- Risk and Return
- Significance of Cost Accountancy
- Behavioral Finance

CO2. Develop skills in
- Material, Labor, Overheads control.
- Excellence and ability to minimize the cost of the organization

CO3. Develop effective Communication in Cost control and Financial Management.

CO4. Providesolutions for effective investment decisions.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO COST AND COST ACCOUNTING (9 Periods)
Cost and Cost Accounting, Scope, Objectives, Advantages and disadvantages – Cost Accounting vs. Management Accounting – Elements of Costing – Installation of costing system – Material Control, Labour Control, Overhead Control.

UNIT-II: COST SHEET AND PREPARATION OF COST SHEET (9 Periods)
Analysis of Cost – Preparation of cost sheet, estimate, tender and quotation (Simple problems) – Importance of Costing while pricing the products.

UNIT-III: STANDARD COSTING AND VARIANCE ANALYSIS (9 Periods)
Introduction to Standard Costing & Variances – Variance Analysis: Material variances, Labour variances (Simple Problems).

UNIT-IV: INTRODUCTION TO FINANCIAL MANAGEMENT AND RATIO ANALYSIS (9 Periods)
Financial Management-Meaning and Scope, Liquidity, Profitability, Financial Statement Analysis through ratios (Simple Problems).

UNIT-V: INTRODUCTION TO INVESTMENT AND BEHAVIORAL FINANCE (9 Periods)
Investment-Meaning and Definition- concept of risk and returns-Investment Alternatives- Introduction to Behavioral Finance – Anomalies –Key Concepts –Anchoring – Mental Anchoring-Confirmation and Hindsight Bias-Gambler's Fallacy-Herd Behavior-Over Confidence-Overreaction and Availability Bias-Prospect Theory.

Total Periods: 45

TEXT BOOKS:

1. S.P. Jain and K.L. Narang,*Cost Accounting*, Kalyani Publishers, Ludhiana, Sixth Edition, 2002.
2. I.M. Pandey, *Financial Management*, Vikas Publishing House Pvt. Ltd., Tenth Edition, 2010.

REFERENCE BOOKS:

1. The Institute of Company Secretaries of India, *Cost and Management Study Material*, New Delhi.
2. James C Van Horne, *Financial Management and Policy*, Prentice-Hall of India/Pearson, Twelveth Edition, 2001.

III B.Tech. – II Semester

(16BT6HS04) ENTREPRENEURSHIP FOR MICRO, SMALL AND MEDIUM ENTERPRISES

(Open Elective)

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Introduction to Entrepreneur Development; Idea generation and formation of Business Plan; Micro and Small Enterprises; Institutional Finance and Support to Entrepreneur; Woman Entrepreneurship.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Acquire Knowledge in
- Schemes and institutions encouraging entrepreneurship.
- Basic Principles and concepts of Accountancy.
- Significance of entrepreneurship.

CO2. Develop skills in providing solutions for
- Personal excellence through financial and professional freedom.
- Women entrepreneurship serving as contrivance in societal development

CO3. Develop critical thinking and evaluation ability.

CO4. Widens knowledge and build up attitude towards trouble shooting.

CO5. Demonstrate business acumen.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO ENTREPRENEURSHIP DEVELOPMENT (9 Periods)

Concept ofEntrepreneurship – Growth of Entrepreneurship in India **-** Factors affecting entrepreneurship growth - Characteristics of an Entrepreneur – Functions of Entrepreneur – Need for an Entrepreneur Entrepreneurial Decision Process – Types of Entrepreneurs – Distinction between an Entrepreneur and a manager.

UNIT-II: IDEA GENERATION AND FORMULATION OF BUSINESS PLANS (9 Periods)

Sources of Ideas – Methods of idea generation – Steps in Setting up of a Small Business Enterprise – Formulation of Business Plan – Contents of Business Plan – Significance – Common Errors in Business Plan Formulation, The role of incubation centers for promoting Entrepreneurship, Start-up – New Guidelines.

UNIT-III: MICRO AND SMALL ENTERPRISES (9 Periods)

Meaning and Definition – Micro and Macro units – Essentials – Features – Characteristics– Scope of Micro and Small Enterprises – Objectives of Micro Enterprises – relationship between Micro and Macro Enterprises- Problems of Micro and Small Enterprises.

UNIT-IV: INSTITUTIONAL FINANCE (9 Periods)

Institutional Finance **–** Need-Scope-Services - Various Institutions offering Institutional support: – Small Industries Development of Bank of India (SIDBI), State Industrial Development Corporations (SIDCs)– Small Industries Development Organisation (SIDO) – Small Industries Service Institutes (SISIs) – District Industries Centres (DICs) – National Institute of Entrepreneurship and Small Business Development (NIESBUD) – Technical Consultancy Organizations (TCOS). Micro Units Development and Refinance Agency Bank (MUDRA).

UNIT-V:WOMEN AND RURAL ENTREPRENEURSHIP (9 Periods)

Concept of Women entrepreneur - Functions of Women entrepreneurs - Growth of women entrepreneurship in India - Challenges of Women entrepreneurs- Programmes supporting women entrepreneurship – Rural Entrepreneurship – Meaning, Need for Rural entrepreneurship, Problems of rural entrepreneurship, Role of NGOs, Role of BharatiyaMahila Bank for encouraging Women Entrepreneurs.

Total Periods: 45

TEXT BOOKS:

1. Dr.S.S.Khanka*, Entrepreneurial Development*, S. Chand and Company Ltd, Revised edition, 2012.
2. MadhurimaLall&ShikhaSahai, *Entrepreneurship*, Excel Books India, 2ndedition 2008.

REFERENCE BOOKS:

1. Nandan, H., *Fundamentals of Entrepreneurship*, PHI Learning Pvt. Ltd., 2013, New Delhi, Third Edition 2013.
2. Vasanth Desai, *The Dynamics of Entrepreneurial Development and Management*, Himalaya Publishing House, Fourth Edition, 2009.

3. BholanathDutta, *Entrepreneurship Management* –Text and Cases, Excel Books, First Edition 2009.

III B. Tech. – II Semester

(16BT6HS05) FRENCH LANGUAGE (La Langue Francais)

(Open Elective)

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:—

COURSE DESCRIPTION: Oral communications; Basic grammar; advancedgrammar;basic writing; Business French (La Francais Commercial)

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge in
- · Process of communication
- · Modes of listening
- · Paralinguistic features
- · Skimming and Scanning
- · Elements of style in writing

CO2. Analyze the possibilities and limitations of language, understanding
- · Barriers to Communication
- · Barriers to Effective Listening
- · Barriers to Speaking
- · Formal and metaphorical language

CO3. Design and develop language skills for professional practice**.**

CO4. Apply basic writing skills in writing Emails and understanding wide range of technical terminologies.

CO5. Understand French culture and civilization.

CO6. Communicate effectively with the native French in day to day situation**.**

DETAILED SYLLABUS:

UNIT-I: ORAL COMMUNICATION (9 Periods)

Introduction - Language as a Tool of Communication, French alphabets, Phonetics and pronunciation, making contacts, giving information, Arranging things, Expression of feelings.

UNIT-II: BASIC GRAMMAR (9 Periods)

Introduction –Articles, -Er ending Verbs, Nouns, Numbers, Gender, Pronouns, Sentence structure – Case study.

UNIT-III: ADVANCED GRAMMAR (9 Periods)

Introduction -Adjectives, Prepositions, Introduction to tenses – Present tense, past tense and future tense, Active and Passive voice.

UNIT-IV: BASIC WRITING (9 Periods)

Introduction -Introduction to written communication, Pre-writing, Creating context for writing and Data collection, fill in forms, Write greeting cards, Invitations and Short personal announcements, Short text to describe photos and pictures.

UNIT-V: BUSINESS FRENCH (La Francais Commercial) (9 Periods)

Introduction - E-mail writing, Letter writing, Learning technical vocabulary and its application.

Case study of influential French companies, Learning computer/desktop/new age- media vocabulary, Introduction to how to present a topic, Fixing an Appointment.

Total Periods: 45

TEXT BOOK:

1. Annie Berther, *Alter Ego*, Hachette Publications, 2012.

REFERENCE BOOKS:

1. RegineMerieux, Yves Loiseau, *Connexions*, Goyall Publishers, 2011.
2. DelphineRipaud, *Saison*, French and Euroean Inc., 2015.

III B.Tech. - II Semester

(16BT6HS06) **GERMAN LANGUAGE (Deutsch alsFremdsprache)**

(Open Elective)

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:—

COURSE DESCRIPTION: Oral communication;Basic grammar; Advanced grammar; Basic writing; Berufsdeutcsch (Business German)

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge in
- · Process of communication
- · Modes of listening
- · Paralinguistic features
- · Skimming and Scanning
- · Elements of style in writing

CO2. Analyze the possibilities and limitations of language, understanding
- · Barriers to Communication
- · Barriers to Effective Listening
- · Barriers to Speaking
- · Formal and metaphorical language

CO3. Design and develop language skills for professional practice.

CO4. Apply basic writing skills in writing Emails and understanding wide range of technical terminologies.

CO5. UnderstandGerman culture and civilization.

CO6. Communicate effectively with the native German in day to day situation.

DETAILED SYLLABUS:

UNIT-I: ORAL COMMUNICATION **(9 Periods)**

Introduction - Language as a Tool of Communication, German alphabets, Phonetics and pronunciation, making contacts, giving information, Arranging things, Expression of feelings.

UNIT-II: BASIC GRAMMAR **(9 Periods)**

Introduction –Articles, Verbs, Nouns, Numbers, Gender, Pronouns, Sentence structure – Case study.

UNIT-III: ADVANCED GRAMMAR **(9 Periods)**

Introduction -Adjectives, Prepositions, Introduction to tenses – Present tense, past tense and future tense, Active and Passive voice, Introduction to Case- Akkusativ, Nominativ, Dativ&Genetiv Case.

UNIT-IV: BASIC WRITING **(9 Periods)**

Introduction -Introduction to written communication, Pre-writing, Creating context for writing and Data collection, fill in forms, Write greeting cards, Invitations and Short personal announcements, Short text to describe photos and pictures.

UNIT-V: BERUFSDEUTCSCH (BUSINESS GERMAN) **(9 Periods)**

Introduction - E-mail writing, Letter writing, Learning technical vocabulary and its application.
Case studies of influential German companies, Learning computer/desktop/new age- media vocabulary, Introduction to how to present a topic, Fixing an Appointment.

Total Periods: 45

TEXT BOOK:

1. Heuber,*Tangram Aktuelleins*, HeuberVerlagPublications, 2011.

REFERENCE BOOKS:

1. Anta Kursisa, Gerhard Newner,Sara vicenta, *Fir fuer Deutsch 1 und Deutsch 2,*HeuberVerlag Publications, 2005.

2. Herman Funk, *Studio D A1*, Cornelsen GOYAL SAAB Publication, 2011.

III B.Tech. - II Semester

(16BT6HS07) INDIAN CONSTITUTION

(Open Elective)

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Elements, functions and functionaries according to Indian Constitution, understanding forbetter professional practice and good citizenry.

COURSE OUTCOMES:
On successful completion of this course, students will be able to:

CO1. Gain knowledge in
- Parliamentary proceedings, laws, legislature, administration and its philosophy Federal system and judiciary of India.
- Socials problems and public services like central civil services and state civil services
- Indian and international political aspects and dynamics.

CO2. Develop etiquette and professional behavior in line with the constitution of India for becoming a responsible citizen.

DETAILED SYLLABUS:

UNIT-I: PREAMBLE AND ITS PHILOSOPHY **(8 Periods)**
Introduction and Evolution of Indian Constitution, preamble and its Philosophy.

UNIT-II: UNION GOVERNMENT **(8 Periods)**
Powers, Functions and Position of President, Vice-President and Council of Ministers, Composition of parliament, Constitution Amendment Procedure, Financial Legislation in Parliament.

UNIT-III:FEDERAL SYSTEM **(14 Periods)**
Centre-State relations, Directive Principles of State Policy, Fundamental Rights and Duties, Centre State Relations, Features of Federal System, Administrative Relationship between Union and States, Powers, Functions and Position of Governors, Function of Chief Ministers, Council of Ministers, Composition and powers of the State Legislature.

UNIT-IV:JUDICIARY AND PUBLIC SERVICES **(10 Periods)**
The Union Judiciary - Supreme Court and High Court, All India Services, Central Civil Services, State Services, Local Services and Training of Civil Services.

UNIT-V: INTERNATIONAL POLITICS **(5 Periods)**
Foreign Policy of India, International Institutions like UNO, WTO, SAARC and Environmentalism.

Total Periods: 45

TEXT BOOK:
1. Briji Kishore Sharma, *Introduction to the Constitution of India*, Prentice Hall of India, 2005.

REFERENCE BOOKS:
1. Mahendra Pal Singh,V. N. Shukla's, *Constitution of India*, Eastern Book Company, 2011.
2. Pandey J. N, *Constitutional Law of India* - Central Law Agency, 1998.

III B.Tech. - II Semester

(16BT6HS08) INDIAN ECONOMY

(Open Elective)

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Introduction; Time Value of Money; Elementary Economic Analysis; Value analysis, Value Engineering; Economic Planning.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Acquire the knowledge in
- Micro and Macro Economics.
- Traditional and Modern methods of Capital Budgeting.
- Five year plans and NITI Aayog.

CO2. Analyze
- Capital Budgeting.
- Value Analysis and Value Engineering.
- Economic analysis
- Law of supply and demand

CO3. Understand the nuances of project management and finance

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION (9 Periods)

Economics- Flow in an Economy, Law of Supply and Demand; Micro and Macro Economics; Relationship between Science, Engineering, Technology, and Economic Development;Concept of Engineering Economics-Types of Efficiency, Definition and Scope of Engineering Economics.

UNIT-II: TIME VALUE OF MONEY (12 Periods)

Concepts and Application; Capital Budgeting-Traditional and Modern Methods; Simple and Compound Interest, Cash Flow Diagram, Principle of Economic Equivalence; Evaluation of Engineering Projects – Present Worth Method, Future Worth Method, Annual Worth Method, Internal Rate of Return Method, Cost-benefit Analysis in Public Projects; Depreciation Policy-Depreciation of Capital Assets, Causes of Depreciation, Straight Line Method and Declining Balance Method.

UNIT-III: ELEMENTARY ECONOMIC ANALYSIS (9 Periods)

Economic Analysis – Meaning, Significance, Simple Economic Analysis; Material Selection for a Product, Substitution of Raw Material; Design Selection for a Product;Material Selection-Process Planning, Process Modification.

UNIT-IV: VALUE ENGINEERING (6 Periods)

Introduction- Value Analysis, Value Engineering,Functions, Aims; Value Analysis vs. Value Engineering; Value Engineering Procedure- Advantages, Application Areas.

UNIT-V: ECONOMICPLANNING (9 Periods)

Introduction- Need For Planningin India,Five year plans(1951-2012), NITI Aayog(from 2014 onwards); Inclusive Growth-Meaning, Significance, Need for inclusive growth in India, Strategy for more inclusive growth, Challenges and Prospects; Employment and Inclusive Growth in India, Role of engineers in sustaining inclusive growth.

Total Periods: 45

TEXT BOOKS:

1. PanneerselvamR ,*Engineering Economics*, PHI Learning Private Limited, Delhi, Second Edition,2013.
2. Jain T.R., V. K.Ohri, O. P. Khanna. *Economics for Engineers*, VK Publication, First Edition, 2015.

REFERENCE BOOKS:

1. DuttRudar&Sundhram K. P. M., *Indian Economy*, S. Chand, New Delhi, Sixty Second revised Edition, 2010.

2. Misra, S.K. & V. K. Puri., *Indian Economy: Its Development Experience*, Himalaya Publishing House, Mumbai Thirty Second Edition, 2010.

III B.Tech. - II Semester

(16BT6HS09) INDIAN HERITAGE AND CULTURE

(Open Elective)
(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION:
Basic traits of Indian Culture; Humanistic Reforms under Jainism and Buddhism; Culture in the medieval period; Socio Religious reforms in Indian Culture; Reform movements for harmonious relations.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Acquaint knowledge in
- · Human aspirations and values in Vedic culture.
- · Cultural aspects of Buddhism and Jainism
- · Unification of our country under Mourya's and Gupta's administrations
- · Socio Religious aspects of Indian culture
- · Reform movements and harmonious relations.

CO2. Apply ethical principles and reforms as models for the upliftment of the societal status in the present cultural contexts

DETAILED SYLLABUS:

UNIT-I: BASIC TRAITS OF INDIAN CULTURE (9 Periods)
Meaning and definition and various interpretations of culture.Culture and its features.The Vedic and Upanishadic culture and society.Human aspirations and values in these societies.Chaturvidhapurushardhas, Chaturashrma and Chaturvarna theory.

UNIT-II: HUMANISTIC REFORMS UNDER JAINISM AND BUDDHISM (9 Periods)
Salient features of Jainism - contributions of Jainism to Indian culture. Contributions of Aachaarya and Mahaapragya.Buddhism as a humanistic culture.The four noble truths of Buddhism.Contributions of Buddhism to Indian culture.

UNIT-III: CULTURE IN THE MEDIEVAL PERIOD (9 Periods)
Unifications of India under Mouryas and Guptas and their cultural achievements. Cultural conditions under satavahanas. Contributions to pallavas and cholas to art and cultural achievements of vijayanagara rulers.

UNIT-IV: SOCIO RELIGIOUS REFORMS IN INDIAN CULTURE (9 Periods)
Western impact on India, Introduction of western education, social and cultural awakening and social reform movements of Rajaramohan Roy – DayanandhaSaraswathi- Anne Besant. (theosophical society)

UNIT-V: REFORM MOVEMENTS FOR HARMONIOUS RELATIONS (9 Periods)
Vivekananda, Eswar Chandra vidyasagar and Veeresalingam- emancipation of women and struggle against caste. Rise of Indian nationalism. Mahatma Gandhi- Nonviolence and satyagraha and eradication of untouchability.

Total Periods: *45*

TEXT BOOK:

1. ValluruPrabhakaraiah, *Indian Heritage and Culture*, Neelkamal Publications Pvt. Ltd. Delhi, First Edition, 2015.

REFERENCE BOOKS:

1. L. P. Sharma, *History of Ancient India*, Konark Publishers, Pvt. Ltd., New Delhi, 2010.
2. L. P. Sharma, *History of Medieval India*, Konark Publisher, Pvt. Ltd., New Delhi, 2010.
3. L. P. Sharma, *History of Modern India*, Konark Publishers, Pvt. Ltd., New Delhi, 2010.

4. The Cultural Heritage of India Vol-I, II, III, IV, V, *The Ramakrishna Mission Institute of Culture*, Calcutta.

III B.Tech. - II Semester

(16BT6HS10) **INDIAN HISTORY**

(Open Elective)

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Introduction; Ancient India; Classical and Medieval era; Modern India; India after independence.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Gain knowledge on evolution and history of India as a nation

CO2. Analyze social and political situations of past and current periods

CO3. Practice in career or at other social institutions morally and ethically

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION (8 Periods)

Elements of Indian History; History Sources: Archaeology, Numismatics, Epigraphy & Archival research; Methods used in History; History & historiography; sociological concepts-structure, system, organization, social institutions, Culture and social stratification (caste, class, gender, power), State& Civil Society.

UNIT-II: ANCIENT INDIA (9 Periods)

Mohenjo-Daro civilization; Harappa civilization; Mauryan Empire.

UNIT-III: CLASSICAL AND MEDIEVAL ERA (12 Periods)

Classic Era (200 BC - 1200 AD); Hindu - Islamic Era (1200 - 1800 AD).

UNIT-IV: MODERN INDIA (6 Periods)

Age of Colonialism (17th - 19th centuries); First war of Indian Independence;Freedom Struggle (1857-1947).

UNIT-V:INDIA AFTER INDEPENDENCE (1947-) (10 Periods)

The Evolution of the Constitution and Main Provisions; Consolidation of India as a Nation; Politics in the States; Indian economy; Modernization and globalization, Secularism and communalism, Nature of development, Processes of social exclusion and inclusion, Changing, Nature of work and organization.

Total Periods: 45

TEXT BOOK:

1. K. Krishna Reddy, *Indian History*, Tata McGraw-Hill, Twenty First reprint,2017.

REFERENCE BOOKS:

1. Guha, Ramachandra, *India after Gandhi*, Pan Macmillan,2007.
2. Thapar, Romila, *Early India*, Penguin, 2002.

III B.Tech. - II Semester

(16BT6HS11) **PERSONALITY DEVELOPMENT**

(Open Elective)

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Self-esteem & Self-Management; Developing Positive Attitudes; Self-Motivation & Self-Management; Getting Along with the Supervisor; Workplace Success.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge in
- Self-Management
- Planning Career

CO2. Analyze the situations based on
- Attitudes
- Thinking strategies

CO3. Design and develop the functional skills for professional practice in

CO4. Function effectively as an individual and as a member in diverse teams.

CO5. Communicate effectively in public speaking in formal and informal situations.

DETAILED SYLLABUS:

UNIT-I: SELF-ESTEEM AND SELF-IMPROVEMENT (9 Periods)
Know Yourself – Accept Yourself; Self-Improvement: Plan to Improve - Actively Working to Improve Yourself.
Case study: 1

UNIT-II: DEVELOPING POSITIVE ATTITUDES (9 Periods)
How Attitudes Develop – Attitudes are Catching – Improve Your Attitudes.
Case study: 2

UNIT-III: SELF-MOTIVATION AND SELF-MANAGEMENT (9 Periods)
Show Initiative – Be Responsible Self-Management; Efficient Work Habits – Stress Management – Employers Want People Who can Think – Thinking Strategies.
Case study: 3

UNIT-IV: GETTING ALONG WITH THE SUPERVISOR (9 Periods)
Know your Supervisor – Communicating with Your Supervisor – Special Communications With Your Supervisor – What Should You Expect of Your Supervisor? – What Your Supervisor Expects of You - Moving Ahead Getting Along with Your Supervisor.
Case study: 4

UNIT-V: WORKPLACE SUCCESS (9 Periods)
First Day on the Job – Keeping Your Job – Planning Your Career – Moving ahead.
Case study: 5

Total Periods: 45

TEXT BOOK:

1. Harold R. Wallace and L. Ann Masters, *Personality Development*, Cengage Learning, Delhi, Sixth Indian Reprint 2011.

REFERENCE BOOKS:

1. Barun K. Mitra, *Personality Development and Soft Skills,* Oxford University Press, New Delhi, 2011.
2. Stephen R. Covey, *The 7 Habits of Highly Effective People*, Free Press, New York, 1989.
3. K. Alex, *Soft Skills*, S. Chand & Company Ltd, New Delhi, Second Revised Edition 2011.
4. Stephen P. Robbins and Timothy A. Judge*, Organizational Behaviour*, Prentice Hall, Delhi, Sixteenth Edition 2014.

III B.Tech. - II Semester

(16BT6HS12) PHILOSOPHY OF EDUCATION

(Open Elective)

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Introduction to Philosophy and Engineering Education; Philosophical methods and their implications in engineering; Philosophical education in India; Values and Engineering education; Outcome based education.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Acquire knowledge in
- Philosophy of Engineering education.
- Philosophical Methods.
- Knowledge acquiring methods.
- Engineering education and responsibilities.

CO2. Understand the impact of Outcome Based Education for effective educational outcomes

CO3. Apply reasoning to assess societal issues with the contextual knowledge of engineering education and responsibilities.

DETAILED SYLLABUS:

UNIT-I:INTRODUCTION TOPHILOSOPHY AND ENGINNERING EDUCATION (9Periods)

Concept , Significance, and Scope of Philosophy in Engineering – Aims of Engineering Education – relationship between philosophy and engineering education – speculative, normative and critical approaches of philosophy in engineering.

UNIT-II:PHILOSOPHICAL METHODS AND THEIR IMPLICATIONS INENGINEERING (9Periods)

Introduction to Philosophical approaches: Idealism, Naturalism, Pragmatism, Realism and Existentialism; Significance and Scope in Engineering Education.

UNIT-III: PHILOSOPHICAL EDUCATION IN INDIA (9 Periods)

Different branches of philosophy- meaning, Epistemology: nature and scope; Knowledge acquiring methods;Kinds and instruments of knowledge; Re-shapingof educational thoughts by Indian thinkers: Rabindranath Tagore, Sri Aurobindo Gosh, Mahatma Gandhi,Jiddu Krishnamurthy and Swamy Vivekananda.

UNIT-IV:VALUES AND ENGINEERING EDUCATION (9 Periods)

Introduction; Engineering educationand responsibilities: health,social, moral, ethics aesthetic;Value: crisis and strategies forinculcation;

Case study: Engineering Solutions given by Mokshagundam Visvesvaraya.

UNIT-V:OUTCOME-BASED EDUCATION (9 Periods)

Institutional visioning;educational objectives; programme outcomes, curriculum,stakeholders, infrastructure and learning resources; governance and management, quality in education.

Total periods: 45

TEXT BOOKS:

1. Ganta Ramesh, *Philosophical Foundations of Education*, Neelkamal Publications, First Edition,2013.
2. CarlMicham,*Thinking through technology(The Paths between Engineering and Philosophy)*, University of Chicago Press, First Edition,1994.
3. Louis L Bucciarelli,*Engineering Philosophy,*Delft University Press,First Edition, 2003.
4. NBA/ABET Manuals.

REFERENCE BOOKS:

1. Louis L Bucciarelli, *Philosophy of Technology and Engineering Sciences*, North Holland, First Edition, 2009 (e-book).
2. Samuel Florman, *Existential pleasures of education*, Martins's Griffin S.T. publication, First Edition,

1992.

III B.Tech. - II Semester

(16BT6HS13) PUBLIC ADMINISTRATION

(Open Elective)

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Introduction; Public Policy; Good Governance; E-Governance; Development Administration.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Acquireknowledge in
- Public Policy.
- Good Governance.
- E-governance.
- Development Administration.

CO2. Analyze the possibilities and limitations ofexisting policies through Good Governance perspective.

CO3. Design and develop solutions in e-governance modelsto find and provide opportunities in e-governance.

CO4. Adopt principles ofe-governance in addressing the existing issues and challenges in e-governance sector.

CO5. Understand the significance of Administrative Development in finding professional engineering solutions by probing
- Bureaucracy.
- Role of civil society.

DETAILEDSYLLABUS:

UNIT-I: INTRODUCTION (9 Periods)

Public and Private Administration- Differences and Similarities, Meaning, Scope; Importance of Public Administration in Modern Era; Public Administration and its implications in the field of Engineering.

Case Study: Unique Identification Authority of India (UIDAI):Aadhaar Project: Challenges Ahead.

UNIT-II: PUBLIC POLICY (9 Periods)

Meaning and Scope; Policy Formulation in India; Policy making process; Policy Implementation.
Engineering and Public Policy**,**Social, ethical, Monetary and fiscal policies; policy implications of engineering;The engineer's role in Public Policy.

Case Study:NITI Aayog: Demonetization and Aftermath of Demonetization – Cashless transactions.

UNIT-III: GOOD GOVERNANCE (9 Periods)

Significance; Objectives;Concepts;Reforms;Organization and its basic problemsAdministrative and Governance reforms in India; Sustainable and Inclusive growth in India;Engineering and Sustainable Environment-Role of Engineers; Right to information Act.

Case Study: Strategies in Good Governance: A Case Study of Karnataka, Kerala and Orissa.

UNIT-IV: E-GOVERNANCE (9 Periods)

Meaning, Significance, Issues in E-governance; E-governance Models, Problems and Opportunities; Application of DataWarehousing and Data Mining in Governance; Engineers role in re-engineering E-governance.

Case Study: e-Housing System for Bhavana Nirman Dhanasahayam Online disbursement of housing assistance in Kerala.

UNIT-V: DEVELOPMENT ADMINISTRATION (9 Periods)

Introduction; Development Administration-Administrative Development- Sustainable Development -Significance- Objectives; Bureaucracy - Personnel administration and human resources development; Role of civil society-Citizens and administration;Development and Engineering: Issues Challenges and Opportunities.

Case Study: Neeru-Chettu (Water-Tree) of Andhra Pradesh.

Case Study: TPDDL of Delhi and Odisha. **Total Periods: 45**

TEXT BOOKS:

1. M.P. Sharma, B.L. Sadana, HarpreetKaur,*Public Administration in Theory and Practice,* KitabMahal, Mumbai, First Edition,2014.
2. CSR Prabhu, *E., Governance – concepts and case studies*, PHI, New Delhi, Second Edition, 2012.

REFERENCE BOOKS:

1. SurendraMunshi, Bijupaul Abraham, *Good Governance, Democratic societies and Globalization,* Sage publications, New Delhi, First Edition, 2004.

2. R.K.Sapru, *Public Policy,*Sterling Publishers Pvt. Ltd., New Delhi, First Edition, 2001.

III B.Tech. - II Semester

(16BT60112) BUILDING MAINTENANCE AND REPAIR

(Open Elective)

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Durability of buildings, Failure and repair of buildings, Material Techniques for repair, Maintenance of buildings, Conservation and recycling.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Acquire basic knowledge on durability and serviceability, failures, repair and rehabilitation of buildings.
CO2. Analyzefailures, repair and rehabilitation techniques.
CO3. Solve complex building maintenance problems through proper investigations and interpretation.
CO4. Use modern tools and techniques for various repairs and rehabilitation of structures.
CO5. Provide solutions for building maintenance and repair problems considering health and safety.
CO6. Consider environmental sustainability in building maintenance and repair.
CO7. Maintain ethical standards for quality in repairs and rehabilitation of structures.
CO8. Evaluate specifications and perform cost analysis of building components while repair and rehabilitation.

DETAILED SYLLABUS:

UNIT-I: DURABILITY AND SERVICEABILITY OF BUILDINGS (10 Periods)

Life expectancy of different types of buildings; Effect of environmental elements such as heat, dampness, frost and precipitation on buildings; Effect ofchemical agents on building materials, Effect of pollution on buildings, Effect of fire onbuilding; Damage by biological agents like plants, trees, algae, fungus, moss, insects, etc.; Preventive measures on various aspects, Inspection, Assessment procedure for evaluating for damaged structures, Causes of deterioration, Testing techniques.

UNIT-II:FAILURE AND REPAIR OF BUILDINGS (10 Periods)

Building failure – Types, Methodology for investigation; Diagnostictesting methodsandequipment, Repair of cracks inconcrete and masonry, Materials for Repair,Methods of repair, Repair and strengthening of concrete buildings, Foundationrepair and strengthening, Underpinning, Leakage of roofs and repair methods.

UNIT-III: TECHNIQUES FOR REPAIR (8 Periods)

Rust eliminators and polymers coating for rebars during repair, Foamed concrete, Mortar and dry pack, Vacuum concrete, Gunite and shotcrete, Epoxy injection, Mortar repairs for cracks, Shoring and underpinning.

UNIT-IV: MAINTENANCE OF BUILDINGS (9 Periods)

Reliability principles and its applications in selection of systemsfor building, Routine maintenance of building, Maintenance cost, Specifications formaintenance works, Dampness-Damp proof courses, Construction details for prevention ofdampness; Termite proofing, Fire protection, Corrosion protection.

UNIT-V: CONSERVATION AND RECYCLING (8 Periods)

Performance of construction materials and components in service, Rehabilitation of constructed facilities, Conservation movement, Materials and methodsfor conservation work, Recycling of old buildings and its advantages, Examples. **Total Periods: 45**

TEXT BOOKS:

1. Dennison Campbell, Allen and Harold Roper, *Concrete Structures – Materials, Maintenance and Repair*, Longman Scientific and Technical, UK, 1991.
2. Allen, R.T. L., Edwards, S.C. and J. D. N. Shaw,*TheRepair of Concrete Structures*, Blackie Academic & Professional, UK, 1993.

REFERENCE BOOKS:

1. Peter H. Emmons, *Concrete Repair and Maintenance*, John Wiley and Sons Publications, 2002.
2. Building Constructionunder Seismic Conditions in the Balkan Region, UNDP/UNIDO Project Rer/79/015,Volume 5, *Repair and Strengthening of Reinforced Concrete, Stone and Brick Masonry Buildings*, United Nations Industrial Development Organisation, Vienna.
3. Shetty, M. S., *Concrete Technology*, S. Chand and Company.
4. Smith, P. and Julian, W., *Building Services*, Applied Science Publications, London, 1976.
5. SP: 25, BIS;*Causes and Prevention of Cracks in Buildings*.
6. Champion, S., *Failure and Repair of Concrete Structures*, John Wiley and Sons Publications, 1961.
7. Perkins, P. H., Repair, Protection and Water Proofing of Concrete Structures, E& FN Spon, UK, 3rdEdition, 1997.

III B.Tech. - II Semester

(16BT60113) CONTRACT LAWS AND REGULATIONS

(Open Elective)

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: –

COURSE DESCRIPTION: Construction contracts; Tenders; Arbitration; Legal requirements; Labour regulations.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate basic Knowledge on construction contracts, tenders, arbitration, legalrequirements and labour regulations.

CO2. Analyze contracts and tenders.

CO3. Address the legal issues in contracts and tenders.

CO4. Follow laws and regulations in the preparation of contracts and tenders.

CO5. Prepare contract and tender documents as per the standards.

CO6. Consider project schedule, cost, quality and risk in the preparation of contracts and tenders.

DETAILED SYLLABUS:

UNIT-I:CONSTRUCTION CONTRACTS (9 Periods)

Indian contracts act, Elements of contracts, Types of contracts, Features, Suitability, Design of contract documents, International contract document and laws, Standard contract document, Law of torts.

UNIT-II: TENDERS (9 Periods)

Prequalification, Bidding, Accepting; Evaluation of tender from technical, contractual and financial points of view; Two cover system, Preparation of the documentation, Contract formation and interpretation, Potential contractual problems, Price variation clause, Comparison of actions and laws, Subject matter, Violations.

UNIT-III: ARBITRATION (9 Periods)

Arbitration, Comparison of actions and laws, Agreements, Appointment of arbitrators, Conditions of arbitration, Powers and duties of arbitrator, Rules of evidence, Enforcement of award, Arbitration disputes, Dispute review board.

UNIT-IV: LEGAL REQUIREMENTS (9 Periods)

Legal requirements for planning, Property law, Agency law, Tax laws – Income tax, Sales tax, Excise and custom duties, Local government approval, Statutory regulations, Insurance and bonding, Laws governing purchase and sale, Use of urban and rural land, Land revenue codes, EMD, Security deposits, Liquidated damages.

UNIT-V:LABOUR REGULATIONS (9 Periods)

Social security, Welfare legislation; Laws relating to wages, bonus and industrial disputes; Labour administration, Insurance and safety regulations, Workmen's compensation act, Maternity benefit act, Child labour act, Other labour laws.

Total Periods: 45

TEXT BOOKS:

1. SubbaRao,G.C.V., *Law of Contracts I & II*, S. Gogia& Co., Eleventh Edition, 2011.
2. Jimmie Hinze, *Construction Contracts,*McGraw Hill, Third Edition, 2011.

REFERENCE BOOKS:

1. Kishore Gajaria, *GT Gajaria's Law Relating to Building and Engineering Contracts in India*, Lexis Nexis Butterworths India, Fourth Edition, 2000.
2. Patil, B. S,*Civil Engineering Contracts and Estimates*, University Press (India) Private Ltd., Fourth Edition, 2015.
3. Joseph T. Bockrath, *Contracts and the Legal Environment for Engineers and Architects*, McGraw Hill Education, Seventh Edition, 2010.
4. AkhileshwarPathak, *Contract Law*, Oxford University Press, 2011.

III B.Tech. - II Semester

(16BT60114) DISASTER MITIGATION AND MANAGEMENT

(Open Elective)

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION: Disasters; Earthquakes; Floods; Cyclones; Droughts; Landslides; Disaster management.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrateknowledge on disasters, their vulnerability and mitigation measures.

CO2. Analyze disasters and their vulnerability.

CO3. Design strategies for effective disaster mitigation.

CO4. Address pre and post disaster issues for better preparedness and mitigation measures, through proper analysis and interpretation.

CO5. Use appropriate methods in disaster mitigation and management.

CO6. Use historical data of disasters to inform the people over preparedness and mitigation measures.

CO7. Solve disaster related issues considering environment.

CO8. Consider economical issues in disaster management.

DETAILED SYLLABUS:

UNIT-I: DISASTERS (09 Periods)

Types of disasters - Natural disasters; Impact of disasters on environment, infrastructure and development; Concepts of hazards and vulnerability analysis, Hazard Assessment, Guidelines for hazard assessment and vulnerability analysis, Basic principles and elements of disaster mitigation.

UNIT-II: EARTHQUAKES (09 Periods)

Introduction to earthquake, Intensity scale (MSK–64), Seismic activity in India, Seismic zones of India, Earthquakes in A.P., Action plan for earthquake disaster preparedness, Elements at risk, Recovery and rehabilitation after earthquake, Earthquake resistant design and construction of buildings; Tsunami – Onset, Types and causes,Warning, Elements at risk, Typical effects, Specific preparedness and mitigation strategies.

UNIT-III: FLOODS, CYCLONES AND DROUGHTS (11 Periods)

Floods and Cyclones: Onset, Types, Warnings; Elements at risk, Typical effects, Indian floods and cyclones, Hazard zones, Potential for reducing hazards, Mitigation strategies and community based mitigation.

Droughts: Onset, Types and warning; Causes, Impact, Early warning and response mechanisms, Mitigation strategies, Droughts in India.

UNIT-IV: LANDSLIDES (08 Periods)

Onset, Types and warning; Causes, Elements at risk, Indian landslides, Hazards zones, Typical effects, Mitigation strategies and community based mitigation.

UNIT-V: DISASTER MANAGEMENT (08 Periods)

Disaster management organization and methodology, Disaster management cycle, Disaster management in India – Typical cases; Cost–benefit analysis with respect to

various disaster management programs implemented by NGOs and Government of India.

Total Periods: 45

TEXT BOOKS:

1. V. K. Sharma, *Disaster Management, Medtech Publishing,* Second Edition, 2013.
2. Anand S. Arya, AnupKaranth, and AnkushAgarwal, *Hazards, Disasters and Your Community: A Primer for Parliamentarians*, GOI–UNDP Disaster Risk Management Programme, Government of India, National Disaster Management Division, Ministry of Home Affairs, New Delhi, Version 1.0, 2005.

REFERENCE BOOKS:

1. Donald Hyndman and David Hyndman, *Natural Hazardsand Disasters*, Cengage Learning, Third Edition, 2011.
2. *Disaster Management in India,*AStatus Report, Ministry of Home Affairs, Govt. of India, May, 2011.
3. Rajendra Kumar Bhandari, *Disaster Education and Management: A Joyride for Students, Teachers, and Disaster Managers*, Springer India, 2014.
4. R. B. Singh, *Natural Hazards and Disaster Management*, Rawat Publications, 2009.

III B.Tech - II Semester

(16BT60115) ENVIRONMENTAL POLLUTION AND CONTROL

(Open Elective)

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Fundamentals ofair pollution;Dispersion of pollutants; Effects and control of air pollution; Water pollution;Soil pollution and control; Municipal solid waste management.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrateknowledge on air, water, soil pollution and their control and solid waste management.
CO2. Analyze causes and effects of air, water and soilpollution and their remedial measures.
CO3. Recommend suitable solutionsto complex environmental pollution problems.
CO4. Use appropriate remedial technique to solve environmental pollution problems.
CO5. Understand the effects of environmental pollutionon human health and vegetation.
CO6. Encourage sustainable development through implementation of pollution control measures.
CO7. Maintain IS Codes for environmental quality control.

DETAILED SYLLABUS:

UNIT-I: AIR AND NOISE POLLUTION (8 Periods)

Air Pollution: Scope, Significance, Classification, Sources – Line, Area, Stationary, Mobile; Effects of air pollutants on man, material and vegetation; Global effects of air pollution; Air pollution meteorology - Lapse rate, Inversion, Plume pattern;Dispersion of air pollutants - Dispersion models and applications; Ambient air quality standards.

Noise Pollution: Sound pressure, Power and intensity,Impacts of noise, permissible limits of noise pollution, measurement of noise.

UNIT-II: AIR AND NOISE POLLUTIONCONTROL (10 Periods)

Self-cleansing properties of the environment,Dilution method, Control at source, Process changes and equipment modifications, Control of particulates–Types of equipment, Design and operation – Settlingchambers,Centrifugal separators, Bag house filters, Wet scrubbers, Electrostatic precipitators; Control of gaseouspollutants – Adsorption, Absorption, Condensation, Combustion; Control of air pollution from automobiles, Control of noise pollution.

UNIT-III: WATER POLLUTIONAND CONTROL (10 Periods)

Water pollution – Sources, Causes, Effects; Surface and groundwater quality – Physical, Chemical, Biological; Drinking water quality standards, Water purification – Processes, Engineered systems – Aeration, Solids separation, Settling operations, Coagulation, Softening, Filtration, Disinfection; Wastewater – Sources, Causes, Effects, Treatment and disposal – Primary, Secondary, Tertiary; Case studies.

UNIT-IV: SOIL POLLUTION AND CONTROL (8 Periods)

Soil pollutants, Sources of soil pollution, Causes, Effectsand control of soil pollution, Diseases caused by soil pollution, Methods to minimize soil pollution, Effective measures to control soil pollution, Case studies.

UNIT-V: MUNICIPAL SOLID WASTE MANAGEMENT (9 Periods)

Types of solid waste, Composition of solid waste, Collection and transportation of solid waste, Methods of disposal – Opendumping, Sanitary landfill, Composting, Incineration, Utilization - Recovery and recycling, Energy Recovery. **Total Periods: 45**

TEXT BOOKS:

1. Peavy, H. S, Rowe, D. R., and Tchobanoglous, G., *Environmental Engineering*, McGraw Hill Inc., 1985.
2. C.S.Rao, *Environmental Pollution Control Engineering*, New Age International Pvt. Ltd., Second Edition, 2007.
3. Ibrahim A. Mirsa, *Soil Pollution: Origin, Monitoring & Remediation*, Springer, UK, Second Edition, 2008.

REFERENCE BOOKS:

1. M.N. Rao and H.V.N. Rao, *Air Pollution,* Tata McGraw–Hill Education Pvt. Ltd., Ninteenth Edition, 2010.
2. Daniel Vallero, *Fundamentals of Air Pollution,* Academic Press (Elsevier), Fifth Edition, 2014.
3. S.M.Khopkar,*Environmental Pollution Monitoring and Control,* New Age International Pvt. Ltd., Second Edition, 2007.
4. V. M. Domkundwar, Environmental Engineering, DhanpatRai & Co. Pvt. Ltd., New Delhi, 2014.

III B.Tech - II Semester

(16BT60116) PLANNING FOR SUSTAINABLE DEVELOPMENT

(Open Elective)

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Sustainable development; Environmental impact;Sustainable Policies; Governance; Theories and strategies; Media and education for sustainability.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on sustainable development, environmental impact, sustainable policies, governance, systems and strategies, media and education for sustainability.

CO2. Analyze theories, environmental impact, policies, systems and strategies for sustainable development.

CO3. Develop suitable methods and systems for sustainable development.

CO4. Use appropriate techniquesin solving issues related to sustainable development.

CO5. Provide solutions to problems associated with sustainable development considering society.

CO6. Consider environment while planning sustainable development.

CO7. Communicate effectively on sustainable development issues through media and education.

CO8. Consider economical issues while planning for sustainable development.

DETAILED SYLLABUS:

UNIT-I: SUSTAINABLE DEVELOPMENT (9 Periods)

Definition and concepts of sustainable development, Capitalization of sustainability - National and global context;Millennium development goals, Emergence and evolution of sustainability and sustainable development, Theories of sustainability, Case studies.

UNIT-II: ENVIRONMENTAL IMPACT (9 Periods)

Climate change – Science, Knowledge and sustainability; Unforeseen environmental impacts on development, Challenges of sustainable development, Centrality of resources in sustainable development, Case studies.

UNIT-III: SUSTAINABLE POLICIES AND GOVERNANCE (9 Periods)

Governance - Democracy and Eco–welfare; Global civil society and world civil politics, Civic environmentalism, Policy responses to sustainable development, Economics of sustainability, Social responsibility in sustainability, National action, ISO 14001: Environmental management system.

UNIT-IV: SUSTAINABLE SYSTEMS AND STRATAGIES (9 Periods)

Need for system innovation, Transition and co–evolution, Theories and methods for sustainable development, Strategies for eco–innovation, Ecological foot print analysis, Socio ecological indicators – Eco labels; Policy programmes for system innovation, Case studies.

UNIT-V: MEDIA AND EDUCATION FOR SUSTAINABILITY (9 Periods)

Role of emerging media, Remarkable design and communication art, Activism and the public interest, Education for sustainability, Participation in decision making, Critical thinking and reflection, Case studies.

Total Periods: 45

TEXT BOOKS:

1. John Blewitt, *Understanding Sustainable Development*, Earth Scan Publications Ltd., 2ndEdition, 2008.
2. Jennifer A. Elliot, *An Introduction to Sustainable Development*, Earth Scan Publications Ltd., 4thEdition, 2006.

REFERENCE BOOKS:

1. Peter Rogers, Kazi F Jalal and John A Boyd, *An Introduction to Sustainable Development*, Earth Scan Publications Ltd., 2006.
2. Simon Dresner, *The Principles of Sustainability*, Earth Scan Publications Ltd., Second Edition, 2008.
3. Peter Bartelmus, *Environment Growth and Development: The Concepts and Strategies of Sustainability*, Routledge, Third Edition, 2003.
4. Gabriel Moser, Enric Pol, Yvonne Bernard, MiriliaBonnes, Jose Antonio Corraliza and Maria Vittoria Giuliani, *People Places and Sustainability*, Hogrefe& Huber Publishers, Second Edition, 2003.

III B.Tech. - II Semester

(16BT60117) **PROFESSIONAL ETHICS**

(Open Elective)

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Engineering ethics; Professional ideals and virtues; Engineering as social experimentation; Responsibilities and rights; Global issues.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the principles of ethics, importance of professional values and social responsibility.
CO2. Analyze the problems in the implementation of moral autonomy and use ethical theories in resolving moral dilemmas.
CO3. Develop suitable strategies to resolve problems arise in practicing professional ethics.
CO4. Provide solutions to complex problems associated with professional ethics by proper analysis and interpretation.
CO5. Use appropriate theories in resolving issues pertain to professional ethics.
CO6. Understand the impact of professional ethics on society and address the limitations of codes of ethics.
CO7. Practice engineering with professionalism, accountability and ethics.
CO8. Function as a member, consultant, manager, advisor and leader in multi-disciplinary teams.
CO9. Write reports without bias and give instructions to follow ethics.

DETAILED SYLLABUS:

UNIT-I: ENGINEERING ETHICS (9 Periods)

Scope and aim of engineering ethics, Senses of engineering ethics, Variety of moral issues, Types of inquiry, Moral dilemmas, Moral autonomy-Kohlberg's theory, Gilligan's theory, Consensus and controversy.

UNIT-II:PROFESSIONAL IDEALS AND VIRTUES (8 Periods)

Theories about virtues, Professions, Professionalism, Characteristics, Expectations, Professional responsibility, Integrity, Self-respect, Sense of responsibility, Self-interest, Customs and religion, Self-interest and ethical egoism, Customs and ethical relativism, Religion and divine command ethics, Use of ethical theories, Resolving moral dilemmas and moral leadership.

UNIT-III:ENGINEERING AS SOCIAL EXPERIMENTATION (10 Periods)

Engineering as experimentation, Similarities to standard experiments, Learning from the past and knowledge gained, Engineers as responsible experimenters, Conscientiousness, Moral autonomy and accountability, The challenger case, Codes of ethics and limitations, Industrial standards, Problems with the law of engineering.

UNIT-IV: RESPONSIBILITIES AND RIGHTS (9 Periods)

Collegiality and loyalty, Respect for authority, Collective bargaining, Confidentiality, Conflict of interests, Occupational crime, Rights of engineers, Professional rights, Whistle-blowing, The BART case, Employee rights and discrimination.

UNIT-V: GLOBAL ISSUES (9 Periods)

Multinational corporations, Professional ethics, Environmental ethics, Computer ethics, Engineers as consultants, Witnesses, Advisors and Leaders, Engineers as Managers, Managerial ethics applied to Engineering Profession, moral leadership.

Total Periods: 45

TEXT BOOKS:

1. Mike W. Martin and Roland Schinzinger, *Ethics in Engineering*, Tata McGraw-Hill, Third Edition, 2007.
2. Govindarajan, M., NataGovindarajan, M., Natarajan, S. and Senthilkumar, V. S., *Engineering Ethics*, Prentice Hall of India, 2004.

REFERENCE BOOKS:

1. S. Kannan and K. Srilakshmi, *Human Values and Professional Ethics*, Taxmann Allied Services Pvt Ltd., 2009.
2. Edmund G. Seebauer and Robert L. Barry, *Fundamental of Ethics for Scientists and Engineers*, Oxford University Press, 2001.
3. Charles F. Fledderman, *Engineering Ethics*, Pearson Education, Second Edition, 2004.

III B.Tech. - II Semester

(16BT60118) RURAL TECHNOLOGY

(Open Elective)

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION:

Rural technology; Non conventionalenergy; Community development; IT in rural development.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on technologies for rural development.

CO2. Analyze various technologies available which are appropriate for rural development.

CO3. Carryout feasibility study on the public and private partnership for rural development.

CO4. Develop and use latest technologies for rural development.

CO5. Address health and safety issues while choosing technologies for rural development.

CO6. Educate the rural populace on the positive impacts of bio-fertilisers and usage of agro machinery in agriculture.

DETAILED SYLLABUS:

UNIT-I:RURAL TECHNOLOGY (9 Periods)

India - Technology and rural development, Pre and post-independence period,Rural India Life, Indian farmer, Role of science and technology in rural development, Rural technology and poverty eradication, Rural business hubs, Technology in improving rural infrastructure,Various organizations related to innovation, Issues of technology transfer - CAPART, NABARD, CSIR, NIF.

UNIT-II: NON CONVENTIONAL ENERGY (9 Periods)

Definition of energy, Types of alternative sources of energy, Sources of non-conventional energy – Solar energy: Solar cooker,Solar heater; Biogas, Recycling and management,Wastes conservation, Assessment and production of biomass products and their utilization.

UNIT-III: TECHNOLOGIES FOR RURAL DEVELOPMENT (9 Periods)

Food and agro based technologies, Tissue culture, Nursery,Building and construction technologies, Cultivation and processing of economic plants, Cottage and social industries.

UNIT-IV: COMMUNITY DEVELOPMENT (9 Periods)

Water conservation, Rain water Harvesting, Drinking water, Environment and Sanitation, Bio fertilizers, Medical and aromatic plants, Employment generating technologies–Apiculture, Pisciculture and Aquaculture.

UNIT-V:IT IN RURAL DEVELOPMENT (9 Periods)

Role of information technology (IT) in rural areas, Impact of IT in rural development, Need and necessity of technology, Corporate social responsibilities, Private sector participation (Activities in different spheres: Employment, Education, Health, Agriculture and service sectors) and SaansadAdarsh Gram Yojana (SAGY), Village adoptionschemes.

Total Periods: 45

TEXT BOOKS:

1. M.S.Virdi, *Sustainable Rural Technologies*, Daya Publishing House, 2009.
2. S.V. Prabhathand, P. Ch. Sita Devi, *Technology and Rural India*, Serials Publications, 2012.

REFERENCE BOOKS:

1. R. Chakravarthy and P.R.S. Murthy, *Information Technology and Rural Development,* Pacific Book International, 2012.
2. Shivakanth Singh, *Rural Development Policies and Programmes,* Northern Book Centre, 2002.
3. L.M.Prasad, *Principles and Practice of Management*, S. Chand & Sons, Eighth edition, 2014.
4. Venkata Reddy, K., *Agriculture and Rural Development -Gandhian Perspective*, Himalaya Publishing House, 2001.

III B.Tech - II Semester

(16BT60308) GLOBAL STRATEGY AND TECHNOLOGY

(Open Elective)

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Introduction to strategic management; Strategic management process; Principles of good strategy; Globalization strategies; Research and Development strategies; Technology Management and Transfer; Elements of Transfer Process; Corporate Governance in the Indian scenario.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on Strategic management, Research & development strategies, Technology management and transfer, Globalization and Corporate governance.

CO2. Identify and analyze crucial problems in strategic management to improve performance of the organizations.

CO3. Develop the products and production process by using research and development strategies.

CO4. Conduct investigations on the impact of globalization in current scenario in the context of corporate governance.

CO5. Appraise the resources and capabilities of the firm in terms of their ability to confer sustainable development.

CO6. Apply ethics in strategic decision making.

DETAILED SYLLABUS:

UNIT-I: STRATEGIC MANAGEMENT (9 Periods)

Introduction, Classes of decisions, Levels of strategy, Core competence, Strategic intent and stretch, Approaches to strategy making, Roles of different strategists, Strategic management- Process, Benefits, Limitations; Ethics in strategic decision making, Principles of good strategy, Strategic Management in India.

UNIT-II: RESEARCH & DEVELOPMENT STRATEGIES (9 Periods)

Concept, Evolution of R&D Management, R&D as a business, R&D as competitive advantage, Elements of R & D strategies, Integration of R & D, Selection and implementation of R & D strategies, R & D trends.

UNIT-III: TECHNOLOGY MANAGEMENT AND TRANSFER (9 Periods)

Technology Management: Introduction, Technology - Definition, Components, Classification Features; Technology Management- Concept, Nature; Drivers of Management of Technology-Significance, Scope, Responding to technology challenges.

Technology Transfer: Introduction, Definition, Classification, Significance, Elements of process, Types of Technology Transfer, Package, Modes of Transfer, Routes, Channels and Effectiveness of Technology Transfer.

UNIT-IV: GLOBALISATION (9 Periods)

Definition, Stages, Essential conditions for globalization, Globalization strategies, Competitive advantage of Nations, Factors affecting Globalization, Globalization of Indian business.

UNIT-V: CORPORATE GOVERNANCE: THE INDIAN SCENARIO (9 Periods)

Emergence of corporate governance in India- Landmarks, Models, Codes and status in India, Role and Responsibilities of Regulators, The Board of Directors; Corporate Governance- Specific issues in India, Family owned Business, Corporate Governance and the Indian ethos.

Total periods: 45

TEXT BOOKS:

1. Francis Cherunilam, *Strategic Management*, Himalaya Publishing House, Third Edition, 2002.
2. C.S.G.Krishnamacharyulu and Lalitha Ramakrishnan, *Management of Technology*, Himalaya Publishing House, Second Edition, 2012.

REFERENCE BOOKS:

1. White and Bruton, *The Management of Technology and Innovation: A Strategic Approach*, Cengage Learning, First Edition, 2007.
2. S.K.Mandak, *Ethics in Business and Corporate Governance*, TMH, Second Edition, 2012.

III B.Tech - II Semester

(16BT60309) INTELLECTUAL PROPERTY RIGHTS AND MANAGEMENT

(Open Elective)

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Protection of ideas; innovation and artistic endeavors; Acts and procedure related to patents, trademarks, copy right, design registration, trade secrets and cyber laws; Infringement; Commercialization of intellectual property rights; Case studies in each.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on intellectual property rights, patents, trademarks, copyrights, trade secrets and commercialization of intellectual property.

CO2. Analyse the commercial significance of discoveries and developments and to assist in bringing these into public use.

CO3. Investigate and ensure smooth transition from concept to final product by following National & International Laws of Intellectual Property.

CO4. Utilize the various policies and procedures related to patents, trademarks and copyrights relating to IPR.

CO5. Safeguard, review and manage the intellectual property so that it may receive adequate and appropriate legal protection against unauthorized use.

CO6. Follow ethical standards in capacity building and work as a platform for development, promotion, protection, compliance, and enforcement of intellectual property and knowledge.

CO7. Prepare documents and fill applications needed for filing a patent, design, copyright and trade mark.

DETAILED SYLLABUS:

UNIT-I: OVERVIEW OF INTELLECTUALPROPERTY RIGHTS (9 Periods)

Introduction, Intellectual Property vs. Conventional Property, and importance of intellectual property rights (IPRs), types of intellectual property, International Treaties for protection of IPR-Paris Convention, World Intellectual Property Organization (WIPO), World Trade Organization (WTO), Trade Related Aspects of Intellectual Property Rights (TRIP) Agreement, General Agreement on Tariffs and Trade(GATT).

UNIT-II: TRADEMARKS (9 Periods)

Introduction, Functions and kinds of trademarks, Trade Mark Registration Process, Post registration procedures, Trade Mark maintenance, Transfer of rights, Inter parties Proceedings, Infringement and Dilution of Ownership of Trade Mark, Trade Mark claims, International Trade Mark Law.

UNIT-III: PATENTS (9 Periods)

Introduction, Rights under Patent Law, Patent Application Process, Terms and Maintenance of Patents Requirements, Patent Ownership and Transfer, Licensing of Patent Rights, Sole and Joint Inventors, Disputes over Inventorship, Patent Infringement, International Patent Law, Patent Cooperation Treaty (PCT), Patent Law Treaty (PLT), Substantive Patent Law Treaty (SPLT).

UNIT-IV: COPY RIGHTS, TRADE SECRETS, CYBER LAWS (9 Periods)

Copy Rights: Introduction, nature and scope, subject matter, Rights afforded by copyright law, Copyrights ownership, transfers and duration, Copyright registration process.

Trade Secrets: Introduction, Determination of Trade Secret Status, Employer-Employee Relationships, Protection of submissions.

Cyber laws: E-commerce and cyber laws, cybercrime and legislation- need, objective and scope; IT Act 2000, Information Technology and Information Security.

UNIT-V: INDUSTRIAL DESIGN AND COMMERCIALIZATION OF INTELLECTUAL PROPERTY RIGHTS (9 Periods)

Industrial Design: Introduction, Indian Law related to registration of Industrial Designs, Essential requirements for registration of a design in India, International Agreements – Hague System; Conflicts related to registration of design.

Commercialization of Intellectual Property Rights: Competition and Confidentiality Issues, Antitrust Laws, Assignment of Intellectual Property Rights, Technology, Transfer Agreements, Intellectual Property Issues in the Sale of Business, Legal Auditing of Intellectual Property, Due Diligence of Intellectual Property Rights in a Corporate Transaction. **Total Periods: 45**

TEXT BOOKS:

1. Deborah E. Bouchoux, *Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets*, Cengage Learning, Fourth Edition, 2016.
2. KompalBansal and ParikshitBansal, *Fundamentals of Intellectual Property for Engineers*, BS Publications, First Edition, 2013.

REFERENCE BOOKS:

1. Prabuddha Ganguli, *Intellectual Property Rights-Unleashing the Knowledge Economy*, McGraw Hill Education, Sisth reprint, 2015.
2. P. Narayanan, *Intellectual Property Law*, Eastern Book Company, Third Edition, 2013.

3. R.Radha Krishnan, S. Balasubramanian, *Intellectual Property Rights: Text and Cases*, Excel Books, First Edition, 2008.

III B.Tech. - II Semester

(16BT60310) MANAGING INNOVATION AND ENTREPRENEURSHIP

(Open Elective)

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:—

COURSE DESCRIPTION: Evolution of entrepreneurship from economic theory Managerial and entrepreneurial competencies; Concepts of Shifting Composition of the Economy Purposeful Innovation & Sources of Innovative Opportunity; The Innovation Process; Innovative Strategies; Entrepreneurial Motivation; Entrepreneurs versus inventors; Ethics and International Entrepreneurship; Strategic Issues in International Entrepreneurship; Problem solving Innovation and Diversification.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the principles of business innovation and entrepreneurship for establishing industrial ventures.

CO2. Analyze business plans for potential investors and stakeholders and effectively answer probabilistic questions on the substance of plan.

CO3. Develop a comprehensive and well planned business structure for a new venture.

CO4. Conduct investigation on complex problems, towards the development of Project.

CO5. Apply modern statistical and mathematical tools to design projects and subsequent work procedures.

CO6. Apply ethics in constructive innovation framework.

CO7. Exhibit professionalism by employing modern project management and financial tools.

DETAILED SYLLABUS:

UNIT-I: CREATIVITY AND INNOVATION (7 Periods)

Introduction, Levels of innovation, Purposeful innovation and the sources of innovative opportunity, The innovation process, Innovative strategies, Strategies that aim at introducing and innovation, Dynamics of ideation and creativity – Inbound, Outbound; Context and process of new product development, Theories of outsourcing.

UNIT-II: PARADIGMS OF INNOVATION (11Periods)

Systems approach to innovation, Innovation in the context of developed economies and Emerging economies, Examining reverse innovation and its application, Performance gap, Infrastructure gap, Sustainability gap, Regulatory gap, Preference gap, organizational factors effecting innovation at firm level.

UNIT-III: SOURCES OF FINANCE AND VENTURE CAPITAL (7 Periods)

Importance of finance, Comparison of venture capital with conventional development capital, Strategies of venture funding, Investment phases, Investment process, Advantages and disadvantages of venture capital, Venture capital developments in India.

UNIT-IV: INTELLECTUAL PROPERTY INNOVATION AND ENTREPRENEURSHIP (11 Periods)

Introduction to Entrepreneurship, Evolution of entrepreneurship from economic theory, Managerial and entrepreneurial competencies, Entrepreneurial growth and development, Concepts, Ethics and Nature of International Entrepreneurship, Intellectual property – forms of IP, Patents, Trademarks, Design registration, Copy rights, Geographical indications, Patent process in India.

UNIT-V: OPEN INNOVATION FRAMEWORK AND PROBLEM SOLVING (9 Periods)

Concept of open innovation approach, Difference between open innovations and Cloud innovation approaches, Limitations and Opportunities of open innovation framework, Global context of strategic alliance, Role of strategic alliance, Problem Identification and Problem Solving, Innovation and Diversification.

Total Periods: 45

TEXT BOOKS:

1. Vinnie Jauhari, SudhanshuBhushan, *Innovation Management*, Oxford University Press, First Edition, 2014.
2. Drucker, P. F., *Innovation and Entrepreneurship*, Taylor & Francis, Second Edition, 2007.

REFERENCE BOOKS:

1. Robert D Hisrich, Claudine Kearney, *Managing Innovation and Entrepreneurship,* Sage Publications, First Edition, 2014.
2. V.K.Narayanan, *Managing Technology and Innovation for Competitive Advantage*, Pearson India, First Edition, 2002.

III B.Tech. - II Semester

(16BT60311) MATERIALS SCIENCE

(Open Elective)

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION: Structure and Bonding in metals; Steels, Cast Irons and Non Ferrous alloys; Material Selection for conductors, Insulators and semiconductors; Strengthening mechanisms of metals; Plastics and Ceramics as Insulators; AC and DC properties of Insulators; Semiconductors and Magnetic materials; Composite materials in Electrical and Electronics engineering; Material Selection and manufacturing of Optical fibers.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on concepts of fundamental science and engineering principles relevant to materials.

CO2. Analyze the structures of various types of Ferrous, Non-ferrous alloys influencing various engineering applications.

CO3. Conduct investigations to select suitable materials with desired properties for engineering applications.

CO4. Use phase diagrams to interpret the data regarding microstructure of materials.

CO5. Consider health and safety issues while providing materials to real time applications.

CO6. Use composite materials that reduce material waste in design and manufacturing for sustainability.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO MATERIAL SCIENCE (07 Periods)

Structure of metals: Bonds in Solids, Crystallization of metals, Grain and grain boundaries, Effect of grain boundaries on the properties of metals / alloys, Determination of grain size measurement.

Constitution of alloys: Necessity of alloying, Types of solid solutions, Hume rothery rules, Intermediate alloy phases.

UNIT-II: CAST IRONS, STEELS AND NON-FERROUS METALS (12 Periods)

Structure and properties of Grey cast iron, Spheroidal cast iron, White Cast iron, Malleable Cast iron, Alloy cast irons, Classification of steels, structure and properties of plain carbon steels, Structure and properties of Copper and its alloys, Aluminum and its alloys.

UNIT-III: ELECTRIC CONDUCTORS AND INSULATORS (12 Periods)

Type of materials selected for conductors, Insulators and semiconductors, Introduction to ceramics - Bonding and microstructure, DC properties of ceramic materials, AC properties of ceramic materials, mechanical properties, Ceramics as Conductors, Insulators and capacitors; Introduction to Plastics - DC properties, AC properties, Mechanical properties.

UNIT-IV: SEMICONDUCTORS AND MAGNETIC MATERIALS (09 Periods)

Fabrication of Semiconductors, Producing a silicon wafer-Lithography and Deposition packaging of semiconductors materials; Types of magnetic materials, Measuring magnetic properties, Application of soft magnetic materials in Electromagnets and relays, AC transformers, Generators and motors.

UNIT-V: ADVANCED MATERIALS AND APPLICATIONS (05 Periods)

Composites - Fiber reinforced metal matrix, Ceramic matrix, Polymer matrix, Properties and applications of composites; Ceramics - Alumina, Zirconia, Silicon Carbide, SiAlONs, Reaction Bonded Silicon Nitride (RBSN); Glasses- properties and applications, manufacturing of optical fibers.

Total Periods: 45

TEXT BOOKS:

1. Kodgire V D, *Material Science and Metallurgy*, Everest Publishing House, Pune, Thirty First Edition, 2011.
2. Ian. P.Jones, *Material Science for Electrical and Electronic Engineers*, Oxford University Press, First Edition, 2000.

REFERENCE BOOKS:

1. V. Raghavan, *Physical Metallurgy: Principles and Practices*, PHI, New Delhi, Second Edition, 2006.
2. William. D. Callister, *Materials Science & Engineering-An Introduction*, John Wiley and Sons, New Delhi, Sixth Edition, 2002.

III B.Tech. - II Semester
(16BT70412) GREEN TECHNOLOGIES
(Open Elective)
(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Principles of green engineering; Green communications; Green energy; Green computing; Green construction; Green manufacturing.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Deploy conceptual knowledge in green technologies pertaining toengineering practice.
CO2. Analyze various green technologies for engineering practice.
CO3. Provide green solutions to engineering problems.
CO4. Apply various green techniques in the engineering practice.
CO5. Consider health and safety issues while providing green solutions to the society.
CO6. Understand issues related to environment sustainability.
CO7. Apply ethical standards for environmental sustainability in the engineering practice.

DETAILED SYLLABUS:

UNIT-I: PRINCIPLES OF GREEN ENGINEERING AND GREEN COMMUNICATIONS (9 Periods)

Principles of Green Engineering:
Introduction, Definition of green engineering, Principles of green engineering.

Green Communications:
Introduction, Origin of Green Communications, Energy Efficiency in Telecommunication systems, Telecommunication system model and energy Efficiency, Energy saving concepts, Quantifying energy efficiency in ICT, Energy efficiency metrics of green wireless networks, Embodied energy of communication devices- Introduction, The extended energy model, Embodied/Operating Energy of a BS in Cellular network- A Case study; Energy efficient standards for wireline communications.

UNIT-II: GREEN ENERGY (9 Periods)

Introduction, adverse impacts of carbon emission, control of carbon emission– methods, greenhouse gas reduction – methods, Energy sources and their availability, Green energy for sustainable development. Green energy sources – Solar energy, Wind energy, Fuel cells, Biofuels, Wave and Geothermal energy (Principle of generation only).

UNIT-III: GREEN IT (9 Periods)

The importance of Green Information technologies, Strategizing Green Initiatives, Implementation of Green IT, Information Assurance, Communication and Social Media, Regulating Green IT- Laws, Standards and Protocols; RoHS, REACh, WEEE, Legislating for GHG Emissions and Energy Use of IT Equipment, Non-regulatory Government Initiatives, Industry Associations and Standard Bodies, Green Building Standards, Green Data Centres, Social Movements and Greenpeace, Conclusions.

UNIT-IV: GREEN CONSTRUCTION (9 Periods)

Green Building: Definition, Typical features, Benefits, Requisites for green building construction, Sustainability, Concept of REDUCE, REUSE, RECYCLE, RETHINK, REPLENISH AND REFUSE (6 R's), Sustainable construction focus point – Site selection, Planning, Water, Energy, Material, Indoor air quality, Construction procedures.

Indian Green Building Council: Introduction to IGBC green homes, Benefits of IGBC, IGBC green home rating system, Introduction to USGBC, LEED rating system, Procedure to get IGBC certification, GRIHA Rating.

UNIT-V: GREEN MANUFACTURING (9 Periods)

Introduction, background, definition, motivation and barriers to green manufacturing, Impact of manufacturing in environmental ecology, Need for green manufacturing, Advantages and Limitations, green manufacturing strategies, Green manufacturing and sustainability, Sustainability tools; Waste stream mapping and application, Green manufacturing through clean energy supply, green lean manufacturing, green packaging and supply chain. **Total Periods: 45**

TEXT BOOKS:

1. KonstantinosSamdanis, Peter Rost, Andreas Maeder, MichelaMeo, Christos Verikoukis, *Green Communications: Principles, Concepts and Practice,*John Wiley & Sons, 2015.
2. Soli J. Arceivala, *Green Technologies for a better future,* McGraw Hill Education (India) Pvt. Ltd, 2014.
3. San Murugesan, G.R. Gangadharan, *Harnessing Green IT – Principles and Practices,* John Wiley & Sons Ltd., 2008.
4. Tom Woolley, Sam Kimmins, Paul Harrison and Rob Harrison, *Green Building Handbook*, *Volume 1*, E & FN Spon, an imprint of Thomson Science & Professional.
5. *IGBC Green Homes Rating System Version 1.0* – A bridged reference guide.
6. J Paulo Davim, Green Manufacturing: Processes and Systems, Springer, 2012.
7. David A Dornfeld, Green Manufacturing: Fundamentals and Applications, Springer, 2013.

REFERENCE BOOKS:

1. Athanasios V Alavanidis, ThomaisVlachogianni, *Green Chemistry and Green Engineering*, SynchronaThemata, 2012.
2. G.D. Rai, *Non-conventional Energy Sources*, Khanna Publishers, Delhi, Fifth Edition,2011.

3. Marty Poniatowski, *Foundation of Green Information Technology, Prentice Hall, 2009.*
4. R. K. Gautham, *Green Homes*, BS publications, 2009.

III B.Tech. - II Semester

(16BT70413) INTRODUCTION TO NANOSCIENCE AND NANOTECHNOLOGY

(Open Elective)

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:—

COURSE DESCRIPTION: Introduction to the concept ofnano;Description of nanomaterial;Nanostructure characterization tools;Classification of nanomaterials;Fabrication of nanomaterial;Different applications of nanostructures and nanomaterials.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge in
- Nanoscale technology.
- Difference between micro and nanotechnology
- Classification of Nanostructure and Nanomaterial
- Fabrication of various nanomaterials and nanostructures.

CO2. Analyze numerical and analytical problems in
- Nanomaterial size by using Scanning Electron Microscope and X-Ray diffraction

CO3. Design and fabricate devices based on nanostructures like
- Nano solar cell
- Nano cantilever
- Nano bio-sensor

CO4. Synthesize nano particle of different materials to solve the problems related to fabrication of nanostructures.

CO5. Select appropriate technique for fabrication ofnanostructures and Nano composites.

CO6. Apply ethical standards and legal issues while using chemical substances infabrication of new nanostructures.

DETAILED SYLLABUS:

UNIT-I: FUNDAMENTALS OF NANOTECHNOLOGY (8 Periods)

Introduction – Scientific revolutions, Time and length scale in structures, Definition of a nanosystem; Dimensionality and size dependent phenomena - Surface to volume ratio Fraction of surface atoms, Surface energy and surface stress, surface defects, Properties at nanoscale (optical, mechanical, electronic, and magnetic).

UNIT-II:IDENTIFICATION AND CHARACTERIZATION TOOLS FOR NANOMATERIALS AND NANOSTRUCTURE (10 Periods)

Field Emission Scanning Electron Microscopy (FESEM), Environmental Scanning ElectronMicroscopy (ESEM) High Resolution, Transmission Electron Microscope (HRTEM), Scanning Tunneling Microscope(STM), Surface enhanced Raman spectroscopy (SERS), Secondary Ion Mass Spectroscopy, Focused Ion Beam Photoelectron Spectroscopy, X-ray Photoelectron Spectroscopy (XPS), Auger electron spectroscopy (AES), Rutherford backscattering spectroscopy (RBS), X-Ray Diffraction, Intensities in X-Ray Scattering Particle Size Effect.

UNIT-III:CLASSIFICATION OF NANOMATERIALS (10 Periods)

Classification based on dimensionality, Quantum Dots,Wells and Wires-III-V Nanoparticles, Electronic Structure of Nanosemiconductor, Carbon based nanomaterials (buckyballs, nanotubes, graphene), Metal based nano materials (nanogold, nanosilver and metal oxides), Nanocomposites, Nanopolymers, Nanoglasses, Nano ceramics, Biological nanomaterials, Fulrene-discovery and early years,.

UNIT-IV: SOME FABRICATION TECHNIQUES OF NANOMATERIALS AND NANOSTRUCTURES (9 Periods)

Chemical Methods: Metal Nanocrystals by Reduction, Solvothermal Synthesis, Photochemical Synthesis,Sonochemical Routes, Chemical Vapor Deposition (CVD), Metal Oxide Chemical Vapor Deposition (MOCVD), Plasma Enhanced Chemical Vapour Deposition Technique(PECVD), Hydrothermal Method, Sol-Gel.

PhysicalMethods: Ball Milling, Electrodeposition, Spray Pyrolysis, Flame Pyrolysis, DC/RF Magnetron Sputtering, Molecular Beam Epitaxy (MBE) Thermal Evaporation Method.

UNIT-V:APPLICATIONS (8 Periods)

Solar energy harvesting, Catalysis,Molecular electronics and printed electronics Nanoelectronics, Polymers with aspecial architecture, Liquid crystalline systems, Linear and nonlinear optical and electro-optical properties, Applications in displays and other devices, Nanomaterials for data storage, Photonics, Plasmonics, Chemical and biosensors, Nanomedicine and Nanobiotechnology, MESFET.

Total Periods: 45

TEXT BOOKS:

1. Pradeep T., *A Textbook of Nanoscience and Nanotechnology*, Tata McGraw Hill Education Pvt. Ltd., 2012.
2. Hari Singh Nalwa, *Nanostructured Materials and Nanotechnology*, Academic Press, 2002.

REFERENCE BOOKS:

1. Nabok A., *Organic and Inorganic Nanostructures*, Artech House, 2005.
2. Dupas C., Houdy P., Lahmani M*, Nanoscience: Nanotechnologies and Nanophysics*, Springer - Verlag Berlin Heidelberg, 2007.

3. S.M. Sze, Physics of Semiconductor Devices, Second Edition, 2001.

III B.Tech. - II Semester

(16BT60505) ENGINEERING SYSTEM ANALYSIS AND DESIGN

(Open Elective)

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:—

COURSE DESCRIPTION: Systems Process; Technologies for Systems; System Development Life Cycle; System Analysis and Modeling; Levels of Management; Project Management; Systems Implementation and Importance of UML Prototyping; Maintaining and Managing the Systems Output Process.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge in
- Systems Process and System Design
- Systems Analysis and Modeling
- System Development Life Cycle
- Design Management and Maintenance Tools.

CO2. Analyzesystem Process and estimate the given models by using case tools.

CO3. Design and develop a model to the organizational systems.

CO4. Solve complex problems related to engineering systems and produce accurate results

CO5. Apply object oriented techniques for modeling dynamic systems.

CO6. Contribute towards societal issues and responsibilities in designing, modeling and developing of organizational systems.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION (9 Periods)

Systems, Types of systems, Integrating technologies for systems, Need for system analysis and design, Role of the systems analyst, System development life cycle, CASE tools for analysis and design.

UNIT-II: ANALYSIS AND MODELING ORGANIZATIONAL SYSTEM (9 Periods)

Organization as system, System analysis, Depicting systems graphically, Use case modeling, Levels of management, Organizational culture.

UNIT-III: PROJECT MANAGEMENT (10 periods)

Project initiation, Problem in organization, Determining feasibilities, Ascertaining hardware and software needs, Identifying, Forecasting, Comparing costs and benefits, Activity planning and control, Managing the project.

UNIT-IV: OBJECT ORIENTED ANALYSIS AND DESIGN USING UML (8 Periods)

Introduction, Object modeling, Dynamic modeling, functional modeling, packages and other UML artifacts, the importance of using UML for modeling.

UNIT-V: DESIGNING EFFECTIVE OUTPUT (9 Periods)

Output design objectives, Relating output content to output method, Realizing how output bias affects users, Designing output for display, Case studies-Designing a web site management, Online exam management, Online portal design.

Total Periods:45

TEXT BOOK:

1. Kenneth E. Kendall and Julie E. Kendall,*System Analysis and Design*, Pearson Education, Ninth Edition, 2011.

REFERENCE BOOKS:

1. Dennis, Wixom and Roth,*Systems Analysis and Design*, John Wiley, Fifth Edition, 2012.
2. Shelly and Rosenblatt,*Systems Analysis and Design*, Cengage Learning, Ninth Edition, 2012.

III B.Tech.- II Semester

(16BT71011) **MICRO-ELECTRO-MECHANICAL SYSTEMS**

(Open Elective)

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:—

COURSE DESCRIPTION: Overview of Micro Electro Mechanical Systems (MEMS); scaling laws; working principles of microsensors and microactuators; materials; microfabrication processes; packaging of Microsystems.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on MEMS devices, scaling laws, microsensors and microactuators

CO2. Analyze the properties of materials and identify its suitability for MEMS devices.

CO3. Design MEMS devices that meet desired specifications and requirements.

CO4. Analyze and synthesize the information to provide effective solution to engineering problems with MEMS devices.

CO5. Use modern techniques in micro manufacturing process.

CO6. Develop efficient and cost effective MEMS based products for society.

DETAILED SYLLABUS:

UNIT-I: OVERVIEW OF MEMS AND SCALING LAWS **(9 periods)**

MEMS and Microsystems, Microsystems and microelectronics, miniaturization, applications of MEMS in the automotive industry and in other industries.

Scaling laws of miniaturization: Introduction to scaling, scaling in: geometry, rigid- body dynamics, electrostatic forces, electromagnetic forces, Electricity, Fluid mechanics, Heat transfer.

UNIT-II: **WORKING PRINCIPLES OF MICROSYSTEMS** **(9 periods)**

Microsensors,acoustic wave sensors, biomedical and biosensors, chemical sensors, pressure sensors, thermal sensors. Microactuation: actuation using thermal forces, shape-memory alloys, piezoelectric crystals, electrostatic forces. MEMS with microactuators, microgrippers, micromotors, microvalves, micropumps.Microaccelerometers, microfludics.

UNIT-III:MATERIALS FOR MEMS AND MICROSYSTEMS **(9 periods)**

Substrate and wafers, silicon as a substrate material, silicon compounds, silicon piezoresistors, gallium arsenide, quartz, piezoelectric crystals, polymers, carbon nano tube (CNT), development of CNTs, application of CNTs.

UNIT-IV: MEMS FABRICATION PROCESS AND MICROMANUFACTURING **(9 periods)**

Photolithography, ion implantation, diffusion, oxidation, chemical vapor deposition, physical vapor deposition, deposition by epitaxy, etching, bulk micromanufacturing, surface micromanufacturing, LIGA process.

UNIT-V: MEMS PACKAGING **(9 periods)**

Introduction to microsystem packaging, objectives and general considerations in packaging design, three levels of microsystem packaging, interfaces in microsystem packaging, packaging technologies, three-dimensional packaging, selection of packaging materials, signal mapping and transduction, Design case: Pressure sensor packaging.

Total Periods: 45

TEXT BOOK:

1. Tai-Ran Hsu, *MEMS & Microsystems, Design and Manufacture*, McGraw Hill Education (India) Pvt. Ltd., 2002.

REFERENCES BOOKS:

1. G.K.Ananthasuresh, K.J.Vinoy,*Micro and Smart Systems*, Wiley India, 2010.

2. NitaigourPremchand Mahalik, *MEMS*, McGraw Hill Education (India) Pvt. Ltd., 2007.

III B.Tech. – II Semester

(16BT61205) CYBER SECURITY AND LAWS

(Open Elective)

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:—

COURSE DESCRIPTION:

Cyber Crimes and Indian IT Act; Cyber Offenses; Tools and Methods used in Cyber Crime; Phishing ad Identity Theft; Indian and Global Perspective on Cyber Crimes and Cyber Security; Organizational Implications on Cyber Security; IPR Issues; Cyber Crime and Terrorism; Cyber Crime Illustrations

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge in Cyber security, Cybercrimes and its related laws in Indian and Global Act.

CO2. Analyze the legal perspectives and laws related to cybercrimes in Indian context.

CO3. Apply security and privacy methods in development of modern applications and in organizations to protect people and to prevent cybercrimes.

CO4. Solve Cyber security issues using privacy policies.

CO5. Use antivirus tools to minimize the impact of cyber threats.

CO6. Follow security standards for the implementation of Cyber Security and laws.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO CYBER CRIMES AND OFFENSES (9 Periods)

Cyber Crimes: Introduction, Definition, Origin, Cybercrime and information security, Cyber criminals, Classifications of cybercrimes, The legal perspectives and Indian perspective, Cybercrime and Indian ITA 2000, Global perspective on cybercrimes.

Cyber Offenses: Introduction, Criminals planning on attacks, Social engineering, Cyber stalking, Cyber cafe and crimes, Botnets.

UNIT-II: TOOLS AND METHODS USED IN CYBER CRIME AND PHISHING AND IDENTITY THEFT (9 Periods)

Introduction, Proxy servers and Anonymizers, Phishing, Password cracking, Key loggers and Spywares, Virus, Worms and Ransomware, Trojan horses and Backdoors, Steganography, DoS and DDoS attacks.

Phishing and Identity Theft: Introduction, Phishing, Identity Theft (ID Theft).

UNIT-III: CYBER CRIMES AND CYBER SECURITY-LEGAL PERSPECTIVES (8 Periods)

Introduction, Cyber laws in Indian context, The Indian IT act, Challenges to Indian law and Cybercrime scenario in India, Consequences of not addressing the weakness in IT act, Digital signatures and the Indian IT Act, Cyber Crime and Punishment, Cyber law, Technology and Students in India scenario.

UNIT-IV: CYBER SECURITY-ORGANIZATIONAL IMPLICATIONS (10 Periods)

Introduction, Web threats for organizations – evils and perils, Security and privacy implications from cloud computing, Social Media Marketing-Security risks and Perils for organizations, Social computing and associated challenges for organizations, Protecting people's privacy in organization, Organizational guidelines for internet usage, Safe computing and Usage policy, Incident handling and Best practices.

UNIT-V: CYBER CRIME AND TERRORISMAND ILLUSTRATIONS (9 Periods)

Cyber Crime & Terrorism: Introduction, Intellectual property in the cyber space, The ethical dimension of cybercrimes, The psychology, Mindset and skills of hackers and cyber criminals, Sociology of cyber criminals, Information warfare.

Cyber Crime Illustrations: Indian banks lose millions of rupees, Justice vs. Justice, Parliament attack, The Indian case of online gambling, Bank and credit card related frauds, Purchasing goods and services scam, Nigerian 419 scam.

Total Periods: 45

TEXT BOOK:

1. Nina Gobole and SunitBelapure, *Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives,* Wiley India, 2011.

REFERENCE BOOK:

1. Prashant Mali, *Cyber Law and Cyber Crimes,* Snow White Publications Pvt. Ltd., 2013.

III B.Tech. - II Semester

(16BT61505) BIO-INFORMATICS

(Open Elective)

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION:
Introduction to Bioinformatics; Biology and Information; Sequence alignment and dynamic programming; Biological Database; Homology Modeling; Structure Prediction; Molecular Dynamics.

COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on concepts of biological databases, Genome and proteome.
CO2. Analyze biological sequences for Homology Modeling.
CO3. Apply clustering methods for Phylogenetic trees.
CO4. Solve bio sequencing problems using dynamic programming.
CO5. Select and apply appropriate techniques and tools to structure Prediction.

DETAILED SYLLABUS:
UNIT-I: NUCLEIC ACIDS, PROTEINS AND AMINO ACIDS (8 periods)
Bioinformatics - Definition, Nucleic acid structure, Protein structure, the central dogma, Physico-chemical properties of the amino acids and their importance in protein folding, Polymerase chain reaction (PCR)

UNIT-II: INFORMATION RESOURCES FOR GENES AND PROTEIN (10 periods)
Database file formats, Nucleic acid sequence databases, Protein sequence databases.
Sequence Alignment Algorithm
Pair wise sequence alignment – The problem, Pair wise sequence alignment – Dynamic programming methods, The effect of scoring parameters on the alignment, Multiple sequence alignment.

UNIT-III: PREDICTION OF THE THREE-DIMENSIONAL STRUCTURE OF A PROTEIN AND HOMOLOGY MODELING (9 Periods)
Secondary Structure Prediction, Basic Principles, The Steps of Comparative Modeling, Accuracy of Homology Models, Manual versus Automatic Models, SNPs, Motifs**.**

UNIT-IV: PHYLOGENETIC METHODS (10 periods)
Phylogenetic trees, choosing sequences, Distance matrices and clustering methods, Calculation of distances in the neighbor-joining method, Bootstrapping, Tree optimization criteria and tree search methods, The maximum-likelihood criterion, Calculating the likelihood of the data on a given tree, The parsimony criterion.

UNIT-V: NEW FOLD MODELING (8 periods)
Estimating the Energy of a Protein Conformation, Energy Minimization, Molecular Dynamics, The "Omics" Universe-Transcriptomics, Proteomics, Interactomics, Structural Genomics, Pharmacogenomics.

Total Periods:45

TEXTBOOKS:

1. Paul G. Higgs and Teresa K. Attwood, *Bioinformatics and Molecular Evolution* Blackwell Publishing, 2005.
2. Anna Tramontano, *Introduction to Bioinformatics* Chapman and Hall/CRC, 2006.

REFERENCE BOOKS:

1. Hooman H. Rashidi and Lukas K. Buehler, *Bioinformatics Basics, Applications in Biological Science and Medicine*, CRC Press, Taylor & Francis Group, Second Edition, 2005.
2. Rastogi S. C., NamitaMendiratta and ParagRastogi, *Bioinformatics: Methodsand Applications: Genomics, Proteomics and Drug Discovery*, PHI Learning Pvt. Ltd., Third Edition, 2011.

III B.Tech. - II semester

(16BT61231) CLOUD COMPUTING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on "Cloud Computing".

COURSE DESCRIPTION: Hands-on experience on creating virtual machines on Windows and Linux platforms; Development of service based web applications and their deployment.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate hands-on experience on Virtualization models and Cloud Environment.
CO2. Analyze the given experiment and relate to existing cloud architectures.
CO3. Apply API development skills in web applications for cloud deployment.
CO4. Demonstrate independent problem solving skills in developing dynamic web applications.
CO5. Use advanced programming languages to access cloud services.
CO6. Build suitable cloud environment for societal requirements.
CO7. Work effectively as an individual and as a member in team for mini-project implementation.
CO8. Demonstrate communication skills, both oral and written for preparing and presenting reports.

LIST OF EXPERIMENTS:

1. Create VM's with given set of configuration on Hyper-V Ubuntu 14LTs files with 2GB RAM and 200GB Hard Disk through Infrastructure Services (IaaS).
2. Create Virtualization on VMware Windows 7 OS with 4GB RAM and 500GB Hard Disk" through Infrastructure as a Service (IaaS).
3. Develop a simple web application for student details and operative using Salesforce.com in Cloud Platform under Software as Service (SaaS).
4. Develop a simple web application for personal Homepage, Attributes, Controllers, GUI, Visual Page, Forms, and Templates under Software as Service (SaaS).
5. Develop a web application for performing calculator operations. Deploy this application on Salesforce.com Cloud Platform under Software as Service (SaaS).
6. Develop a web application on IBM Bluemix Cloud Platform for executing application using Eclipse under Platform as a Service.
7. Create virtual machine instance with given set of configuration on Amazon web Services (AWS) under Infrastructure as a Service (IaaS).
8. Create virtual machine instance with set of configuration on Amazon S3 (Simple Storage Service) in Amazon Web Service (AWS) under Infrastructure as a Service (IaaS).
9. Develop a web application on IBM Bluemix Cloud Platform for implementing IoT application.
10. Develop a calculator web based application on MS-Azure Platform i.e. Platform as a Service (PaaS).
11. Develop a student home page web based application on MS-Azure Platform i.e. Platform as a Service (PaaS) Cloud.
12. Develop a mobile app on Google App Engine for uploading a resume into a website, collaborated with Drop box. The resume should be encrypted. (PaaS)
13. Develop a service call to run on Drop box resumes for picking the resumes of given skill set. (PaaS)

i. 6+ years of Exp in Java Development.
ii. 10 years of experience in Automation Testing.
iii. 15+ years of Managerial experience with technical background.
iv. 5-7 years of on-site experience in .NET support and programming.

REFERENCE BOOKS:

1. Barrie Sosinsky, *Cloud Computing Bible,* Wiley India Pvt Ltd, 2011.
2. Rajkumar Buyya, James Broberg and Andrzej Goscinski, *Cloud computing principles and paradigms,* John Wiley and Sons, 2011.
3. Thomas Erl and RicardoPuttini, *Cloud Computing- Concepts,* Technology and Architecture, Pearson, 2013.
4. John W. Rittinghouse and James F. Ransome, Cloud *Computing implementation, Management and Security,* CRC Press, Taylor and Francis group, 2010.

III B.Tech. - II semester

(16BT61232) KNOWLEDGE ENGINEERING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on "Data Warehousing and Data Mining".

COURSE DESCRIPTION: Hands-on experience on Data preprocessing techniques; Mining frequent patterns; classification and clustering techniques using Weka and R Studio tools.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on: preprocessing techniques, Descriptive and predictive mining tasks.
CO2. Identify suitable algorithms to mine knowledge from real-time databases.
CO3. Classify and predict the information for forecasting applications.
CO4. Demonstrate independent decision making skills for business analysis applications.
CO5. Apply Weka and R tools to extract interesting patterns from large databases.
CO6. Prepare analytical reports suitable for societal requirements.
CO7. Work effectively as an individual and member of a team to implement mini-project.
CO8. Demonstrate communication skills, both oral and written for preparing and presenting reports.

LIST OF EXPERIMENTS:

I. Experiments on Weka:

1. Create a dataset using ARFF and CSV formats and load into the Weka Explorer.
2. Perform the following preprocessing filters on 'Weather' dataset.
   (i) Add (ii) Remove (iii) Discretize
   (iv) Replace Missing values (v) Normalize
3. List all the categorical attributes and the real-valued attributes separately in 'German credit' data set.
4. Generate strong Association rules by using Apriori algorithm on 'German_credit' dataset with Min_Sup=60% and Min_Conf=80%.
5. (i) Implement the Classification using Decision Tree algorithm on 'Weather' dataset. Draw the confusion matrix and report the model with accuracy.
   (ii) Implement Bayesian Classification and analyze the results on 'iris' Dataset.
6. (i) Implement Simple Linear Regression on an 'Employee' dataset.
   (ii) Demonstrate the simple k-Means clustering algorithm on 'iris' dataset.
7. (i) Rank the performance of j48, PART and oneR Algorithms on 'Weather' dataset using Experimenter.
   (ii) Perform an experiment using 'Knowledge Flow' in Weka 3.8.1 tool.

II. Experiments using R Studio

8. Create an EMP Dataset in R studio and perform the following functions
   (i) Display the EMP dataset with all rows and columns
   (ii) Perform few manipulations and display the updated dataset
9. Perform an exploratory data analysis using R Studio.
10. (i) Perform Association rule mining by using Apriori Algorithm on Sales Dataset.
    (ii) Train the Decision Tree on 'Weather' Dataset and report the Decision Tree and cross-validation results. Convert the Decision Trees into "if-then-else rules".
11. Implement simple linear regression using R Studio.
12. Mini-project: Implement all data mining functionalities on the following real datasets after performing data preprocessing filters.
    (i) Supermarket (ii) Weather (iii) Airlines (iv) Breast Cancer (v) Forest fires

REFERENCE BOOKS:

1. Ian. H. Witten and Eibe Frank, *Data Mining: Practical Machine Learning Tools and Techniques,* Elsevier Publication, Second Edition, 2005.
2. Joseph Adler, *R in a Nutshell,* O'Reily Publishers, 2010.
3. Pang-Ning Tan, Vipin Kumar and Michael Steinbach, *Introduction to Data Mining,* Pearson Education, 2006.

4. Jiawei Han and Micheline Kamber, *Data Mining: Concepts and Techniques,* Morgan Kaufmann Publishers, Second Edition, 2006.

III B.Tech. - II semester
(16BT61233) **SEMINAR**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
	100	100	-	-	-	2

PRE-REQUISITES: All the courses of the program up to III B. Tech. – I Semester.

COURSE DESCRIPTION: Identification of topic for the seminar; Literature survey; Performing critical study and analysis of the topic identified; Preparation of report and presentation.

COURSE OUTCOMES:

Completion of the seminar work enables a successful student to demonstrate:

CO1. Demonstrate in-depth knowledge on the seminar topic.

CO2. Analyze critically, the concepts relevant to the seminar topic.

CO3. Understand methodology relevant to seminar topic.

CO4. Undertake investigation of issues related to seminar topic providing valid conclusions.

CO5. Use techniques and tools to consolidate the solutions relevant to the seminar topic.

CO6. Comprehend societal issues in the context of seminar topic.

CO7. Understand ethical issues in the context of seminar topic.

CO8. Function effectively as individual on the chosen seminar topic.

CO9. Develop communication skills, both in oral and written form, for preparing and presenting seminar report.

CO10. Engage in lifelong learning to improve knowledge and competence in the chosen area of seminar.

IV B.Tech. - I semester

(16BT5HS01) MANAGEMENT SCIENCE

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Concepts of Management; Environmental Scanning; Concepts Related to Organization; Operations Management; Work Study; Statistical Quality Control; Inventory Management; Marketing; Human Resource Management; Project Management; Project Crashing; Entrepreneurship; Contemporary Management Practices.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1: Demonstrate the concepts of operations management, human resources management, project management and contemporary management practices in managerial context.

CO2: Identify and analyse management problems in the business organizations reaching substantiated conclusions using principles of management.

CO3: Design appropriate organization structure for meeting the needs of the organization with consideration of the employees of the organization.

CO4: Competently employ broad based analytical tools for decision making, system design, analysis and performance.

CO5: Provide solution to organizations for sustainable development.

CO6: Apply knowledge of engineering and management principles to manage the projects in multidisciplinary environments.

DETAILED SYLLABUS:

UNIT- I: INTRODUCTION TO MANAGEMENT AND ORGANIZATION (9 Periods)

Concepts of management and Administration, Nature and Importance of management, Evolution of management thought, Functions of management, Contributions of F.W. Taylor and Henry Fayol to the management, Systems approach to management, Managerial skills, Elements of corporate planning process, Environmental scanning, SWOT Analysis, Social responsibilities of management.

Basic concepts related to organization, Objectives and Principles, Types of organizations- Line Organization, Line and Staff Organization, Functional Organization, Matrix Organization, Network organization.

UNIT- II: OPERATIONS MANAGEMENT (12 Periods)

Plant location- Factors and Principles; Plant Layout- Principles and Types; Methods of production, Work study- Basic procedure involved in method study and work measurement; Statistical Quality Control- Factors affecting quality, Control charts for variables and attributes, Acceptance sampling; Materials management- objectives, Inventory- Types of inventory, Classical EOQ model, ABC analysis; Purchase procedure, Stores management, Marketing- Functions, Channels of distribution.

UNIT-III: HUMAN RESOURCE MANAGEMENT (HRM) (6 Periods)

Nature and scope of HRM, Functions of HRM, Role of HR Manager in an organization, Job evaluation, Merit rating, Maslow's hierarchy of human needs, McGregor's theory X and theory Y, Herzberg's two-factor theory of motivation.

UNIT-IV: PROJECT MANAGEMENT (PERT/CPM) AND ENTREPRENEURSHIP (9 Periods)

Network analysis - Critical path method (CPM), Program evaluation and review technique (PERT); Project cost analysis - Project crashing.

Introduction to Entrepreneurship, Entrepreneurial Traits, Entrepreneur vs Manager, Role of Entrepreneurship in Economic Development, Women as an Entrepreneur.

UNIT-V: CONTEMPORARY MANAGEMENT PRACTICES (9 Periods)

Basic concepts of Material Requirements Planning, Enterprise resource planning (ERP), Just In Time (JIT) system, Total Quality Management (TQM), Value Chain Analysis, Business Process Outsourcing (BPO), Globalization, Management Challenges, Supply Chain Management (SCM), Role of Information Technology in managerial decision making, Six Sigma Concept, Maintenance Strategies- Preventive, Periodic and Breakdown Maintenance.

Total Periods: 45

TEXT BOOK:

1. O.P. Khanna, Industrial Engineering and Management, Dhanpat Rai and Sons, 2010.
2. Martand T.Telsang, Industrial Engineering and Production Management, S. Chand, Second Edition, 2006.

REFERENCE BOOKS:

1. Koontz and Weihrich, Essentials of Management, TMH, Sixth Edition, New Delhi, 2007.
2. N.D. Vohra, Quantitative Techniques in Management, TMH, Second Edition, New Delhi.

IV B.Tech. - I semester

(16BT71201) BIG DATA TECHNOLOGIES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Data Warehousing and Data Mining".

COURSE DESCRIPTION: Introduction to Big Data, Hadoop; Hadoop Distributed File Systems; Hadoop I/O; MapReduce; Hive; Pig; HBase; Zookeeper; Sqoop and Case studies.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on Big Data characteristics, storage, processing, querying and reporting.

CO2. Analyze large dataset issues and solve using data analytic techniques.

CO3. Design and Develop classification and clustering models for dataset analysis.

CO4. Use research knowledge to manage large datasets.

CO5. Apply MapReduce, Hive, Pig, Sqoop, HBase, and Zookeeper tools for data analytics.

CO6. Use data analytics tools to solve societal problems.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO BIG DATA AND HADOOP (9 Periods)

Introduction to Big Data: Evolution and definition of Big Data, Structure of Big Data, Characteristics, Advantages, Applications and Tools.

Hadoop: Data storage and analysis, Comparison with other systems, History of Hadoop, Apache Hadoop and the Hadoop ecosystem, Hadoop releases.

UNIT-II: HADOOP DISTRIBUTED FILE SYSTEM AND HADOOP I/O (9 Periods)

Hadoop Distributed File system: HDFS concepts, Command-Line Interface, Hadoop file systems, Java interface, Data flow, Hadoop archives.

Hadoop I/O: Data integrity, Compression, Serialization, File-based data structures.

UNIT-III: MAPREDUCE, TYPES and FORMATS AND FEATURES (9 Periods)

MapReduce: Analyzing the data with Hadoop, Scaling out, Hadoop streaming, Hadoop pipes.

Types and Formats: MapReduce types, Input formats, Output formats.

Features: Counters, Sorting, Joins, Side data distribution and MapReduce library classes.

UNIT-IV: HIVE, PIG AND HBASE (9 Periods)

Hive: Comparison with traditional databases, HiveQL, Tables, Querying data, and User-defined functions.

Pig: Comparison with databases, Pig latin, User-defined functions, Data processing operators.

HBase: HBasics, Concepts, Clients, HBase vs. RDBMS, Praxis.

UNIT-V: ZOOKEEPER, SQOOP AND CASE STUDIES (9 Periods)

Zookeeper: Zookeeper service, Building applications with Zookeeper, Zookeeper in production.

Sqoop: Database imports, Working with imported data, Importing large objects, Performing an export.

Case Studies: Mahout, Healthcare, Facebook and Twitter.

Total Periods: 45

TEXT BOOK:

1. Tom White, *Hadoop: The Definitive Guide,* O'REILLY Publications, Third Edition, 2012.
2. Anil Maheswari, *Big Data,* Tata McGraw Hill, 2017.

REFERENCE BOOKS:

1. Bart Baesens, *Analytics in a Big Data World: The Essential Guide to Data Science and its Applications,* Wiley Publications, 2014.
2. Paul Zikopoulos, IBM, *Chris Eaton and Paul Zikopoulos, Understanding Big Data: Analytics for Enterprise Class Hadoop and streaming Data,* The McGraw-Hill Companies, 2012.
3. Chuck Lam, *Hadoop in action,* Manning Publications, 2011.

IV B.Tech. - I semester

(16BT71202) MOBILE APPLICATION DEVELOPMENT

(Common to IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on "Java Programming" and "Web Technologies".

COURSE DESCRIPTION: Mobile platforms; Mobile User Interface and tools; Introduction to Android; Activities; Views; Menus; Database Storage; SMS; e-mail; Displaying Maps; Building a Location Tracker Web Services Using HTTP; Sockets Programming; Communication between a Service and an Activity; Introduction to iOS.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Mobile platforms and Mobile User Interface
- Android Activities and Intents
- Messaging, Networking, Location based Services, Android Services
- Basics of iOS

CO2. Analyze the context of complex problems and identify user interface design requirements.
CO3. Design and develop solutions for real world problems with android mobile applications.
CO4. Demonstrate problem solving skills to create applications for mobile devices.
CO5. Apply Android studio and iOS tools to develop mobile applications.
CO6. Create mobile applications as per societal needs.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION AND MOBILE USER INTERFACE DESIGN (8 Periods)

Mobile web presence, Mobile applications, Marketing, App as a mobile web app; User interface design - Effective use of screen real estate, Mobile application users, Mobile information design, Mobile platforms, Tools of mobile interface design.

Android versions, Features and architecture, Required tools, Android application launching.

UNIT - II: ACTIVITIES, INTENTS AND ANDROID USER INTERFACE (9 Periods)

Activities, Linking activities using intents, Displaying notifications, Components of a screen, Adapting to display orientation, Managing changes to screen orientation, Utilizing the action bar, Listening for UI notifications.

UNIT - III: ADVANCED USER INTERFACE AND DATA PERSISTENCE (10 Periods)

Basic views, Picker views, List view, Image view, Menus with views, Web view, Saving and loading user preferences, Persisting data to files, Creating and using databases.

UNIT - IV: MESSAGING, LOCATION-BASED SERVICES, AND NETWORKING (9 Periods)

SMS messaging, Sending e-mail, Displaying maps, Getting location data, Monitoring a location, Consuming web services using HTTP.

UNIT - V: ANDROID SERVICES AND IOS (9 Periods)

Services, Communication between a service and an activity, Binding activities to services, Threading.

iOS tools, iOS project, Debugging iOS apps, Objective-C basics, Hello world app, Building the derby app in iOS.

Total Periods: 45

TEXT BOOKS:

1. J. F. DiMarzio, Beginning Android Programming with Android Studio, Wiley India, Fourth Edition, 2017.
2. Jeff McWherter and Scott Gowell, Professional Mobile Application Development, Wiley India, 2012.

REFERENCE BOOKS:

1. Neils Smyth, Android Studio Development Essentials, Creative Space Independent publishing platform, Seventh Edition, 2016.
2. Paul Deital and Harvey Deital, Android How to Program, Detial associates publishers, 2013.

IV B.Tech. - I semester

(16BT71203) INFORMATION RETRIEVAL SYSTEMS

(Program Elective - 2)

(Common to CSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on "Data Structures" and "Database Management Systems".

COURSE DESCRIPTION: Architecture of Information Retrieval Systems; Functional Capabilities; Data Structures; Mathematical Algorithms; Indexing; Similarity and Clustering; Human Perception and Presentation; Text Search Techniques and Evaluation Measures.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Information Retrieval System Architecture
- Functional capabilities
- Indexing and data presentation methods.
- Evaluation measures of Information Retrieval Systems.

CO2. Analyze indexing methods and clustering algorithms to group similar data items for efficient search.

CO3. Design and develop data structures used to store and retrieve data items.

CO4. Demonstrate problem solving skills in the usage of mathematical algorithms for information retrieval.

CO5. Use text search algorithms and collaborative filtering techniques for information retrieval and visualization methods for information presentation.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION (9 Periods)

Primary information retrieval problems, Objectives of information retrieval system, Functional overview, Understanding the search functions, Relationship to DBMS, Digital libraries and data warehouses, Data structures and mathematical algorithms.

UNIT II: INGEST AND INDEXING (9 Periods)

Ingest: Introduction, Item receipt, Duplicate detection, Item normalization, Zoning and creation of processing tokens, Stemming, Entity processing, Categorization, Citational metadata.

Indexing: Manual indexing process, Automatic indexing of text and multimedia.

UNIT III: SEARCH AND CLUSTERING (12 Periods)

Search: Similarity measures and ranking, Hidden markov models, Ranking algorithms, Relevance feedback, Selective dissemination of information search, Weighted searches for boolean systems, Multimedia searching.

Clustering: Introduction to clustering, Thesaurus generation, Item clustering, Hierarchy of clusters.

UNIT IV: INFORMATION PRESENTATION (7 Periods)

Introduction, Presentation of the hits, Display of the item, Collaborative filtering, Multimedia presentation, Human perception and presentation.

UNIT V: SEARCH ARCHITECTURE AND EVALUATION (8 Periods)

Search Architecture: Index search optimization, Text search optimization, GOOGLE Scalable multiprocessor architecture.

Evaluation: Information system evaluation, Measures used in system evaluation.

Total Periods: 45

TEXT BOOK:

1. Gerald Kowalski, *Information Retrieval Architecture and Algorithms,* Springer, 2013.

REFERENCE BOOKS:

1. Christopher D. Manning, Prabhakar Raghavan and Hinrich Schütze, *An Introduction to Information Retrieval,* Cambridge University Press, 2012.
2. Ricardo Baeza-Yates and Berthier Ribiero-Neto, *Modern Information Retrieval the Concepts and Technology behind Search,* Addison Wesley, Second Edition, 2010.

IV B.Tech. - I semester

(16BT71204) MOBILE COMPUTING

(Program Elective - 2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Computer Networks".

COURSE DESCRIPTION: Introduction to Mobile Computing, GSM; Medium Access Control, Wireless LAN; Mobile Network and Transport Layers; Data Dissemination; Mobile Ad-Hoc Networks (MANETs), Wireless Application Protocol (WAP).

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- GSM, GPRS, 3G, 4G, Wireless LAN, MANETs.
- Protocols in Data Link, Network, Transport and Application layer.

CO2. Analyze the issues related to database design and data retrieval in mobile applications.

CO3. Apply routing algorithms for finding shortest path in MANETs.

CO4. Use protocols of Wireless Technologies for security implementation in mobile computing.

CO5. Follow standards in the usage of mobile communications.

DETAILED SYLLABUS:

UNIT-I: OVERVIEW OF MOBILE COMPUTING AND GSM (9 Periods)

Introduction: Introduction to mobile computing, Novel applications, Limitations, and Mobile computing architecture.

GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services, Introduction to 3G and 4G Communications Standards: WCDMA, LTE, WiMAX

UNIT-II: MEDIUM ACCESS CONTROL AND WIRELESS LAN (9 Periods)

Medium Access Control: Motivation for a specialized MAC - Hidden and exposed terminals, Near and far terminals, SDMA, FDMA, TDMA, CDMA.

Wireless LAN: IEEE 802.11 - System architecture, Protocol architecture, Physical layer, Medium access control layer, MAC management; Bluetooth - User scenarios, Architecture, Radio layer, Baseband layer, Link manager protocol, L2CAP, Security.

UNIT-III: MOBILE NETWORK AND TRANSPORT LAYERS (9 Periods)

Mobile IP: Goals, Assumptions, Entities and terminology, IP packet delivery, Tunneling and encapsulation, Optimizations; IPv6; Dynamic Host Configuration Protocol (DHCP).

Mobile Transport Layer: Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/ fast recovery, Transmission/ time-out freezing, Selective retransmission, Transaction oriented TCP; TCP over 2.5G/3G wireless networks.

UNIT-IV: DATABASE ISSUES AND DATA DISSEMINATION (9 Periods)

Database Issues: Hoarding techniques, Caching invalidation mechanisms, Client server computing with adaptation, Power-aware and context aware computing, Database transactional models, Query processing and recovery.

Data Dissemination: Communications asymmetry, Classification of data delivery mechanisms, Push-based mechanisms, Pull-based mechanisms, Hybrid mechanisms, Selective tuning (indexing) techniques.

UNIT-V: MOBILE AD HOC NETWORKS (MANETs) AND WAP (9 Periods)

Mobile Ad Hoc Networks: Properties of a MANET, Spectrum of MANET, Applications, routing and routing algorithms, Security in MANETs.

Wireless Application Protocol: Architecture, Wireless datagram protocol, Wireless transport layer security, Wireless transaction protocol, Wireless session protocol, Wireless application environment.

Total Periods: 45

TEXT BOOKS:

1. Rajkamal, *Mobile Computing,* OXFORD University Press, Second Edition, 2012.
2. Jochen Schiller, *Mobile Communications,* Pearson Education, Second Edition, 2009.

REFERENCE BOOKS:

1. Gordon A. Gow and Richard K. Smith, *Mobile and Wireless Communication,* Mc Graw Hill, 2006.
2. Hansmann, Merk, Nicklous and Stober, *Principles of Mobile Computing,* Springer, Second Edition, 2003.

IV B.Tech. - I semester

(16BT71505) NETWORK PROGRAMMING

(Program Elective - 2)

(Common to IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Computer Networks".

COURSE DESCRIPTION: OSI model, Unix standards; Normal startup, terminate and signal handling server process termination; lost datagram, summary of UDP example, Lack of flow control with UDP; Function and IPV6 support, uname function ,IPv4 Client- IPv6 Server ;FIFO's, streams and messages, RPC.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on concepts of sockets, inter process communication and remote login.

CO2. Identify appropriate TCP Echo server functions and Socket options used in Network based systems.

CO3. Analyze networking protocols such as TCP and UDP for connection establishment between client and server.

CO4. Design appropriate solutions for network applications based on UNIX.

CO5. Apply modern tools to create cooperating processes in network based Systems.

CO6. Relate suitable ethical principles to design and develop applications related to Network Traffic Monitoring.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO NETWORK PROGRAMMING AND SOCKETS (9 Periods)

OSI model, Unix standards, TCP and UDP and TCP connection establishment and Format, Buffer sizes and limitation, standard internet services, Protocol usage by common internet application, Address structures, Value Result Arguments, Byte ordering and manipulation function and related functions.

Elementary TCP sockets: Socket, connect, bind, listen, accept, fork and exec function, concurrent servers, Close function.

UNIT-II: TCP CLIENT SERVER AND SOCKET OPTIONS (9 Periods)

TCP Echo server functions, Normal startup, terminate and signal handling, Server process termination, Crashing and Rebooting of server host, Shutdown of server host.

Socket Options:I/O Models, select function, Batch input, shutdown function, poll function, getsockopt and setsockopt functions, Socket states, Generic socket option, IPV6 socket options.

UNIT-III: ELEMENTARY UDP SOCKETS (8 Periods)

Introduction, UDP Echo server functions, UDP Echo client functions, lost datagram, summary of UDP example, Lack of flow control with UDP, Determining outgoing interface with UDP.

UNIT IV: DOMAIN NAME SERVER AND IPv4 AND IPv6 INTEROPERABILITY (9 Periods)

DNS, gethostbyName function, gethostbyAddr Function, Resolver option, Function and IPv6 support, uname function and other networking Information.

IPv4 and IPv6 Interoperability: Introduction, IPv4 Client- IPv6 Server, IPv6 Client-IPv4 Server, IPv6 Address-Testing Macros, Source Code Portability.

UNIT-V: INTERPROCESS COMMUNICATION AND REMOTE LOGIN (11 Periods)

Introduction, Pipes, popen and pclose functions, FIFO's, streams and messages, System V IPC: IPC_Perm Structure, IPC Permissions, Creating and Opening IPC Channels, Message queues (msgget, msgsnd, msgrcv, msgctl Functions), Shared Memory (shmget, shmat, shmdt, shmctlFunctions).

Remote Login: rlogin Overview, RPC.

TEXT BOOKS:

1. W.Richard Stevens, *UNIX Network Programming,* Vol. I, Sockets API, PHI, Third Edition, 2010.
2. W.Richard Stevens, *UNIX Network Programming IPC,* Vol. II, Pearson Education, Second Edition , 2015.

REFERENCE BOOKS:

1. T Chan, *UNIX SYSTEMS PROGRAMMING USING C++,* PHI, Third Edition, 2012.

2. Graham Glass, King Ables, *UNIX for programmers and Users,* Pearson Education, Third Edition, 2003.

IV B.Tech. - I semester

(16BT60501) SOFTWARE TESTING

(Program Elective - 2)

(Common to IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Software Engineering".

COURSE DESCRIPTION: Software Testing Basics: Goals, Defects, Terminology, Methodology, STLC in SDLC, Verification and Validation; Software Testing Techniques: White box testing, Black Box Testing, Regression testing; Test Management: Test Planning, Design and Specifications; Test Automation: Tool selection and Guidelines.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Software Testing Life Cycle.
- Testing Techniques.
- Test Management and Metrics.
- Regression Testing
- Test Automation

CO2. Analyze testing circumstances and their resultants in software development.

CO3. Design and develop the appropriate test cases in accordance to the software development model.

CO4. Use problem solving skills to control and monitor the testing process.

CO5. Apply testing tools for testing the software quality.

CO6. Apply contextual knowledge to perform testing on software related to societal applications.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO SOFTWARE TESTING (9 Periods)

Evolution of Software Testing, Software Testing-Myths and Facts, Goals of Software Testing, Psychology for Software Testing, Software Testing Definitions, Model for Software Testing, Effective Software Testing vs. Exhaustive Software Testing. Effective Testing is Hard, Software Testing as a Process.

Terminology and Methodology: Software Testing Terminology, Software Testing Life Cycle (STLC), Software Testing Methodology.

UNIT-II: WHITE BOX TESTING (9 Periods)

Need of White-Box Testing, Logic Coverage Criteria, Basis Path Testing, Graph Matrices, Loop Testing, Data Flow Testing, Mutation Testing.

UNIT-III: BLACK BOX TESTING (8 Periods)

Boundary Value Analysis (BVA), Equivalence Class Testing, State Table-Based Testing, Decision Table-Based Testing, Cause-Effect Graphing Based Testing, Error Guessing.

UNIT-IV: SOFTWARE TEST MANAGEMENT AND METRICS (10 Periods)

Test Management: Test Organization, Structure of Testing Group, Test Planning, Detailed Test Design, Test Specifications.

Software Metrics: Definition of Software Metrics, Classification of Software Metrics, Size Metrics.

UNIT-V: REGRESSION AND AUTOMATION (9 Periods)

Regression Testing: Progressive vs. Regressive Testing, Regression Testing Produces Quality Software, Regression Testability, Objectives of Regression Testing, Regression Testing Types, Defining Regression Test Problem, Regression Testing Techniques.

Automation and Testing Tools: Need for Automation, Categorization of Testing Tools, Selection of Testing Tools, Costs Incurred in Testing Tools, Guidelines for Automated Testing, Overview of Some Commercial Testing Tools. **Total Periods: 45**

TEXT BOOK:

1. Naresh Chauhan, *Software Testing: Principles and Practices,* Oxford University Press, Second Edition, 2016.

REFERENCE BOOKS:

1. Boris Beizer, *Software Testing Techniques,* Dream Tech Press, Second Edition, 2004.
2. Dr. K. V. K. K. Prasad, *Software Testing Tools,* Dreamtech, 2004.

IV B.Tech. - I semester

(16BT71205) CRYPTOGRAPHY AND NETWORK SECURITY

(Program Elective - 3)
(Common to CSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Computer Networks".
COURSE DESCRIPTION: Principles and Practice of Cryptography and Network Security; Classical Systems; Symmetric Block Ciphers; Public-key Cryptography; Hash Functions; Authentication; Key Management; Key Exchange; Signature Schemes; E-mail; Web Security; Malicious Software; Intrusion Detection; Phishing and Identity Theft.
COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Cryptographic algorithms and their mathematical models
- Message Authentication
- Digital Signatures
- Malicious Software
- Intrusion Detection
- Phishing and Identity Theft

CO2. Analyze vulnerabilities and threats on information systems based on various security parameters.
CO3. Apply security and privacy methods to protect and prevent cyber crimes.
CO4. Solve information privacy issues using encryption and digital signatures.
CO5. Use firewall and PGP to protect network and e-mail respectively.
CO6. Follow standards in implementation of network security.

DETAILED SYLLABUS:
UNIT-I: CLASSICAL ENCRYPTION TECHNIQUES (6 Periods)
Introduction: Services, Mechanisms, and Attacks concepts, The OSI security Architecture, Model for network security.
Classical Encryption Techniques: Symmetric cipher model, Substitution techniques- Ceaser cipher, Hill cipher, Poly and mono alphabetic cipher, Transposition techniques.
UNIT-II: BLOCK CIPHERS AND PUBLIC-KEY CRYPTOGRAPHY (8 Periods)
Block Ciphers: Block cipher principles, The data encryption standard (DES), The Strength of DES, Block cipher design principles, Block cipher modes of operation.
Public-Key Cryptography: Principles of public-Key cryptosystems, the RSA algorithm, Diffie-Hellman key exchange.
UNIT-III: MESSAGE AUTHENTICATION CODES, HASH FUNCTIONS, AND DIGITAL SIGNATURES (10 Periods)
Message Authentication Codes: Message authentication requirements, Message authentication functions, Message authentication codes.
Hash Functions: Security of hash functions and MACs, Hash algorithms-SHA, HMAC.
Digital Signatures: Digital Signatures and The Indian IT Act, Digital signature standard (DSS), Authentication applications- Kerberos.
UNIT-IV: ELECTRONIC MAIL SECURITY, IP SECURITY AND WEB SECURITY (11 Periods)
Electronic Mail Security: Pretty good privacy (PGP).
IP Security: IP security overview, Architecture, Authentication header, Encapsulating security payload, Combining security associations.
Web Security: Web security Considerations, Secure sockets layer (SSL), Transport layer security (TLS), Secure electronic transaction.
UNIT-V: MALICIOUS SOFTWARE, INTRUSION DETECTION, PHISHING AND IDENTITY THEFT (10 Periods)
Malicious Software: Spywares, Viruses and worms, DoS and DDoS attacks.
Intrusion Detection: Key loggers, Intrusion detection, Password management-Password protection, Password selection; Firewall design principles, Trusted systems.
Phishing and Identity Theft: Proxy servers, Anonymizers, Phishing and identity theft (ID Theft).

Total Periods: 45

TEXT BOOKS:
1. William Stallings, *Cryptography and Network Security Principles and Practice,* Pearson Education, Fourth Edition, 2010.
2. Nina Gobole and Sunit Belapure, *Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives,* Wiley India, 2011.

REFERENCE BOOK:

1. Behrouz A Forouzan and Debdeed Mukhopadhyay, *Cryptography and Network Security,* McGraw Hill Education, Second Edition, 2010.

IV B.Tech. - I semester

(16BT71206) .NET TECHNOLOGIES

(Program Elective - 3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Web Technologies".

COURSE DESCRIPTION: Introduction to .NET Framework and C# Programming;Object-oriented concepts with C#, Exception handling; Interfaces, Generics, Delegates and Events in C#; Database access with ADO.NET; Web application development using ASP.NET Web forms and Web controls.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Basics of .NET platform.
- Building C# applications, designing ASP.NET websites, perform Data access, building ASP.NET applications.

CO2. Analyze complex problems and identify .NET components for client-server environment.

CO3. Design and develop Graphical User Interface and Web applications using .NET technologies.

CO4. Demonstrate problem solving skills for developing interactive web applications.

CO5. Use C#, ADO.NET and ASP.NET technologies for website design.

CO6. Create websites as per societal needs.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO C# AND .NET PLATFORM (9 Periods)

The Philosophy of .NET: Benefits of .NET platform, Building blocks of .NET platform, Overview of .NET assemblies, Common type system, Common language specification, Common language runtime, Platform-independent nature of .NET.

Building C# Applications: Building C# applications on windows OS, Building .NET applications Beyond windows OS, Anatomy of a simple c# program, System. Console class, System data types and corresponding C# keywords, Working with string data, C# iteration constructs; Decision constructs and Relational/equality operators, Understanding C# arrays.

UNIT-II: OBJECT ORIENTED PROGRAMMING WITH C# AND EXCEPTION HANDLING (11 Periods)

Object Oriented Programming with C#: Introduction to C# class type, Constructors, The role of the this keyword, The static keyword, Pillars of OOP, C# access modifiers, C# encapsulation services, Understanding automatic properties, The basic mechanics of inheritance, The details of inheritance, C#'s polymorphic support.

Understanding Structured Exception Handling: The role of .NET exception handling, The simplest possible example, System-level exceptions, Application level exceptions, Processing multiple exceptions.

UNIT-III: INTERFACES, GENERICS, DELEGATES AND EVENTS (7 Periods)

Interfaces: Understanding interface types, Defining custom interfaces, Implementing an interface, Implementing interfaces using visual studio.

Generics: Role of generic type parameters, Creating custom generic methods, Creating custom generic structures and classes.

Delegates: Understanding the .NET delegate type, Delegate example, Generic delegate.

Events: C# events, Understanding operator overloading.

UNIT-IV: ADO.NET (9 Periods)

Definition of ADO.NET, ADO.NET data provider, ADO.NET namespaces, Connected layer of ADO.NET, Data readers, Database transactions, Disconnected layer of ADO.NET, Role of the dataset, Working with DataColumns, DataRows, DataTable, DataAdapters, Binding DataTable objects to windows forms GUIs.

UNIT-V: ASP.NET WEB FORMS, WEB CONTROLS AND STATE MANAGEMENT TECHNIQUES (9 Periods)

ASP.NET Web Forms: The role of HTTP, Web Applications and Web Servers, Role of client side scripting, Posting back to the web server, Overview of ASP.NET API, Building a single file ASP.NET web page, Building an ASP.NET webpage using code files, ASP.NET web sites vs. ASP.NET web applications, ASP.NET web site directory structure, The life cycle of an ASP.NET web page, Role of the web.config file.

ASP.NET Web Controls: Understanding the nature of web controls, Major categories of ASP.NET web control, The Role of validation controls, Application cache, The control and WebControl Base Classes

ASP.NET State Management Techniques: Maintaining session data, Understanding Cookies.

Total Periods: 45

TEXT BOOK:

1. Andrew Troelsen and Philip Japikse, *Pro C# 5.0 and the .NET 4.5 Framework,* Apress, Sixth Edition, 2012.

REFERENCE BOOKS:

1. Christian Nagel, Jay Glynn and Morgan Skinner, *Professional C# 5.0 and .NET 4.5.1,* WROX Publications, 2014.
2. Mathew Mac Donald, *The Complete Reference ASP.NET,* Tata McGraw Hill, 2010.

IV B.Tech. - I semester

(16BT71207) E - COMMERCES

(Program Elective - 3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Computer Networks".

COURSE DESCRIPTION: Electronic Commerce Framework; Consumer Oriented Electronic Commerce; Electronic Payment Systems; Inter and Intra Organizational Commerce; Corporate Digital Library; Advertising and Marketing on Internet; Consumer Search and Resource Discovery; Multimedia and Digital Video.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- The basic concepts and technologies used in the field of E-Commerce.
- E-Payment systems
- Inter and Intra Organizational E-Commerce
- Advertising and Marketing on Internet
- Key Multimedia Concepts

CO2. Analyze the Mercantile Process Models in different views.
CO3. Apply compression and decompression techniques and codec required for Video Conferencing.
CO4. Solve security issues in E-Commerce using encryption mechanisms.
CO5. Follow ethics in the usage of E-Commerce.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION AND NETWORK SECURITY (9 Periods)

Introduction: Electronic commerce frame work, Electronic commerce and media convergence, The anatomy of E-commerce applications, E-Commerce consumer applications, E-Commerce organization applications.

Network Security: Client-Server network security, Emerging client-server security threats, Firewalls and network security, Data and message security, Encrypted documents and electronic mail - Security and the web.

UNIT-II: CONSUMER ORIENTED ELECTRONIC COMMERCE AND ELECTRONIC PAYMENT SYSTEMS (10 Periods)

Consumer Oriented Electronic Commerce: Consumer oriented applications, Mercantile process models from the consumer's perspective, Mercantile process models from the merchant's perspective.

Electronic Payment Systems: Types of electronic payment systems, Digital token-based, Smart cards, Credit cards, Risks in electronic payment systems.

UNIT-III: INTER ORGANIZATIONAL COMMERCE AND INTRA ORGANIZATIONAL COMMERCE (9 Periods)

Inter Organizational Commerce: EDI, EDI implementation, MIME and value added networks.

Intra Organizational Commerce: Work flow automation and coordination, Customization and internal commerce, Supply chain management.

UNIT-IV: CORPORATE DIGITAL LIBRARY and ADVERTISING AND MARKETING ON THE INTERNET (9 Periods)

Corporate Digital Library: Making a business case for a document library, Types of digital documents, Issues behind document infrastructure, Corporate data warehouses.

Advertising and Marketing on the Internet: Advertising and marketing - Information based marketing, Advertising on internet, On-line marketing process, Market research.

UNIT-V: CONSUMER SEARCH and RESOURCE DISCOVERY AND MULTIMEDIA AND DIGITAL VIDEO (8 Periods)

Consumer Search and Resource Discovery: Information search and retrieval, Electronic commerce catalogs or directories, Information filtering.

Multimedia and Digital Video: Key multimedia concepts, Digital video and electronic commerce, Desktop video processing, Desktop video conferencing. **Total Periods: 45**

TEXT BOOK:

1. Ravi Kalakota and Andrew B. Whinston, *Frontiers of Electronic Commerce,* Pearson Education, Seventh Edition, 2009.

REFERENCE BOOKS:

1. Hendry Chan, Raymond Lee, Tharam Dillon and Ellizabeth Chang, *E-Commerce Fundamentals and Applications,* John Wiley, Third Edition, 2007.
2. S.Jaiswal, *E-Commerce,* Galgotia, 2008

3. Efrain Turbon, Jae Lee, David King and H.Michael Chang, *E-Commerce,* Pearson Education Asia, 2001.
4. Gary P. Schneider and James T. Perry, *Electronic Commerce,* Thomson Learning, 2001.

IV B.Tech. - I semester

(16BT71207) SERVICE ORIENTED ARCHITECTURE

(Program Elective-3)

(Common to CSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Software Engineering".

COURSE DESCRIPTION: Web Services; Principles of SOA; Service Layers; Simple Object Access Protocol (SOAP); Web Services Description Language (WSDL).

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Principles, services and policies of service orientation.
- Fundamentals of web services.
- XML, WSDL related to SOA.

CO2. Analyze complex business process critically in identifying appropriate service model logic.

CO3. Design service oriented architecture suitable for different environments.

CO4. Use XML, SOAP and service interface design tools for building service oriented architecture.

DETAILED SYLLABUS:

UNIT - I: SOA AND EVOLUTION (10 Periods)

Introducing SOA: Fundamental SOA, Common characteristics of contemporary SOA, Common pitfalls of adopting SOA.

The Evolution of SOA: An SOA timeline, The continuing evolution of SOA, The roots of SOA.

Web Services and Primitive SOA: The web services framework, Services, Service descriptions, Messaging.

UNIT - II: SOA AND WS-* EXTENSIONS (8 Periods)

WS-* and Contemporary SOA (Part I): Message Exchange Patterns (MEP), Service activity, Coordination, Atomic transactions, Business activities.

WS-* and Contemporary SOA (Part-II): Addressing, Reliable messaging, Correlation, Policies, Metadata exchange.

UNIT - III: PRINCIPLES, SERVICE LAYERS AND PLANNING (9 Periods)

Principles of Service-Orientation: Service-orientation and the enterprise, Anatomy of SOA, Common principles of service orientation, Inter relationship of service orientation principles, Service orientation and Object orientation.

Service Layers: Service-orientation and contemporary SOA, Service layer abstraction, Application service layer, Business service layer, Orchestration service layer, Agnostic services, Service layer configuration scenarios.

SOA Delivery Strategies: SOA delivery lifecycle phases, The Top-down strategy, the bottom-up strategy, the agile strategy.

UNIT - IV: SERVICE ORIENTED ANALYSIS AND SERVICE MODELING (8 Periods)

Service Oriented Analysis: Objectives and service oriented analysis process, Benefits of a business centric SOA and Deriving business services.

Service Modeling: Service modeling, Service modeling guidelines, Classifying service model logic, Contrasting service modeling approaches.

UNIT - V: SERVICE ORIENTED DESIGN AND SERVICE DESIGN (10 Periods)

Service-Oriented Design: Objectives and Service oriented design process, WSDL related XML schema language basics, WSDL language basics, SOAP language basics, Service interface design tools.

Service Design: Service design overview, Entity-centric business service design, Application service design, Task-centric business service design, Service design guidelines. **Total Periods: 45**

TEXT BOOK:

1. Thomas Erl, *Service-Oriented Architecture - Concepts, Technology, and Design,* Pearson Education, 2011.

REFERENCE BOOKS:

1. Eric Newcomer, *Understanding SOA with Web Services,* Pearson Education, Second Edition, 2005.
2. Shankar Kambhampaty, *Service Oriented Architecture for Enterprise and Cloud Applications,* Wiley-India, Second Edition, 2010.

IV B.Tech. - I semester

(16BT71209) MACHINE LEARNING

(Program Elective - 4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on "Probability and Statistics" and "Data Warehousing and Data Mining".

COURSE DESCRIPTION: Introduction to Machine Learning; Planning for Machine Learning; Bayesian Techniques; Decision Trees; Bayesian Networks; Artificial Neural Networks; Association Rules Learning; Support Vector Machines; Clustering; Machine Learning as a Batch Process; Case Studies, Data Science Fundamentals.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Decision Trees and Bayesian Networks
- Artificial Neural Networks and Association Rules
- Support Vector Machines, Data Science fundamentals.

CO2. Analyze complex datasets and identify suitable machine learning algorithms.

CO3. Design decision making algorithms using supervised and unsupervised approaches.

CO4. Solve complex data analytical problems using machine learning and data science techniques.

CO5. Use Apache Spark and R tools for real-time and batch processing applications.

CO6. Develop machine learning based solutions as per societal needs.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION AND PLANNING FOR MACHINE LEARNING (9 Periods)

Introduction to Machine Learning: History of machine learning, Algorithm types for machine learning, Uses for machine learning, Languages for machine learning, Software used for machine learning, Data repositories.

Planning for Machine Learning: Machine learning cycle, Defining the process, Building a data team, Data processing, Data storage, Data privacy, Data quality and cleaning, Thinking about input data and output data.

UNIT - II: DECISION TREES, BAYESIAN NETWORKS AND ARTIFICIAL NEURAL NETWORKS (9 Periods)

Decision trees, Bayesian networks, Association rule mining concepts and algorithms

Artificial Neural Networks: Usage and breaking down the artificial neural network, Artificial neural networks with weka, Implementing a neural network in java.

UNIT-III: SUPPORT VECTOR MACHINES AND CLUSTERING (9 Periods)

Support Vector Machines using Weka: Usage of support vector machines, Basic classification principles, Support vector machines approach classification.

Clustering using Weka: Usage of clustering, Clustering models, k-means clustering.

UNIT-IV: MACHINE LEARNING AS A BATCH PROCESS AND CASE STUDIES (9 Periods)

Machine Learning as a Batch Process: Considerations for batch processing data, Practical examples of batch processes, Using the hadoop framework, Mining the hashtags mining sales data, Scheduling batch jobs.

Case Studies: Apache Spark and R.

UNIT-V: DATA SCIENCE FUNDAMENTALS (9 Periods)

Deep learning, Semi-supervised learning, Active learning, Multi-task learning, k-nearest neighbors, Recommender systems, SimFple and multiple linear regression. **Total Periods: 45**

TEXT BOOKS:

1. Jason Bell, *Machine Learning for Big Data,* Wiley Big Data Series, 2016.
2. Avrim Blum, John Hopcroft and Ravindran Kannan, *Foundations of Data Science,* 2016.

REFERENCE BOOKS:

1. Tom M. Mitchell, *Machine Learning,* McGraw-Hill, 2013

2. Ethem Alpaydin, *Introduction to Machine Learning,* MIT Press, Second Edition, 2009.
3. Joel Grus, *Data Science from scratch,* O'Reilly Publication, 2015.

IV B.Tech. - I semester
(16BT71508) INTERNET OF THINGS

(Program Elective - 4)

(Common to CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Computer Networks".

COURSE DESCRIPTION: Internet of Things Components; Communication models; Prototyping; Hardware; Design models; Analytics for IoT.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on Protocols, functional blocks and communication models of Internet of things.

CO2. Identify appropriate sensors and communication modes used in IoT based systems.

CO3. Design appropriate solutions for IoT applications using Raspberry Pi and Arduino kits.

CO4. Appropriately synthesize the models and applications for usage in Home automation and cities.

CO5. Apply evolutionary techniques to perform analytics on the data integrated from IoT based systems.

CO6. Use advances in IoT technology to design and develop applications.

DETAILED SYLLABUS:

UNIT- I: INTRODUCTION TO INTERNET OF THINGS (8 Periods)

Definition, Characteristics, Things, Protocols, Logical Design, Functional Blocks, Communication models, APIs, Enabling Technologies, Levels and Deployment templates.

UNIT- II: DEVICES AND END POINTS (10 Periods)

IoT Devices-Examples-Raspbe rry PI interfaces, Arduino interfaces, Programming Raspberry PI with Python, Other IOT devices, Domain Specific IoTs.

UNIT-III: SENSORS and CONNECTIVITY (8 Periods)

Sensors-Types of Sensor Nodes; Internet Communications, IP Addresses, MAC Address, TCP and UDP ports, Application Layer Protocols.

UNIT-IV: DESIGN METHODOLOGY AND CASE STUDIES (10 Periods)

Design Methodology: Purpose and Requirements specifications, Process Specifications, Domain Model specifications, Information Model specifications, Service specification, Level Specifications, Functional View specifications, Operational View specifications, Device and Component integration, Application development.

Case Studies: Home Automation, Cities.

UNIT-V: DATA ANALYTICS FOR IoT (9 Periods)

Analytics, Apache Hadoop, Hadoop MapReduce for Batch Data Analysis, Apache Oozie, Chef and Case studies.

Total Periods: 45

TEXT BOOK:

1. Arshdeep Bahga, Vijay Madisetti, *Internet of Things - A Hands-on Approach,* University Press, 2015.

REFERENCE BOOKS:

1. Adrian McEwen and Hakim Cassimally, *Designing the Internet of Things,* Wiley Publishing, 2013.
2. CharlesBell, *Beginning Sensor Networks with Arduino and Raspberry Pi*, Apress, 2013.
3. Marco Schwartz, *Internet of Things with the Arduino Yun,* Packt Publishing, 2014.
4. Matt Richardson, Shawn Wallace, *Getting Started with Raspberry Pi,* Maker Media, Inc, 2012.

IV B.Tech. - I semester

(16BT71210) HIGH PERFORMANCE COMPUTING

(Program Elective - 4)

(Common to IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Computer Organization".

COURSE DESCRIPTION: Cache-based Microprocessor Architecture; Memory Hierarchies; Multithreaded Processors; Common Sense Optimizations; The Role of Compilers; Data Access Optimization; Shared-memory Computers; Parallel Scalability; Introduction to OpenMP; Parallel Jacobi Algorithm; Introduction to MPI; MPI Performance Tools; MPI Parallelization of Jacobi Solver.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Modern Processors and code Optimization.
- Parallel computing paradigms.

CO2. Analyze computation problems and identify the suitable parallel processing approaches to achieve optimum computation.

CO3. Design Parallel processing algorithms for achieving high performance computing.

CO4. Solve shared memory problems using Parallel Programming.

CO5. Use OpenMP and MPI tools in Parallel Programming.

DETAILED SYLLABUS:

UNIT-I: MODERN PROCESSORS (8 Periods)

Stored-program computer architecture, General-purpose cache-based microprocessor architecture, Memory hierarchies, Multicore processors, Multi-threaded processors, Vector processors.

UNIT-II: BASIC OPTIMIZATION TECHNIQUES FOR SERIAL CODE (10 Periods)

Scalar profiling, Common sense optimizations, Simple measures, Large impact, The role of compilers, C++ optimizations, Data access optimization-balance analysis and light speed estimates, Storage order.

Case study: The Jacobi algorithm and Dense matrix transpose.

UNIT-III: PARALLEL COMPUTERS (9 Periods)

Taxonomy of parallel computing paradigms, Shared-memory computers, Distributed-memory computers, Hierarchical systems, Networks. Basics of parallelization, Data Parallelism, Function parallelism, Parallel scalability.

UNIT-IV: SHARED-MEMORY PARALLEL PROGRAMMING WITH OpenMP (9 Periods)

Introduction to OpenMP - Parallel execution, Data scoping, OpenMP work sharing for loops, Synchronization, Reductions, Loop scheduling and tasking.

Case study: OpenMP-parallel Jacobi algorithm, Efficient OpenMP programming-profiling OpenMP programs, Performance pitfalls.

Case study: Parallel sparse matrix-vector multiply.

UNIT- V:DISTRIBUTED-MEMORY PARALLEL PROGRAMMING WITH MPI (9 Periods)

Message passing, Introduction to MPI, Examples - MPI parallelization of Jacobi solver; Efficient MPI Programming - MPI performance tools, communication parameters, Synchronization, Serialization, Contention, Reducing communication overheads, Understanding intranode point-to-point communication.

Total Periods: 45

TEXT BOOK:

1. Georg Hager and Gerhard Wellein, *Introduction to High Performance Computing for Scientists and Engineers,* Chapman and Hall / CRC Computational Science Series, 2012.

REFERNCE BOOKS:

1. Charles Severance and Kevin Dowd, H*igh Performance Computing,* O'Reilly Media, Second Edition, 1998.
2. Kai Hwang and Faye Alaye Briggs, *Computer Architecture and Parallel Processing,* McGraw Hill, 1984.

IV B.Tech. - I semester

(16BT70505) HUMAN COMPUTER INTERACTION

(Program Elective - 4)

(Common to CSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Computer Graphics".

COURSE DESCRIPTION: Graphical User Interface; Design Process; Screen Designing; Windows; Components; Software Tools; Interaction Devices.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on principles, characteristics, tools and devices of Human Computer Interaction.

CO2. Analyze the user requirements, technological and physical characteristics of users for better interface design.

CO3. Design appropriate user interface for desktop and web applications.

CO4. Conduct investigations on User requirements to provide an effective user interface.

CO5. Utilize user interface mockup tools and input, output and pointing devices for designing user interfaces.

CO6. Apply Contextual knowledge to develop interfaces for differently abled people.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION (9 Periods)

Importance of user Interface: Definition, Importance of good design, Benefits of good design, A brief history of screen design.

Characteristics of Graphical and Web User Interfaces: The graphical user interface - popularity of graphics, The concept of direct manipulation, Graphical systems, Characteristics; Web user Interface - Popularity, Characteristics; Principles of user interface design.

UNIT-II: CONTROL DESIGN PROCESS (8 Periods)

Design Process: Human interaction with computers, Importance of human characteristics, human considerations in design, Human interaction speeds, and understanding business functions.

UNIT-III: SCREEN DESIGN (10 Periods)

Design goals: Screen meaning and purpose, Organizing screen elements, Ordering of screen data and content, Screen navigation and flow, Visually pleasing composition, Amount of information, Focus and emphasis, Presenting information simply and meaningfully, Information retrieval on web, Statistical graphics, Technological considerations in interface design.

UNIT-IV: WINDOWS AND MULTIMEDIA (8 Periods)

Windows Menus and Navigation schemes: Selection of window, selection of device based and screen based controls.

Components: Text and messages, Icons and images, Multimedia, Color uses, Problems with colors, choosing colors.

UNIT-V: SOFTWARE TOOLS AND DEVICES (10 Periods)

Software tools: Specification methods, Interface building tools, Interaction devices - Keyboards and keypads,Pointing devices,Speech and auditory interfaces; Image and video displays, drivers.

Total Periods: 45

TEXT BOOKS:

1. Wilbert O. Galitz, *The Essential Guide to User Interface Design,* Wiley India Education, Second Edition, 2008.
2. Ben Schneiderman and Catherine Plaisant, *Designing the User Interface,* Pearson Education, Fourth Edition, 2009.

REFERENCE BOOKS:

1. A Dix, Janet Finlay, G. D. Abowd and R. Beale, *Human-Computer Interaction,* Pearson Publishers, Third Edition, 2008.
2. Jonathan Wolpaw and Elizabeth Winter Wolpaw, *Brain-Computer Interfaces: Principles and Practice,* Oxford Publishers, 2012.

IV B.Tech. - I semester

(16BT71231) BIG DATA TECHNOLOGIES LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Courses on "Big Data Technologies" and "Java Programming".

COURSE DESCRIPTION: Hands-on experience in Big data storage, processing, querying, reporting, predictive analytics, classification, clustering, recommendation system using Data-parallel programming model of Hadoop, MapReduce, HDFS, Hive, Pig, HBase, Zookeeper and Sqoop Big Data Tools.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on Big Data characteristics, storage, processing, querying and reporting.
CO2. Analyze large dataset issues and solve using data analytic techniques.
CO3. Design and Develop classification and clustering models for dataset analysis.
CO4. Solve large data analysis problems using Big data techniques.
CO5. Apply Big Data Tools: Sqoop, HBase, Hive, Pig, MapReduce and Zookeeper for large data management and knowledge extraction.
CO6. Build Hadoop environment suitable for societal requirements.
CO7. Work effectively as an individual and as a member in team for mini-project implementation.
CO8. Demonstrate communication skills, both oral and written for preparing and presenting reports.

LIST OF EXPERIMENTS:

1. Practice on Hadoop:
   i. Hadoop installation and Cluster Configuration.
   ii. Create Name node, Secondary Name node in Safe mode.
   iii. Create Hadoop File system Shell and Read and write Data.
2. Practice on MapReduce:
   i. Create file to count the number of words and display the same.
   ii. Apply MapReduce for Video Streaming file.
3. Count number of Objects in a given video file using Pig programming Tool.
4. Practice on Hive:
   i. Table Creation and Deletion.
   ii. Querying and reporting.
5. Import and Export data from RDBMS database using Sqoop tool.
6. Practice on HBase:
   i. Table Creation and Deletion.
   ii. Querying and reporting.
7. Create Workflow, Deploy and Run using Oozie Tool.
8. Perform data storage and management using Zookeeper tool.
9. Case study 1: Insurance Domain
   i) Perform Classification Technique on Insurance Dataset
   ii) Perform Clustering Technique on Insurance Dataset
10. Case study 2: Healthcare Domain
    i) Perform Classification Technique on Healthcare Dataset
    ii) Perform Clustering Technique on Healthcare Dataset
11. Case study 3: Retail Store data
    i) Perform Recommendation Engine on Retail Store Dataset
    ii. Perform Association rule mining on Retail Store Dataset.

REFERENCE BOOKS:

1. Tom White, *Hadoop: The Definitive Guide,* O'reilly and Yahoo Press, Third Edition, 2012.

2. Frank J. Ohlhorst, *Big Data Analytics: Turning Big Data into Big Money,* Wiley Publication, December, 2012.
3. Kevin Roebuck, *Big Data: High-Impact Strategies - What You Need to Know: Definitions, Adoptions, Impact, Benefits, Maturity, Vendors,* Tebbo Publisher, 2011.
4. Alex Holmes, *Hadoop in Practice,* Manning Publications Publisher, 2012.

IV B.Tech. - I semester

(16BT71232) MOBILE APPLICATION DEVELOPMENT LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A Course on "Mobile Application Development".

COURSE DESCRIPTION: Hands-on experience on development of Android Mobile applications with Submenus; Context menus; Layouts; Buttons; Date Picker and database access with Android SQLite.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Mobile platforms and Mobile User Interface
- Android Activities and Intents
- Messaging, Networking, Location based Services, Android Services
- Basics of iOS

CO2. Analyze the context of complex problems and identify user interface design requirements.

CO3. Design and develop solutions for real world problems with android mobile applications.

CO4. Demonstrate problem solving skills to create applications for mobile devices.

CO5. Apply Android studio and iOS tools to develop mobile applications.

CO6. Create mobile applications as per societal needs.

CO7. Work effectively as an individual and as a member in team for mini-project implementation.

CO8. Demonstrate communication skills, both oral and written for preparing and presenting reports.

LIST OF EXPERIMENTS:

1. Test the android development environment by performing the following operations.
a. Add the sample application to a project in Android studio.
b. Create an Android Virtual Device (AVD) for sample project.
c. Create a launch configuration for sample project.
d. Run a sample application in Android Emulator.
2. Develop a program which will implement Sub menu in android application.
3. Develop a program to implement Context menu (Floating List of Menu Items) in android application.
4. Develop a program to demonstrate the use of Relative Layout Views with different attributes.
5. Develop a program to demonstrate the use of Linear Layout Views with different attributes.
6. Develop a program to implement a Custom Button and handle the displayed message on button press.
7. Develop a program to implement the Table layout in View Group that displays child View elements in rows and columns.
8. Develop a program to implement the List View in android application.
9. Develop a program to show how to use Date picker control of ADK in android applications.
10. Develop a program to insert, delete, display, and update the employee details using Android SQLite.
11. Design and develop a program to create sign-up and sign-in pages and maintain the user details with SQLite
12. Mini project:-Develop the following applications using Android.
a. Alarm b. Audio player c. Audio Recorder d.Vedio Player

REFERENCE BOOKS:

1. J. F. DiMarzio, *Beginning Android Programming with Android Studio,* Wiley India, Fourth Edition, 2017.
2. Paul Deital and Harvey Deital, *Android How to Program,* Detial associates publishers, 2013.
3. Neils Smyth, *Android Stduio Development Essentials,* Creative Space Independent Publishing Platform, Seventh Edition, 2016.

4. Jeff McWherter and Scott Gowell, *Professional Mobile Application Development,* Wiley India, 2012.

IV B.Tech. - I semester
(16BT71233) COMPREHENSIVE ASSESSMENT

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
	100	100	-	-	-	2

PRE-REQUISITES: All the technical courses of the program upto IV B. Tech. - I Semester.

COURSE DESCRIPTION: Assessment of student learning outcomes in the courses of the program.

COURSE OUTCOMES: Comprehensive Assessment enables successful students to demonstrate:

CO1. Knowledge in the courses of the program.

CO2. Analytical ability in the courses of the program.

CO3. Design skills in the courses of the program.

CO4. Ability to investigate and solve complex engineering problems in the courses of the program.

CO5. Ability to apply tools and techniques to complex engineering activities with an understanding of limitations in the courses of the program.

CO6. Ability to provide solutions as per societal needs with consideration to health, safety, legal and cultural issues in the courses of the program.

CO7. Understanding of the impact of the professional engineering solutions in environmental context and need for sustainable development in the courses of the program.

CO8. Ability to apply ethics and norms of the engineering practice in the courses of the program.

CO9. Ability to function effectively as an individual in the courses of the program.

CO10. Ability to present views cogently and precisely in the courses of the program.

CO11. Ability to engage in life-long leaning in the courses of the program.

IV B.Tech. - II semester
(16BT81231) **PROJECT WORK**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
100	100	200	-	-	-	12

PRE-REQUISITES: All technical courses of the program up to IV B. Tech. - I Semester.

COURSE DESCRIPTION: Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Preparation of thesis and presentation.

COURSE OUTCOMES: Completion of the project work enables successful students to:

CO1. Demonstrate knowledge on the topic of project work.

CO2. Demonstrate analytical ability exercised in the project work.

CO3. Apply design skills for the project implementation.

CO4. Investigate and solve chosen project problem with optimum solution.

CO5. Use techniques and modern engineering tools for the development of project work.

CO6. Provide solutions as per societal needs with consideration to health, safety, legal and cultural issues in the project work.

CO7. Understand environmental issues while executing the project work

CO8. Understand professional and ethical responsibilities while executing the project work.

CO9. Function effectively as an individual and a member in the project team.

CO10. Present views cogently and precisely on the project work.

CO11. Demonstrate project management skills and estimate time and cost required for carrying out the project work.

CO12. Engage lifelong learning to improve knowledge and competence in the chosen area of the project work.

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(Autonomous)

COURSE STRUCTURE (2016-2017)

COMPUTER SCIENCE AND SYSTEMS ENGINEERING

I B.Tech. (I Semester)

S. No	Course Code	Course Title	Contact Periods/ Week				C	Scheme of Examinations		
			L	T	P	Total		Int.	Ext.	Total
1	16BT1HS01	Technical English	3	1	-	4	3	30	70	100
2	16BT1BS01	Engineering Chemistry	3	1	-	4	3	30	70	100
3	16BT1BS03	Matrices and Numerical Methods	3	1	-	4	3	30	70	100
4	16BT1BS04	Multi-Variable Calculus and Differential Equations	3	1	-	4	3	30	70	100
5	16BT10501	Programming in C	3	1	-	4	3	30	70	100
6	16BT1HS31	English Language Lab	-	-	3	3	2	50	50	100
7	16BT1BS31	Engineering Chemistry Lab	-	-	3	3	2	50	50	100
8	16BT10331	Computer Aided Engineering Drawing	-	1	6	7	3	50	50	100
9	16BT10531	Programming in C Lab	-	-	3	3	2	50	50	100
	Total		**15**	**6**	**15**	**36**	**24**	**350**	**550**	**900**

I B.Tech. (II Semester)

S. No	Course Code	Course Title	Contact Periods/ Week				C	Scheme of Examinations		
			L	T	P	Total		Int.	Ext.	Total
1	16BT1BS02	Engineering Physics	3	1	-	4	3	30	70	100
2	16BT2BS01	Transformation Techniques and Partial Differential Equations	3	1	-	4	3	30	70	100
3	16BT20441	Basic Electronic Devices and Circuits	3	1	-	4	3	30	70	100
4	16BT21201	Object Oriented Programming through C++	4	1	-	5	4	30	70	100
5	16BT21501	Digital Logic Design	3	1	-	4	3	30	70	100
6	16BT1BS32	Engineering Physics Lab	-	-	3	3	2	50	50	100
7	16BT20451	Analog and Digital Electronics Lab	-	-	3	3	2	50	50	100
8	16BT21231	IT Workshop	-	-	3	3	2	50	50	100
9	16BT21232	Object Oriented Programming Lab	-	-	3	3	2	50	50	100
	Total		**16**	**5**	**12**	**33**	**24**	**350**	**550**	**900**

II B.Tech. (I Semester)

S. No	Course Code	Course Title	Contact Periods per Week				C	Scheme of Examinations		
			L	T	P	Total		Int.	Ext.	Total
1	16BT3BS01	Probability Distributions and Statistical Methods	3	1	-	4	3	30	70	100
2	16BT30501	Computer Organization	3	1	-	4	3	30	70	100
3	16BT30502	Data Structures	3	1	-	4	3	30	70	100
4	16BT31201	Discrete Mathematical Structures	3	1	-	4	3	30	70	100
5	16BT41202	Java Programming	3	1	-	4	3	30	70	100
6	16BT31501	Operating Systems	3	1	-	4	3	30	70	100
7	16BT30531	Data Structures Lab	-	-	3	3	2	50	50	100
8	16BT31231	Java Programming Lab	-	-	3	3	2	50	50	100
9	16BT31531	Operating Systems Lab	-	-	3	3	2	50	50	100
	Total		**18**	**6**	**9**	**33**	**24**	**330**	**570**	**900**

II B.Tech. (II Semester)

S. No	Course Code	Course Title	Periods per Week			Total	C	Scheme of Examinations		
			L	T	P	Total		Int.	Ext.	Total
1	16BT3HS01	Environmental Studies	3	1	-	4	3	30	70	100
2	16BT41204	Theory of Computation	3	1	-	4	3	30	70	100
3	16BT40502	Database Management Systems	3	1	-	4	3	30	70	100
4	16BT41201	Design and Analysis of Algorithms	3	1	-	4	3	30	70	100
5	16BT51202	Object Oriented Analysis and Design	3	1	-	4	3	30	70	100
6	16BT41203	Software Engineering	3	1	-	4	3	30	70	100
7	16BT40531	Database Management Systems Lab	-	-	3	3	2	50	50	100
8	16BT50533	Object Oriented Analysis and Design Lab	-	-	3	3	2	50	50	100
9	16BT4HS31	Soft Skills Lab	-	-	3	3	2	50	50	100
	Total		**18**	**6**	**9**	**33**	**24**	**330**	**570**	**900**

III B.Tech. (I Semester)

S. No.	Course Code	Course Title	Contact Periods per Week				C	Scheme of Examinations		
			L	T	P	Total		Int.	Ext.	Total
1	16BT5HS01	Management Science	3	1	-	4	3	30	70	100
2	16BT50501	Computer Networks	3	1	-	4	3	30	70	100
3	16BT51501	Compiler Design	3	1	-	4	3	30	70	100
4	16BT50442	Micro Processors and Interfacing	3	1	-	4	3	30	70	100
5	16BT51502	Systems Software	3	1	-	4	3	30	70	100
		Interdisciplinary Elective-1	3	1	-	4	3	30	70	100
6	16BT30503	Python Programming								
7	16BT71203	Information Retrieval Systems								
8	16BT51503	Intelligent Computing Systems								
9	16BT40501	Computer Graphics								
10	16BT50531	Computer Networks Lab	-	-	3	3	2	50	50	100
11	16BT50451	Micro Processors and Interfacing Lab	-	-	3	3	2	50	50	100
12	16BT51531	Systems Software Lab	-	-	3	3	2	50	50	100
	Total		**18**	**6**	**9**	**33**	**24**	**330**	**570**	**900**

III B.Tech. (II Semester)

S. No	Course Code	Course Title	Contact Periods per Week				C	Scheme of Examination		
			L	T	P	Total		Int.	Ext.	Total
1	16BT3HS02	Managerial Economics and Principles of Accountancy	3	1	-	4	3	30	70	100
2	16BT61501	Data Warehousing and Data Mining	3	1	-	4	3	30	70	100
3	16BT51203	Web Technologies	3	1	-	4	3	30	70	100
		Interdisciplinary Elective-2	3	1	-	4	3	30	70	100
4	16BT50341	Optimization Techniques								
5	16BT60404	Image processing								
6	16BT61201	Cloud Computing								
7	16BT71204	Mobile Computing								
		Program Elective – 1	3	1	-	4	3	30	70	100
8	16BT70505	Human Computer Interaction								
9	16BT61502	Network Security								
10	16BT61503	Software Project Management								
11	16BT61504	Windows Programming								
		Open Elective	3	1	-	4	3	30	70	100
12	16BT61531	Data Warehousing and Data Mining Lab	-	-	3	3	2	50	50	100
13	16BT51233	Web Technologies Lab	-	-	3	3	2	50	50	100
14	16BT61532	Seminar	-	-	-	-	2	-	100	100
15	16BT6MOOC	MOOC	-	-	-	-	-	-	-	-
	Total		**18**	**6**	**6**	**30**	**24**	**280**	**620**	**900**

LIST OF OPEN ELECTIVES

Sl. No.	Course Code	Open Elective Course Title	Sl. No.	Course Code	Open Elective Course Title
1.	16BT6HS01	Banking and Insurance	16.	16BT60114	Disaster Mitigation and Management
2.	16BT6HS02	Business Communication and Career Skills	17.	16BT60115	Environmental Pollution and Control
3.	16BT6HS03	Cost Accounting and Financial Management	18.	16BT60116	Planning for Sustainable Development
4.	16BT6HS04	Entrepreneurship for Micro, Small and Medium Enterprises	19.	16BT60117	Professional Ethics
5.	16BT6HS05	French Language	20.	16BT60118	Rural Technology
6.	16BT6HS06	German Language	21.	16BT60308	Global Strategy and Technology
7.	16BT6HS07	Indian Constitution	22.	16BT60309	Intellectual Property Rights and Management
8.	16BT6HS08	Indian Economy	23.	16BT60310	Managing Innovation and Entrepreneurship
9.	16BT6HS09	Indian Heritage and Culture	24.	16BT60311	Materials Science
10.	16BT6HS10	Indian History	25.	16BT70412	Green Technologies
11.	16BT6HS11	Personality Development	26.	16BT70413	Introduction to Nanoscience and Technology
12.	16BT6HS12	Philosophy of Education	27.	16BT60505	Engineering System Analysis and Design
13.	16BT6HS13	Public Administration	28.	16BT71011	Micro-Electro-Mechanical Systems
14.	16BT60112	Building Maintenance and Repair	29.	16BT61205	Cyber Security and Laws
15.	16BT60113	Contract Laws and Regulations	30.	16BT61505	Bio-informatics

IV B.Tech. (I Semester)

S. No	Course Code	Course Title	Contact Periods per Week				C	Scheme of Examination		
			L	T	P	Total		Int.	Ext.	Total
1	16BT71501	System Modeling and Simulation	3	1	-	4	3	30	70	100
2	16BT70402	Embedded Systems	3	1	-	4	3	30	70	100
3	16BT71502	Systems Engineering	3	1	-	4	3	30	70	100
		Program Elective – 2	3	1	-	4	3	30	70	100
4	16BT71503	Data Analytics								
5	16BT71504	Performance Evaluation of Computer Systems								
6	16BT71505	Network programming								
7	16BT71506	Software Architecture and Design Patterns								
		Program Elective – 3	3	1	-	4	3	30	70	100
8	16BT71507	Business Analytics								
9	16BT71202	Mobile Application Development								
10	16BT60502	Soft Computing								
11	16BT60501	Software Testing								
		Program Elective – 4	3	1	-	4	3	30	70	100
12	16BT71210	High Performance Computing								
13	16BT71508	Internet of Things								
14	16BT71509	Secure Software Engineering								
15	16BT60503	Wireless Networks								
16	16BT70432	Embedded Systems Lab	-	-	3	3	2	50	50	100
17	16BT71531	System Modeling and Simulation Lab	-	-	3	3	2	50	50	100
18	16BT71532	Comprehensive Assessment	-	-	-	-	2	-	100	100
		Total	**18**	**6**	**6**	**30**	**24**	**280**	**620**	**900**

IV B.Tech. (II Semester)

S. No	Course Code	Course Title	Contact Periods/ Week				C	Scheme of Examinations		
			L	T	P	Total		Int.	Ext.	Total
1	16BT81531	Project Work *	-	-	-	-	12	100	100	200
		Total	**0**	**0**	**0**	**0**	**12**	**100**	**100**	**200**

*Full-time project work

I B.Tech. - I Semester

16BT1HS01: **TECHNICAL ENGLISH**

(Common to CSE, CSSE, IT, CE and ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: English at Intermediate level

COURSE DESCRIPTION: Introduction to Communication; Active Listening; Effective Speaking; Reading; and Writing.

COURSE OUTCOMES:

On successful completion of this course the students will be able to:

1. Demonstrate knowledge in
   a) Process of communication
   b) Modes of listening
   c) Paralinguistic features
   d) Skimming and Scanning
   e) Elements of style in writing
2. Analyze the possibilities and limitations of language for understanding
   a) Barriers to Communication
   b) Barriers to Effective Listening
   c) Barriers to Speaking
   d) Formal and metaphorical language
3. Design and develop functional skills for professional practice.
4. Apply writing skills in preparing and presenting documents
5. Function effectively as an individual and as a member in diverse teams.
6. Communicate effectively with the engineering community and society in formal and informal situations**.**

DETAILED SYLLABUS:

UNIT I - INTRODUCTION TO COMMUNICATION (9 periods)

Introduction –Language as a Tool of Communication – Communicative Skills (Listening, Speaking, Reading and Writing)– Effective Communication – Modes of Communication – Barriers to Communication (classification).

UNIT II - ACTIVE LISTENING (9 periods)

Introduction – Reasons for poor Listening – Traits of a Good Listener – Listening Modes – Types of Listening – Barriers to Effective Listening – Listening for General Content and Specific Information.

UNIT III - EFFECTIVE SPEAKING (9 periods)

Introduction – Achieving Confidence, Clarity and Fluency – Paralinguistic Features – Barriers to Speaking – Types of Speaking– Persuasive Speaking.

UNIT IV - READING (9 periods)

Introduction and Reading Rates – Reading and Interpretation – Intensive and Extensive Reading – Critical Reading – Reading for Different Purposes – SQ3R Reading Technique –Study Skills.

UNIT V – WRITING (9 periods)

Introduction – Language – Elements of Style – Techniques for Good Technical Writing – Referencing and Styling – Right Words and Phrases – Sentences.

Total Periods: 45

TEXT BOOK:

1. Meenakshi Raman & Sangeetha Sharma, *Technical Communication*, Oxford University Press, New Delhi, 2012.

REFERENCE BOOKS:

1. Ashraf Rizvi, *Effective Technical Communication*, McGraw-Hill Education (India) Pvt.Ltd., New Delhi, 2015.
2. Sanjay Kumar & Pushp Lata, *Communication Skills*, Oxford University Press, New Delhi, 2013.
3. Teri Kwal Gamble and Michael Gamble, *Communication Works*, Tata Mc Graw-Hill, New Delhi, 2010.
4. Rajendra Pal and J.S. Korlahalli, *Essentials of Business Communication*, Sultan Chand and Sons (P) Ltd, New Delhi, 2010.

I B.Tech. - I Semester

16BT1BS01: ENGINEERING CHEMISTRY

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITE: Intermediate/Senior Secondary Chemistry

COURSE DESCRIPTION: Water technology, Chemistry of Engineering materials, Nanochemistry, Green Chemistry, Electro chemical cells, Sensors, Corrosion and Lubricants.

COURSE OUTCOMES:

After completion of the course, a successful student is able to:

CO1: Acquire basic knowledge in water technology, engineering plastics, conducting polymers, composites, Electro chemical cells, Nano Chemistry, principles of Green Chemistry, corrosion phenomenon and lubricants.

CO2: Develop analytical skills in:
- a. Determination of hardness of water.
- b. Determination of viscosity, flame and fire points, cloud and pour points.

CO3: Develop designing skills in:
- a. Synthesis of engineering plastics.
- b. Chemical methods for the synthesis of Nano materials.

CO4: Develop skills for providing solutions through:
- a. Mitigation of hardness of water.
- b. Newer Nanomaterials and engineering plastics for specific applications

CO5: Acquire awareness to practice engineering in compliance to modern techniques such as:
- a. Nalgonda technique for defluoridation of water
- b. Electroplating technique for control of corrosion.

CO6: Acquire awareness to societal issues on:
- a. Quality of water.
- b. Bio-diesel
- c. Chemical materials utility and their impact.

DETAILED SYLLABUS:

UNIT–I: WATER TECHNOLOGY (9 periods)

Introduction: Types of water, impurities in water and their consequences, types of hardness of water, units of hardness of water, disadvantages of hardness of water, estimation of hardness of water by EDTA method, Boiler troubles: Scales and Sludges, Caustic embrittlement, Boiler corrosion and Priming and Foaming.

Softening of water: Zeolite process and Ion exchange process, advantages and disadvantages. Desalination of brackish water by Reverse Osmosis, Numerical problems on estimation of hardness of water.

Fluorides in water: Effects on human health, defluoridation method-Nalgonda method; comparison of merits and demerits of various defluoridation methods (Nalgonda, Bone Charcoal, Activated Alumina, Contact precipitation, Brick, Reverse osmosis).

UNIT – II: CHEMISTRY OF ENGINEERING MATERIALS (9 periods)

Engineering Plastics: Definition, general properties, synthesis, properties and applications of PC, PTFE, and PMMA.

Conducting polymers: Definition, types of conducting polymers: Intrinsic and extrinsic conducting polymers with examples, engineering applications of conducting polymers.

Biodegradable polymers: Definition, properties, classification, mechanism of degradation of biodegradable polymers and their applications.

Composites – Introduction, types of composites: fiber reinforced particulate and layered composites with examples, advantages of composites and applications.

UNIT– III: NANOCHEMISTRY AND GREEN CHEMISTRY (9 periods)

Nanochemistry: Introduction, classification, properties and applications of Nano materials (nano particles, nano tubes, nano wires, nano composites, dendrimers); synthesis of Nano materials – Sol-gel process.

Green Chemistry: Introduction, principles of green chemistry, Tools of Green Chemistry with Examples, Applications of Green Chemistry in science and technology.

Biodiesel: Introduction, Synthesis (Trans esterification method), advantages, disadvantages and applications.

UNIT–IV: ELECTROCHEMICAL CELLS AND SENSORS (9 periods)

Electrochemical cell: Introduction, EMF of an electrochemical cell.

Batteries: Introduction, types of Batteries: primary and secondary batteries with examples, Ni-Cd batteries, Lithium-ion batteries, Lithium- Polymer batteries, Applications of batteries.

Fuel Cells: Definition, examples: $H_2 – O_2$ Fuel cell, solid oxide fuel cell, Bio-fuel cell and applications of fuel cells.

Sensors - Introduction, Types of Sensors, electrochemical sensor: construction and working principle of potentiometric sensor, and applications of electrochemical sensors.

UNIT–V: CORROSION AND LUBRICANTS (9 periods)

Corrosion: Introduction, Definition, types of corrosion (dry and wet corrosion), galvanic corrosion, concentration cell corrosion, Factors influencing corrosion, Corrosion control: cathodic protection; sacrificial anodic protection and impressed current cathodic protection; protective coatings: Galvanizing and Electroplating (Nickel).

Lubricants: Definition, functions of lubricants, mechanism of lubrication, classification of lubricants, properties of lubricants – viscosity, flash and fire points, cloud and pour points, Aniline points, neutralization number and mechanical strength. **Total periods: 45 periods**

TEXT BOOKS:

1. P.C.Jain & Monika Jain, **Engineering Chemistry**, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 16th edition, 2013.
2. K.N. Jayaveera, G.V. Subba Reddy & C. Ramachandraiah **Engineering Chemistry**, Mc. Graw-Hill Higher Education, Hyderabad, 1st edition, 2015.

REFERENCE BOOKS:

1. A.K. Bandyopadhyay, **Nano Materials,** New Age international publishers, 2nd edition, 2014.
2. Paul T. Anastas and John C Warner, **Green Chemistry: Theory and practice,** Oxford University Press, 2000.

I B.Tech. - I Semester
16BT1BS03: MATRICES AND NUMERICAL METHODS
(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate /Senior secondary mathematics
COURSE DESCRIPTION: Fundamentals of matrix theory; numerical solutions of equations, curve fitting; interpolation; numerical differentiation and integration; numerical solutions of ordinary differential equations.

COURSE OUTCOMES: After completion of the course a successful student is able to

CO1: Acquire basic **knowledge** in
- (a) Finding the rank of matrices and analyzing them.
- (b) Solving algebraic and transcendental equations by various numerical methods.
- (c) Fitting of various types of curves to the experimental data.
- (d) Estimating the missing data through interpolation methods.
- (e) Identification of errors in the experimental data
- (f) Finding the values of derivatives and integrals through various numerical methods.
- (g) Solving differential equations numerically when analytical methods fail.

CO2: Develop skills in **analyzing** the
- (a) methods of interpolating a given data
- (b) properties of interpolating polynomials and derive conclusions
- (c) properties of curves of best fit to the given data
- (d) algebraic and transcendental equations through their solutions
- (e) properties of functions through numerical differentiation and integration
- (f) properties of numerical solutions of differential equations

CO3: Develop skills in **designing** mathematical models for
- (a) Fitting geometrical curves to the given data
- (b) Solving differential equations
- (c) Constructing polynomials to the given data and drawing inferences.

CO4: Develop numerical skills in **solving the problems** involving
- (a) Systems of linear equations
- (b) Fitting of polynomials and different types of equations to the experimental data
- (c) Derivatives and integrals
- (d) Ordinary differential equations

CO5: Use relevant numerical **techniques** for
- (a) Diagonalising the matrices of quadratic forms
- (b) Interpolation of data and fitting interpolation polynomials
- (c) Fitting of different types of curves to experimental data
- (d) obtaining derivatives of required order for given experimental data
- (e) Expressing the functions as sum of partial fractions

DETAILED SYLLABUS:

UNIT–I : MATRICES **(11 periods)**
Rank of a matrix, echelon form, normal form, inverse of a matrix by elementary row operations. Solutions of linear system of equations. Eigen values, Eigen vectors and properties (without proof), Diagonalization. Quadratic form (QF), reductions to canonical form using orthogonal transformation and nature of QF.

UNIT-II NUMERICAL SOLUTIONS OF EQUATIONS AND CURVE FITTING **(8 periods)**
Solutions of Algebraic and Transcendental equations by bisection method, Regula-Falsi method, Newton – Raphson's method. Curve fitting by the principle of least squares, fitting of a straight line, parabola and exponential curves.

UNIT- III INTERPOLATION **(8 periods)**
Interpolation, difference operators and their relationships, Newton's forward and backward formulae, Lagrange's interpolation formula. Partial fractions using Lagrange's interpolation formula.

UNIT-IV NUMERICAL DIFFERENTIATION AND INTEGRATION **(8 periods)**
Numerical differentiation using Newton's forward and backward formulae. Numerical integration using Trapezoidal rule, Simpson's $1/3^{rd}$ rule and $3/8^{th}$ rule.

UNIT- V NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS **(10 periods)**
Numerical solutions of first order Initial value problems using Taylor series method, Euler's method , modified Euler's method, Runge – Kutta method (4^{th}order only) and Milne's predictor – corrector method.
Total no. of periods: 45

TEXT BOOK:
1. T.K.V. Iyenger, B. Krishna Gandhi, S.Ranganadham and M.V.S.S.N.Prasad, ***Mathematical Methods,*** S.Chand and Company, 8/e, 2013

REFERENCE BOOKS:
1. B.S. Grewal, ***Higher engineering mathematics***, Khanna Publishers, 42^{nd} Edition. 2012

2. S.S.Sastry, ***Introductory methods of Numerical Analysis***, Prentice Hall of India, 5/e, 2013

I B. Tech. - I Semester

16BT1BS04: MULTI - VARIABLE CALCULUS AND DIFFERENTIAL EQUATIONS

(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate /Senior secondary mathematics

COURSE DESCRIPTION: First order differential equations; higher order linear differential equations; functions of several variables; applications of integration; multiple integrals; vector calculus.

COURSE OUTCOMES: After completion of the course a successful student is able to

CO1: Acquire knowledge in
- (a) Higher order Differential equations
- (b) Maximum and minimum values for the functions of several variables
- (c) Double and triple integrals
- (d) Differentiation and integration of vector functions.
- (e) Line and surface volume
- (f) transforming integrals from three dimensional surfaces and volumes on to plane surfaces

CO2: Develop skills in analyzing the
- (a) methods for differential equation for obtaining appropriate solutions,
- (b) Properties of oscillatory electrical circuits and heat transfer in engineering systems
- (c) The variations in the properties of functions near their stationary values
- (d) Flow patterns of fluids, electrical and magnetic flux and related aspects

CO3: Develop skills in designing mathematical models for
- (a) R-C and L-R-C oscillatory electrical circuits
- (b) Heat transfer and Newton's law of cooling
- (c) Engineering concepts involving lengths of curves and areas of planes, Flux across surfaces

CO4: Develop analytical skills in solving the problems involving
- (a) Newton's law of cooling
- (b) non homogeneous linear differential equations
- (c) maximum and minimum values for the functions
- (d) lengths of curves, areas of surfaces and volumes of solids in engineering
- (e) transformation of integrals from three dimensional surfaces and volumes on to plane surfaces

CO5: Use relevant mathematical techniques for evaluating
- (a) various types of particular integrals in differential equations
- (b) stationary values for multi variable functions
- (c) multiple integrals in change of variables
- (d) integrations of vector functions.

DETAILED SYLLABUS:

UNIT-I: FIRST ORDER DIFFERENTIAL EQUATIONS (6 periods)

Linear and Bernoulli type, exact equations and reducible to exact. Orthogonal trajectories (Both Cartesian and polar forms). Newton's law of cooling.

UNIT II: HIGHER ORDER LINEAR DIFFERENTIAL EQUATIONS (9 periods)

Method for solution of linear equations- Differential operator *D*, Solution of second order linear homogeneous equations with constant coefficients, Solution of Higher order homogeneous linear equations with constant coefficients, **Solution of Non homogeneous linear equations**-Operator methods for finding particular integrals- for cases – e^{ax}, sin ax, cos ax, x^n, $e^{ax}V(x)$, xV(x). Method of Variation of parameters. Applications to oscillatory electrical circuits.

UNIT-III: FUNCTIONS OF SEVERAL VARIABLES (8 periods)

Functions of Two Variables: Limits, Continuity; **Partial Derivatives**: Total Differential and Derivatives, Jacobian, Functional dependence, Taylor's Theorem, maxima and minima of functions of two variables with and without constraints – Lagrange's method of undetermined multipliers.

UNIT-IV: APPLICATIONS OF INTEGRATION AND MULTIPLE INTEGRALS (10 periods)

Applications of integration to – lengths of curves, areas of surfaces of revolution, Double and Triple integrals – change of order of integration, change of variables in integrals. Area enclosed by plane curves, volumes of solids.

UNIT-V: VECTOR CALCULUS (12 periods)

Vector differentiation: Gradient of a scalar field and Directional Derivative, Divergence and Curl of a Vector field

Line integrals: Line integrals independent of path – work done.

Surface area and Surface Integrals: Surface Area, Surface Integrals, Flux across a surface.

Green's Theorem: Green's Theorem (without proof)-verification- applications

Gauss Divergence Theorem and Stoke's Theorem: Gauss Divergence theorem (without proof), Stokes's Theorem (without proof) –verifications and applications. **Total no. of periods: 45**

TEXT BOOK:

1. T.K.V. Iyengar, B. Krishna Gandhi,S.Ranganatham and M.V.S.S.N. Prasad, ***Engineering Mathematics, Vol-1***, S. Chand &Company, 13/e, 2014

REFERENCE BOOKS:

1. Grewal, B.S., ***Higher engineering mathematics***,Khanna publishers, Delhi, 42/e. 2012.
2. Kreyszig, E., ***Advanced Engineering Mathematics***,John Wiley and Sons, Inc.,9/e.2012.

I B. Tech. - I Semester

(16BT10501) **PROGRAMMING IN C**

(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: NIL

COURSE DESCRIPTION:

Program design; Operators and Expressions; Data Input and Output; Control Statements; Functions; Arrays; Strings; Pointers; Structures & Unions and File handling Techniques;

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1: Demonstrate knowledge in:
- o Elements of C Language
- o Selection and Repetition statements.
- o Arrays, Strings and Functional statements.
- o Derived data types, Files and Pointers

CO2: Analyze complex engineering problems to develop suitable solutions
CO3: Design algorithms for specified engineering problems
CO4: Use appropriate 'C' language constructs for solving engineering problems
CO5: Write programs using 'C' language to implement algorithms

DETAILED SYLLABUS:

UNIT I – INTRODUCTION TO C PROGRAMMING, OPERATORS & EXPRESSIONS (08 periods)

Introduction to C Programming: The C Character set, Writing First Program of C, Identifiers and Keywords, Data types, Constants, Variables and Arrays, Declarations, Expressions, Statements and Symbolic Constants.

Operators and Expressions: Arithmetic Operators, Unary Operators, Relational and Logical Operators, Assignment Operators, the Conditional Operators.

UNIT II – DATA INPUT AND OUTPUT & CONTROL STATEMENTS (08 periods)

Data Input and Output: Single Character Input and Output, Input Data & Output data, The gets and puts Function.

Control Statements: Branching: The if-else Statement, Looping: The while Statement, More Looping: The do-while Statement, Still More Looping: The for Statement, Nested Control Statement, The switch Statement, The break & continue Statements, The goto Statement.

UNIT III – FUNCTIONS, PROGRAM STRUCTURES & ARRAYS (11 p*eriods*)

Functions: A Brief Overview, Defining a Function, Accessing a Function, Function Prototypes, Parsing Argument to a Function, Recursion.

Program Structure: Storage Classes, Automatic Variables, External (Global) Variables, Static Variables, Multi file Programs,

Arrays: Defining an Array, Processing an Array, Processing Array to function, Multidimensional Arrays. Linear search, Binary search, Fibonacci search, Bubble sort and Insertion sort

UNIT IV – STRINGS & POINTERS (09 periods)

Strings: Defining a String, NULL Character, Initialization of Strings, Reading and Writing a String, Processing a Strings, Character Arithmetic, Searching and Sorting of Strings, Library Functions for Strings.

Pointers: Pointer Declaration, Passing Pointers to a Function, Pointers and One-dimensional Arrays, Dynamic Memory Allocation, Operations on Pointers, Pointers and Multidimensional Arrays, Arrays of Pointers.

UNIT V – STRUCTURES AND UNIONS & FILE HANDLING (09 periods)

Structures and Unions: Defining a Structure, Processing a Structure, User-Defined Data types (typedef), Structures and Pointers, Passing Structures to Function, Self –Referential Structures, Unions

File Handling: Files introduction, Opening and Closing a Data File, Reading and Writing a Data File, Processing a Data File, Unformatted Data File, Concept of Binary Files, Accessing the File Randomly.

Total Periods: *45*

TEXT BOOK:

1. Byron Gottfried and Jitender Kumar C "*Programming with C*," Third Edition, McGraw Hill Education (India) Pvt, Ltd, New Delhi, 2016.

REFERENCE BOOKS:

1. PradipDey and Manas Ghosh, *"Programming in C",* Second Edition, Oxford University Press, NewDelhi, 2007.
2. E. Balagurusamy, "*Programming in C",* Seventh Edition, Mc Graw Hill Education (India) Pvt, Ltd, New Delhi, 2014.

I B.Tech. - I Semester

16BT1HS31: **ENGLISH LANGUAGE LAB**

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: English at intermediate or equivalent level.

COURSE DESCRIPTION: Phonetics; Vocabulary Building; Functional Grammar; Just a Minute; Elocution/Impromptu; Giving Directions/Conversation Starters; Role Play; Public Speaking; Describing People, Places, Objects and Events; Reading Comprehension; Listening Comprehension; Information Transfer.

COURSE OUTCOMES:

On successful completion of this course the students will be able to:

1. Demonstrate knowledge in
   a) Phonetics
   b) Information Transfer
2. Analyze the situations in professional context by using
   a) Vocabulary
   b) Grammar
3. Design and develop functional skills for professional practice.
4. Apply the techniques of Listening and Reading skills to comprehend Listening and Reading comprehension.
5. Function effectively as an individual and as a member in diverse teams through
   a) Extempore talk and b) Role Play
6. Communicate effectively in public speaking in formal and informal situations.
7. Recognize the need to engage in lifelong learning to upgrade competence of knowledge and communication.

LIST OF EXERCISES:

1. Phonetics
2. Vocabulary Building
3. Functional Grammar
4. Just a Minute
5. Elocution/Impromptu
6. Giving Directions/Conversation Starters
7. Role Play
8. Public Speaking
9. Describing People, Places, Objects and Events.
10. Reading Comprehension
11. Listening Comprehension
12. Information Transfer

Total Lab Slots: 10

TEXT BOOK:

1. Department Lab Manual

REFERENCE BOOKS:

1. D. Sudha Rani, *A Manual for English Language Laboratories*, Pearson Education.
2. D. Sudha Rani, *Advanced Communication Skills Laboratory Manual*, Pearson Education.
3. R. Manivannan and G. Immanuel, *Communication Skills Laboratory*, VK Publications, Sivakasi, 2013
4. Nira Kumar*, English Language Laboratories*, PHI Learning Pvt. Ltd., New Delhi, 2011.

SUGGESTED SOFTWARE:

1. ETNL Language Lab Software Version 4.0
2. GEMS - Globarena E- Mentoring System.
3. Speech Solutions.
4. English Pronunciation Dictionary by Daniel Jones.
5. Learn to Speak English 8.1, The Learning Company - 4 CDs.
6. Mastering English: Grammar, Punctuation and Composition.
7. English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
8. Dorling Kindersley Series - Grammar.
9. Language in Use 1, 2 & 3.
10. Cambridge Advanced Learner's Dictionary - 3rd Edition.
11. Centronix - Phonetics.
12. Let's Talk English, Regional Institute of English South India.
13. The Ultimate English Tutor.

I B.Tech. - I Semester

16BT1BS31: ENGINEERING CHEMISTRY LAB

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE REQUISITE: Intermediate/Senior Secondary Chemistry

COURSE DESCRIPTION: Estimation of hardness, alkalinity, dissolved oxygen of water samples and estimation of Iron by volumetric methods, determination of effect of P^H on rate of corrosion, measurement of viscosity of lubricants; Instrumental methods like potentiometer, conductivity meter, P^H meter and colorimeter; synthesis of Polymers and Nano materials.

COURSE OUTCOMES:

After completion of the course, a successful student is able to:

CO1: Acquire basic Knowledge about the volumetric analysis and synthesis of materials used for engineering applications.

CO2: Acquire analytical skills in the estimation of hardness of water, alkalinity of water, dissolved oxygen in water and estimation of Iron through wet laboratory methods.

CO3: Develop designing skills for the synthesis of polymers and Nanomaterials.

CO4: Acquire skills to use instrumental techniques for the determination of Electrical conductance of electrolytes, EMF of a cell, PH of a solution, determination of viscosity of lubricants and estimation of iron in cement.

CO5: Provide solutions for environmental issues through determination of quality of water.

List of Experiments:

A minimum of any **Ten** experiments are to be conducted among the following:.

1. Estimation of Hardness of water by EDTA method.
2. Estimation of alkalinity of Water.
3. Estimation of Dissolved Oxygen in water.
4. Estimation of Ferrous Iron by Dichrometry.
5. Preparation of Novalac Resin.
6. Synthesis of Nano metal-oxide using sol– gel process.
7. Conductometric titration of strong acid Vs strong base
8. Estimation of Ferrous ion by Potentiometry.
9. Determination of amount of corrosion of metals in different medium
10. Measurement of viscosity of lubricants by Ostwald viscometer.
11. Determination of P^H of a given solution by P^H metry.
12. Estimation of Ferric iron in cement by Colorimetric method.

Total Time Slots: 12

I B.Tech. - I Semester

16BT10331: **COMPUTER AIDED ENGINEERING DRAWING**

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	1	6	3

PRE-REQUISITES: *None*

COURSE DESCRIPTION:

Engineering drawing conventions; importance of engineering drawing; fundamental concepts of sketching; computed aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.

COURSE OUTCOMES:

After completion of the course, a successful student is able to:

- CO1: Understand, write and read the language of engineering drawing in industry through International System of Standards.
- CO2: Develop the imagination and mental visualization ability for interpreting the geometrical details of engineering objects.
- CO3: Produce different views and projection in drawing.
- CO4: Use modern CAD software for design and drafting of drawings.
- CO5: Create multi-view drawings suitable for presentation to Engineering community.
- CO6: Introduce and communicate universally accepted conventions and symbols for their usage in technical drawing.

DETAILED SYLLABUS:

UNIT : I - BASICS OF ENGINEERING DRAWING PRACTICE, GEOMETRICAL CONSTRUCTIONS, CONICS AND SPECIAL CURVES (18 periods)

Introduction, drawing instruments and its uses, sheet layout, BIS conventions, lines, lettering and dimensioning practices. Geometrical constructions: Construction of regular polygons: Pentagon, Hexagon, Heptagon and Octagon. Conic sections**:** Introduction, construction of ellipse: rectangular method, eccentricity method. Construction of parabola: rectangular method, eccentricity method. Construction of hyperbola: eccentricity method. Special curves***:*** cycloid, involute.

UNIT: II – INTRODUCTION TO COMPUTER AIDED SKETCHING (18 periods)

Computer screen, layout of the software, creation of 2D/3D environment, selection of drawing size and scale, Standard tool bar/menus, Coordinate system, description of most commonly used toolbars, navigational tools: commands and creation of lines, Co-ordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination and perpendicularity.

UNIT: III – PROJECTION OF POINTS, STRAIGHT LINES AND PLANES (21 periods)

Introduction, method of projection, planes of projection, reference line and notations. Projection of points: Points in all the four quadrants. Projection of straight lines**:** lines inclined to HP / VP plane, inclined to both HP and VP planes (straight lines are assumed to be in first quadrant only)**.** Projection of planes**:** projection of triangle, square, rectangle, rhombus, pentagon, hexagon and circular plane for the condition inclined to HP / VP by change of position method.

UNIT IV –PROJECTION OF SOLIDS AND SECTION OF SOLIDS (21 Periods)

Projections of Solids: Introduction, projection of solids: prisms, pyramids, cylinders and cones with axis perpendicular to VP/HP and axis inclined to VP/HP only. Sections of solids**:** Introduction, Cutting plane, sectional views of right regular solids resting with base on HP: prisms, pyramids, cylinder and cone and true shapes of the sections.

UNIT V –ORTHOGRAPHIC AND ISOMETRIC PROJECTIONS AND DEVELOPMENT OF SURFACES (22 periods)

Orthographic projection: simple exercises. Isometric projection: Simple exercises.
Development of surfaces: prisms, pyramids, cylinders, cone and miscellaneous surfaces

Total Periods: *100*

Note: *Student shall practice Unit-I using sketch book only and remaining units using sketch book first and later CAD package.*

TEXT BOOKS:

1. D.M.Kulkarni, A.P.Rastogi, A.K.Sarkar, Engineering Graphics with AutoCAD, PHI Learning Private Limited, New Delhi, Revised Edition, 2010.
2. N D Bhat & V M Panchal, Engineering Drawing, Charotar Publishing House, Gujarat, 51st edition, 2013.

REFERENCE BOOKS:

1. Sham Tickoo, AutoCAD 2013 for Engineers and Designers, Dreamtech Press, 2013.
2. M.H.Annaiah & Rajashekar Patil, Computer Aided Engineering Drawing, New Age International Publishers, 4th Edition, 2012.
3. T.Jeyapoovan, Engineering Drawing and Graphics Using AutoCAD, Vikas Publishing House, 3rd Edition, 2010.

4. Jolhe, Engineering Drawing, Tata McGraw Hill Education Private Limited, 1st Edition, 2007.
5. Basant Aggarwal, Engineering Drawing, Tata McGraw Hill Education Private Limited, 1st Edition, 2008.

I B.Tech. - I Semester

16BT10531: PROGRAMMING IN C LAB

(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on "Programming in C"

COURSE DESCRIPTION: Hands on practice in developing and executing simple programs using C Programming constructs– Conditional statements, Loops, Arrays, Strings, Functions, Structures, Pointers and Functions.

COURSE OUTCOMES:

On successful completion of this course the students will be able to:

1. Demonstrate practical knowledge of using C language constructs:
   a) Selection and Repetition statements.
   b) Arrays, Strings and Functional statements.
   c) Derived data types, Files and Pointers
2. Analyze problems to develop suitable algorithmic solutions
3. Design Solutions for specified engineering problems
4. Use appropriate 'C' language constructs for solving engineering problems
5. Implement and execute programs using 'C' language
6. Document programs and communicate effectively while conducting Professional transactions.

List of Exercises:

1. a. Let a and b are two integer variables whose values are 10 and 13 respectively. Write a program to evaluate the following arithmetic expressions.
   i) a + b ii) a–b iii) a * b iv) a/b v) a % b
   b. Write a program to evaluate the following algebraic expressions after reading necessary values from keyword.
      i) $(ax + b)/(ax - b)$
      ii) $2.5 \log x + \cos 32^0 + | x^2 + y^2|$
      iii) $x^5 + 10 x^4 + 8$ and $x^3 + 4 x + 2$
      iv) ae^{kt}
2. a. Mr. Gupta deposited Rs.1000 in a bank. The bank gives simple interest at the rate of 15% per annum. Write a program to determine the amount in Mr. Gupta's account at the end of 5 years. (Use the formula I = P T R / 100)
   b. A cashier has currency notes of denominations Rs.10, Rs. 50 and Rs. 100. If the amount to be withdrawn is input in hundreds, find the total number of notes of each denomination the cashier will have to give to the withdrawer.
   c. In a town, the percentage of men is 52. The percentage of total literacy is 48.If total percentage of literate men is 35 of the total population; write a program to find the total number of illiterate men and women if the population of the town is 8000.
3. a. Write a program that prints the given 3 integers in ascending order using if - else.
   b. Write a program to calculate commission for the input value of sales amount.
      Commission is calculated as per the following rules:
      i) Commission is NIL for sales amount Rs. 5000.
      ii) Commission is 2% for sales when sales amount is >Rs. 5000 and <= Rs. 10000.
      iii) Commission is 5% for sales amount >Rs. 10000.
   c. A character is entered through keyboard. Write a program to determine whether the character entered is a capital letter, a small case letter, a digit or a special symbol. The following table shows the range of ASCII values for various characters.

Characters	ASCII values
A - Z	65 - 90
a - z	97- 122

	0 - 9	48 - 57
Special Symbols	0 - 47, 58 - 64, 91- 96, 123 - 127	

4. a. If cost price and selling price of an item is input through the keyboard, write program to determine whether the seller has made profit or incurred loss. Also determine how much profit or loss he incurred in percentage.

   b. An insurance company calculates premium as follows:

   i. If a person's health is excellent and the person is between 25 and 35 years of age and lives in a city and is a male then premium is Rs.4 per thousand and the policy amount cannot exceed Rs.2 lakhs.

   ii. If a person satisfies all the above conditions and is female then the premium is Rs.3 per thousand and the policy amount cannot exceed Rs.1 lakh.

   iii. If a person's health is poor and the person is between 25 and 35 years of age and lives in a village and is a male then premium is Rs.6 per thousand and the policy cannot exceed Rs. 10000.

   iv. In all other cases the person is not insured.

   Write a program to determine whether the person should be insured or not, his/her premium rate and maximum amount for which he/she can be insured.

5. a. Write a program, which takes two integer operands and one operator as input from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, %. Use switch statement)

   b. Write a program to find the grace marks for a student using switch. The user should enter the class obtained by the student and the number of subjects he has failed in. Use the following rules:

   i. If the student gets first class and the number of subjects failed is >3, then no grace marks are awarded. If the number of subjects failed is less than or equal to '3' then the grace is 5 marks per subject.

   ii. If the student gets second class and the number of subjects failed in is >2, then no grace marks are awarded. If the number of subjects failed in less than or equal to '3' then the grace is 4 marks per subject.

   iii. If the student gets third class and the number of subjects failed in is >1, then no grace marks are awarded. If the number of subjects failed in is equal to '1' then the grace is 5 marks per subject.

6. a. Write a program to find the sum of individual digits of a positive integer.

   b. A Fibonacci sequence is defined as follows:

   The first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a program to generate the first N terms of the sequence.

   Write a program to generate all the prime numbers between 1 and N, where N is a value supplied by the user.

7. a. Write a program to find the largest and smallest number in a given list of integers.

   b. Write a program to perform the following:

   i. Addition of two matrices.

   ii. Multiplication of two matrices.

8. a. Write a program that uses functions to perform the following operations:

   i. To insert a sub-string in main string at a specified position.

   ii. To delete N characters from a given string from a specified position.

   b. Write a program to determine whether the given string is palindrome or not.

   c. Write a program to display the position or index in the main string S where the sub string T begins. Display -1 if S does not contain T.

   d. Write a program to count the number of lines, words and characters in a given text.

9. a. Write a program to read list of student names and perform the following operations using functions.

   i. to print list of names

   ii. to sort them in ascending order

   iii. to print the list after sorting.

   b. Write a menu driven program to read list of student names and perform the following operations using array of character pointers.

i. to insert a student name
ii. to delete a name
iii. to print the name

10. Write a program that uses functions to perform the following operations:
    i. Reading a complex number
    ii. Writing a complex number
    iii. Addition of two complex numbers
    iv. Multiplication of two complex numbers

    (**Note:** Represent complex number using a structure.)

11. a. Write a program to accept the elements of the structure as:

    Employee-name,Basic pay

    Display the same structure along with the DA, CCA and Gross salary for 5 employees.

    Note: DA=51% of Basic pay, CCA=Rs.100.consolidated.

    b. Define a structure to store employee's data with the following specifications:

    Employee-Number, Employee-Name, Basic pay, Date of Joining

    i. Write a function to store 10 employee details.
    ii. Write a function to implement the following rules while revising the basic pay.

    If Basic pay<=Rs.5000 then increase it by 15%.

    If Basic pay> Rs.5000 and <=Rs.25000 then it increase by 10%.

    If Basic pay>Rs.25000 then there is no change in basic pay.

    Write a function to print the details of employees who have completed 20 years of service from the date of joining.

12. a. Write a program which copies one 'text file' to another 'text file'.

    b. Write a program to reverse the first N characters of a given text file.

Note: The file name and N are specified through command line.

13. Write a program to print the output by giving the Customer_ID as an input.

REFERENCE BOOKS:

1. Byron Gottfried and Jitender Kumar C, "*Programming with C,*" McGraw Hill Education(India) Pvt. ltd, 3rd edition, New Delhi, 2016.
2. Pradip Dey and Manas Ghosh, "*Programming in C*," Oxford University Press, 2nd Edition,New Delhi, 2007.

I B.Tech. - II Semester

16BT1BS02: ENGINEERING PHYSICS

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate/senior secondary Physics

COURSE DESCRIPTION: Lasers; optical fibers; principles of quantum mechanics; band theory of solids; semiconductors; dielectric properties of materials; acoustics of buildings; superconductors; crystallography and nanomaterials.

COURSE OUTCOMES:

On successful completion of this course the students will be able to:

1. Acquire basic knowledge of lasers, optical fibers, quantum mechanics, dielectrics, semiconductors, and superconductors, acoustic of buildings, crystallography and anomaterials.
2. Analyze the construction and working of various laser systems, semiconductor devices, various types of optical fibers and its communication system and nano materials properties.
3. Gain skills in designing lasers, optical fiber cable, semiconductor devices, acoustically good halls and nanomaterials.
4. Develop problem solving skills in engineering context.
5. Use relevant techniques for assessing ball milling, pulsed laser deposition, p-n junction and Laser.

DETAILED SYLLABUS:

UNIT-I: LASERS AND FIBER OPTICS (11 periods)

Lasers: Introduction, characteristics of lasers, spontaneous and stimulated emission of radiation, Einstein's coefficients – condition for amplification, population inversion, Nd:YAG laser, Helium-Neon laser, semiconductor laser and applications of lasers.

Fiber optics: Introduction, principle of optical fiber, acceptance angle, acceptance cone and numerical aperture, classification of optical fibers, optical fiber communication system and applications of optical fibers.

UNIT-II: PRINCIPLES OF QUANTUM MECHANICS AND BAND THEORY OF SOLIDS (7 p*eriods*)

Principles of Quantum Mechanics: Introduction, de-Broglie's hypothesis, Schrödinger's one dimensional wave equation (time independent), significance of wave function, particle in a one dimensional potential box, Fermi-Dirac distribution and effect of temperature (qualitative treatment).

Band Theory of Solids: Electron in a periodic potential, Kronig-Penney model (qualitative treatment), origin of energy bands formation in solids, distinction between conductors, semiconductors and insulators based on band theory.

UNIT-III: SEMICONDUCTORS AND DIELECTRIC PROPERTIES OF MATERIALS (13 periods)

Semiconductors: Introduction, types of semiconductors, intrinsic carrier concentration, electrical conductivity in semiconductors, drift and diffusion currents, Einstein's relation, Hall effect and its applications, direct and indirect band gap semiconductors, p-n junction, energy band diagram of p-n diode, LED, photo diode and Solar cell.

Dielectric Properties of Materials: Introduction, dielectric constant, electronic, ionic and orientation polarizations (qualitative treatment), local field, frequency dependence of polarizability (qualitative treatment), ferroelectricity.

UNIT-IV: ACOUSTICS OF BUILDINGS AND SUPERCONDUCTIVITY (7 periods)

Acoustics of Buildings: Introduction, basic requirement of acoustically good hall, reverberation and time of reverberation, Sabine's formula for reverberation time (qualitative treatment), absorption coefficient of sound and its measurement, factors affecting the architectural acoustics and their remedies.

Superconductivity: Introduction, General properties - Meissner effect, penetration depth, Type-I and Type-II superconductors, flux quantization, Josephson effects, BCS theory (qualitative treatment), applications of superconductors.

UNIT-V: CRYSTALLOGRAPHY AND NANOMATERIALS (7 p*eriods*)

Crystallography: Introduction, crystal planes, crystal directions and Miller indices, separation between successive (hkl) planes, X-ray diffraction by crystal planes, Bragg's law- powder method.

Nanomaterials: Introduction, principles of nanomaterials, properties of nanomaterials, synthesis of nanomaterials by ball milling and pulsed laser deposition and applications of nanomaterials.

Total Periods: 45

TEXT BOOK:

1. P. K. Palaniswamy, *Engineering Physics*, Scitech Publications India Private Limited, 2nd Edition, 2009.

REFERENCE BOOKS:

1. Dr. S. Mani Naidu*, Engineering Physics*, Pearson Education, 1st Edition, 2013.

2. M.N. Avadhanulu, P.G. Kshirsagar, *A textbook of Engineering Physics*, S.Chand & Company Ltd. Revised Edition, 2014.
3. K. Thyagarajan, *Engineering Physics-I*, McGraw-Hill Education (India) Pvt.Ltd., 2015.

I B.Tech. - II Semester

16BT2BS01: TRANSFORMATION TECHNIQUES AND PARTIAL DIFFERENTIAL EQUATIONS

(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITE: Intermediate /Senior secondary mathematics

COURSE DESCRIPTION: Fourier series; Fourier integrals and transforms; Laplace transforms; z – transforms; partial differential equations.

COURSE OUTCOMES:

After completion of the course a successful student is able to

CO1: Acquire basic knowledge in
- (a) Fourier series and Fourier transforms
- (b) Fourier integrals
- (c) Laplace transforms and their applications
- (d) z- transforms and their applications
- (e) solving partial differential equations

CO2: Develop skills in analyzing the
- (a) Properties of Fourier series for a given function
- (b) Partial differential equations through different evaluation methods
- (c) Difference equations through z – transforms
- (d) Engineering systems and processes involving wave forms and heat transfer

CO3: Develop skills in designing mathematical models for
- (a) Problems involving heat transfer and wave forms
- (b) Engineering concepts involving, Fourier transforms, Fourier integrals, Laplace transforms, z-transforms and difference equations

CO4: Develop analytical skills in solving the problems involving
- (a) Fourier series and Fourier transforms
- (b) Laplace transforms
- (c) Z-transforms and difference equations
- (d) Heat transfer and wave motion

CO5: Use relevant transformation techniques for
- (a) Obtaining Fourier transforms for different types of functions
- (b) Laplace transforms
- (c) Z- transforms
- (d) Partial differential equations

DETAILED SYLLABUS

UNIT- I : FOURIER SERIES **(7 periods)**

Fourier series: Determination of Fourier coefficients, convergence of Fourier series (Dirichlet's conditions), Fourier series of even and odd functions, Half-range Fourier sine and cosine expansions.

UNIT- II: FOURIER INTEGRALS AND FOURIER TRANSFORMS **(8 periods)**

Fourier integral theorem (statement only), Fourier sine and cosine integrals, Fourier transform, Fourier sine and cosine transforms –properties, Inverse transform and finite Fourier transforms.

UNIT-III: LAPLACE TRANSFORMS **(12 periods)**

Laplace transforms of standard functions. Properties of Laplace transforms. First and second shifting Theorems. Laplace transforms of derivatives and integrals. Inverse transforms. Convolution theorem (without proof), inverse Laplace transforms by convolution theorem. Laplace transform of periodic functions, Applications of Laplace transforms to ordinary differential equations of first and second order with constant coefficients.

UNIT-IV: Z- TRANSFORMS **(9 periods)**

Z – transforms, inverse Z– transforms, damping rule, shifting rule, initial and final value theorems. Convolution theorem (without proof), solution of difference equations by Z– transforms.

UNIT – V: PARTIAL DIFFERENTIAL EQUATIONS **(9 periods)**

Formation of Partial differential equations – Solutions of first order linear equations by method of grouping. First and second order equations by method of separation of variables – Solutions of one dimensional Wave equation, Heat equation. **Total no. of periods: 45**

TEXT BOOKS:

1. T.K.V. Iyengar, B. Krishna Gandhi,S.Ranganadham and M.V.S.S.N. Prasad,***Engineering Mathematics, vol-1***, S. Chand & Company 13/e,2014.
2. T.K.V. Iyenger, B. Krishna Gandhi, S.Ranganadham and M.V.S.S.N.Prasad, ***Mathematical Methods,***S.Chand and Company, 8/e,2013.

REFERENCE BOOKS:

1. Grewal, B.S., ***Higher Engineering Mathematics***,Khanna publishers, Delhi, 42/e,2012.

2. Kreyszig, E., ***Advanced Engineering Mathematics***,John Wiley and Sons, Inc.,9/e,2013.

I B.Tech. - II Semester
16BT20441: BASIC ELECTRONIC DEVICES AND CIRCUITS
(Common to CSE, CSSE & IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: A course on Engineering Physics.
COURSE DESCRIPTION:
Characteristics of general and special purpose electronic devices; Rectifiers; Biasing of BJT; FET, Feedback Amplifiers, Oscillator.
COURSE OUTCOMES: On successful completion of this course the students will be able to
CO1: Gain in-depth knowledge in
- *p-n* junction diode and its characteristics
- Zener diode and its characteristics
- Rectifiers and Filters
- Characteristics of BJT, FET, MOSFET and special purpose electronic devices.
- FET amplifiers
- Feedback amplifiers and Oscillators

CO2: Analyze numerical and analytical problems in
- Rectifiers using Filters
- Transistor biasing circuits
- FET biasing circuits and amplifiers
- Feedback amplifiers and oscillators

CO3: Design electronic circuits such as
- Rectifiers with and without filters
- BJT and FET biasing circuits
- FET amplifiers
- Feedback amplifiers and oscillators

CO4: Solve engineering problems and arrive at solutions pertaining to electronic circuits.
CO5: Select appropriate technique for transistor biasing.

DETAILED SYLLABUS
UNIT-I: *P-N JUNCTION DIODE AND RECTIFIERS* **(10 Periods)**
P-N JUNCTION DIODE
P-N Junction Diode Equation, Volt-Ampere (V-I) Characteristics, Temperature Dependence of V-I Characteristics, Ideal Versus Practical, Static and Dynamic Resistances, Diode Equivalent circuits, Junction capacitances, Break down mechanisms in semiconductor Diodes, Zener Diode Characteristics.
RECTIFIERS
Halfwave rectifier and Fullwave rectifiers (Qualitative and quantitative analysis), Harmonic components in a rectifier circuit, Inductor filter, Capacitor filter, L - section filter, ð - section filter, Problems on rectifier circuits.
UNIT-II: *BIPOLAR JUNCTION TRANSISTOR AND BIASING* **(11 Periods)**
CHARACTERISTICS:
Transistor construction, BJT Operation, Transistor as an amplifier, Transistor currents and their relations, Input and Output Characteristics of a Transistor in Common Emitter, Common Base and Common Collector Configurations, BJT specifications, transistor hybrid model for CE configuration – analytical expressions for transistor characteristics.
BIASING:
Transistor biasing, Operating Point, DC and AC Load Lines, Importance of Biasing, Fixed Bias, Emitter Feedback Bias, Collector to Emitter Feedback Bias, Voltage Divider Bias.
UNIT-III: *FIELD EFFECT TRANSISTOR* **(10 Periods)**
Construction, Principle of Operation and Characteristics of JFET and MOSFET (Enhancement & Depletion), Biasing of FET, Small Signal Model of JFET & MOSFET. Common Source and Common Drain Amplifiers using FET, Generalized FET Amplifier, FET as Voltage Variable Resistor, Comparison between BJT and FET.
UNIT-IV: *FEEDBACK AMPLIFIERS AND OSCILLATORS* **(8 Periods)**
Feedback Concepts, Types of Feedback Circuits (block diagram representation), General characteristics of negative feedback amplifier, Effect of Feedback on Amplifier characteristics. Barkhausen criterion, Hartley & Colpitts oscillators, Phase Shift Oscillators and Crystal Oscillator.
UNIT-V: *SPECIAL PURPOSE ELECTRONIC DEVICES* **(6 Periods)**
Principle of Operation and Characteristics of Tunnel Diode, Uni-Junction Transistor (UJT), Varactor Diode, Silicon Control Rectifier (SCR). Principle of operation of Schottky Barrier Diode.
Total Periods: 45

TEXT BOOKS:
1. J. Millman, Christos C. Halkias and Satyabrata Jit, *Electronic Devices and Circuits,* 3rd Edition, TMH, 2010.

REFERENCE BOOKS:
1. R.L. Boylestad and Louis Nashelsky, *Electronic Devices and Circuits,* 10th Edition, PHI, 2009.

2. S. Salivahana, N. Suresh Kumar, *Electronic Devices and Circuits*, 3rd Edition, Mc-Graw Hill, 2013.
3. David A. Bell, *Electronic Devices and Circuits,* 5th Edition, Oxford University press, 2014.

I B.Tech. - II Semester

16BT21201: OBJECT ORIENTED PROGRAMMING THROUGH C++

(Common to CSE, CSSE & IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	4	1	-	4

PREREQUISITES: A Course on "Programming in C".

COURSE DESCRIPTION:

Introduction to Object Oriented concepts and Fundamental Concepts of C++; Decision Making Statements, Looping Statements and Functions; Arrays, Pointers & References and Strings; Classes & Objects and Overloading Operators; Composition & Inheritance, Templates, Iterators & Generics and File Handling;

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

CO1: Demonstrate knowledge on object oriented programming concepts - Object, Class, Inheritance, Polymorphism, Encapsulation, Abstraction and Message passing.

CO2: Identify object oriented concepts for code reusability and optimization.

CO3: Design and develop solutions for given specifications.

CO4: Demonstrate problem solving skills to provide software solutions to real world problems.

CO5: Develop C++ programming to provide solutions to complex engineering problems using object oriented concepts.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION AND FUNDAMENTAL CONCEPTS (Periods: 10)

An introduction to object technology: Objects and methods, Object: A practical example, Classes, Declaring classes and objects.

Key Object Orientation concepts and Elementary C++ programming: Abstraction, Encapsulation, Aggregation/composition, Inheritance, Some simple programs, The output operator, Characters and literals, Variables and their declarations, Program tokens, Initializing variables, Objects, variables and constants, The input operator.

Fundamental types: Numeric data types, The Boolean types, Enumeration types, Character types, Integer types, Arithmetic operators, The increment and decrement operators, composite Assignment operators, Floating –point types, Type conversions, Numeric overflow, Round-off error, The format for floating –point values, Scope.

UNIT-II: DECISION MAKING STATEMENTS, LOOPING STATEMENTS AND FUNCTIONS (Periods:10)

Decision making statements: The if statement, The if-else statement, Keywords, Comparison operators, Statement blocks, Compound Conditions, Short- circuiting, Boolean expressions, Nested selection statements, The else-if statement, The switch statement, The conditional expression operator.

Looping Statements: The while statements, Terminating a loop, the do-while statement, the for statement, the break statement, the continue statement, the goto statement, Generating pseudo-random numbers

Functions: Introduction, Standard c++ library functions, User-defined functions, Test drivers, function declarations and definitions, Local variables and functions, void functions, Boolean functions, I/O functions, passing by reference, passing by constant reference, Inline functions, Scope, Overloading, The main () function, Default arguments

UNIT-III: ARRAYS, POINTERS & REFERENCES AND STRINGS (Periods: 12)

Arrays: Introduction, processing arrays, initializing an array, Array index out of bounds, passing an array to a function, the linear search algorithm, the bubble sort algorithm, the binary search algorithm, Using arrays with enumeration types, Type definitions, Multidimensional arrays.

Pointers and References: The reference operator, References, Pointers, the dereference operator, Derived types, Objects and lvalues, Returning a reference.

C++ Strings: Introduction, working with strings in C++, String manipulation, Strings and arrays, miscellaneous string functions, String streams

UNIT-IV: CLASSES & OBJECTS AND OVERLOADING OPERATORS (Periods: 12)

Classes and objects: Introduction, Class declarations, Constructors, Constructor initialization lists, Access functions, Private member functions, The copy constructor, The class destructor, Constant Objects, Structures, Pointers to object, Static data members, static function members, predefined classes, Data hiding and encapsulation, Exception handling

Overloading Operators: Introduction, Overloading the assignment operator, The this operator, Overloading Arithmetic operator, Overloading the arithmetic assignment operator, Overloading the relational patterns, Overloading the stream operators, Conversion operators, Overloading the increment and decrement operators, Overloading the subscript operator

UNIT-V: COMPOSITION & INHERITANCE, TEMPLATES, ITERATORS & GENERICS AND FILE HANDLING (Periods: 11)

Composition and inheritance: Introduction, Composition, Inheritance, protected class members, Overriding and dominating inherited members, private access versus protected access, virtual functions and polymorphism, virtual destructors, Virtual functions, pure virtual functions, Abstract classes, object-oriented programming.

Templates, iterators and Generics: Introduction, Function templates, Class templates, Container classes, Subclass templates, passing template classes to template parameters, Iterator classes, Generic programming

C++ File Handling: File I/O **(Total Periods: 55)**

TEXT BOOKS:

1. John R Hubbard, *Programming with C^{++}*, 3rd Edition, Tata McGraw-Hill, 2010.
2. P. B. Mahapatra, "Thinking in C^{++}", 1st Edition, Galgotia Publications Pvt. Ltd, 2005.

REFERENCE BOOKS:

1. Sourav Sahay, Object Oriented Programming with C^{++}, 2nd Edition, Oxford University Press, 2012.

I B.Tech. - II Semester

16BT21501: **DIGITAL LOGIC DESIGN**

(Common to CSE, CSSE & IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -NIL-

COURSE DESCRIPTION: Introduction to number systems; logic gates; Boolean Algebra; simplification of Boolean functions; Design of combinational circuits; Design of sequential circuits, Memory and Programmable Logic

COURSE OUTCOMES:

On Successful completion of this course student will be able to:

CO1. Demonstrate knowledge on Boolean algebra, Minimization of Boolean functions using Map Reduce method.

CO2. Identify appropriate simplification techniques for Boolean functions.

CO3. Design combinational and sequential logic circuits, memory and programmable logic for digital systems.

CO4. Select and Apply Boolean algebra and gate level minimization techniques for designing combinational and sequential logic circuits.

CO5. Learn independently new concepts, new techniques and advanced subject knowledge in the area of combinational and sequential logic circuits.

DETAILED SYLLABUS:

UNIT I – BINARY SYSTEMS AND BOOLEAN ALGEBRA (10 periods)

Digital Systems, Binary Numbers, Number base conversions, Octal and Hexadecimal Numbers, Signed binary numbers, other binary codes, complements. Boolean Algebra, Boolean functions, Canonical and standard forms, Digital logic gates

UNIT II – GATE LEVEL MINIMIZATION (9 periods)

The K-map method - Four-variable map, Five-Variable map, product of sums and sum of products simplification, Don't-care conditions, NAND and NOR implementations, other Two-level implementations, Exclusive – OR function

UNIT III – COMBINATIONAL LOGIC (9 p*eriods*)

Combinational Circuits, Analysis procedure, Design procedure, Binary Adder-Subtractor, BCD Adder, Carry- Look- ahead adder, Binary multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers, De-Multiplexers.

UNIT IV – SEQUENTIAL LOGIC (9 periods)

Latches, Flip-Flops, Analysis of clocked sequential circuits, Design of synchronous sequential circuits, registers, shift registers, Ripple counters, Synchronous counters, Ring Counter and Johnson Counter.

UNIT V–MEMORY AND PROGRAMMABLE LOGIC (8 p*eriods*)

Random-Access Memory, Memory Decoding, Error Detection and Correction, Read-only memory, Programmable logic Array, programmable Array logic, Sequential Programmable Devices.

Total Periods: *45*

TEXT BOOK:

1. M. Morris Mano, "Digital Design", Third Edition, Pearson Education/PHI, 1999.

REFERENCE BOOKS:

1. David J Comer, "Digital Logic and State Machine Design", Third Edition, Oxford University Press, 2012.
2. Charles H.Roth Jr, "Fundamentals of Logic Design", Fifth edition, Cengage Learning, 2008.

3. A. Anand Kumar, “Switching Theory and Logic Design”, Prentice-Hall of India Pvt. Limited, 2010.

I B.Tech. - II Semester

16BT1BS32: ENGINEERING PHYSICS LAB

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Intermediate / senior secondary Physics.

COURSE DESCRIPTION:

Characteristics of p-n junction diode, Photodiode, LED, and semiconductor laser diode. Experimental determination of carrier concentration and energy gap of a semiconductor material, wave length of a laser source, size of fine particle, numerical aperture and acceptance angle of optical fiber. Determination of frequency of electrically vibrating tuning fork and A.C source using A.C sonometer, magnetic field along axial line of a current carrying coil and rigidity modulus of material of a wire using torsional pendulum.

COURSE OUTCOMES:

After completion of the course, a successful student will be able to:

CO1: Acquire basic knowledge about semiconductor materials, magnetic materials and lasers.

CO2: Acquire analytical skills in the estimation of carrier concentration of semiconductor materials and characterization of p-n junction.

CO3: Develop skills in designing electronic circuits using semiconductor components.

CO4: Acquire skills to use instrumental techniques in A.C sonometer and Melde's experiment.

CO5: Apply diffraction techniques for determination of size of tiny particles and wave length of lasers.

ENGINEERING PHYSICS LAB

Conduct a minimum of any **Ten** of the following experiments.

1. Determination of wavelength of a laser source using Diffraction Grating.
2. Determination of particle size by using a laser source.
3. Determination of Numerical aperture and acceptance angle of an optical fiber.
4. Melde's experiment - transverse & longitudinal modes.
5. Magnetic field along the axis of a current carrying coil- Stewart and Gee's method.
6. Calculation of A.C frequency using sonometer.
7. I-V Characteristics of a p-n Junction diode.
8. Energy gap of a material of a p-n Junction.
9. Characteristics of LED source.
10. Characteristics of Photo diode.
11. Hall Effect.
12. Determination of rigidity modulus of the material of the wire using torsional pendulum.

I B.Tech. - II Semester

16BT20451: **ANALOG AND DIGITAL ELECTRONICS LAB**

(Common to CSE, CSSE & IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Courses on "Basic Electronic Devices & Circuits and Digital Logic Design"

COURSE DESCRIPTION: Identification and testing of active and passive components; RPS, DMM, Function Generator, CRO; Diode characteristics; Rectifiers; BJT and FET characteristics; UJT and SCR characteristics; BJT Amplifiers; Realization of FFs, Combinational Circuits, sequential Circuits; Demonstration on VHDL Programme.

COURSE OUTCOMES: On successful completion of this course, the student will be able to:

CO1. Demonstrate knowledge in different electronic devices, analog and digital circuits

CO2. Analyze the characteristics of different electronic devices and circuits like
- Diodes p-n Junction Diodes, Zener Diodes, SCR
- Transistors-BJT,FET,UJT
- Flip Flops-JK FF, D FF
- Combinational Circuits-HA, FA
- Sequential Circuits -Counters

CO3. Design electronic circuits like FET Amplifiers, Feedback amplifiers, Oscillators, Combinational Circuits and Sequential Circuits.

CO4. Solve engineering problems by proposing potential solutions through Design of better electronic circuits.

CO5. Model an electronic circuit which fulfil the needs of the society.

CO6: Function effectively as an individual and as a member in a group

CO7: Communicate effectively in verbal and written form.

DETAILED SYLLABUS:

PART A

ELECTRONIC WORKSHOP PRACTICE (Only for Viva-Voce)

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards. Identification, Specifications and Testing of Active Devices: Diodes, BJTs, Low-power JFETs, MOSFETs, LEDs, LCDs, SCR, UJT, Linear and Digital ICs.

PART B

ANALOG DEVICES AND CIRCUITS (Minimum seven experiments to be conducted)

1. p-n Junction and Zener diodes characteristics
2. Ripple Factor and Load Regulations of Rectifier with and without filters (Full wave or Half wave)
3. Input and Output characteristics of Transistor in CE configuration
4. Drain and Transfer Characteristics of JFET
5. Gain and Frequency response of FET Amplifier
6. Gain and Frequency response of Feedback Amplifier (Voltage series or current series)
7. Frequency of oscillations of Hartley and Colpitts Oscillator
8. UJT relaxation oscillator
9. SCR characteristics

PART C

DIGITAL CIRCUITS

Realization of

1. Flip Flops using Logic Gates
2. Two Problems on Combinational Circuits
3. Asynchronous Counter
4. Synchronous Counter

Demonstration of
VHDL Programme

I B.Tech. - II Semester

16BT21231: **IT WORKSHOP**

(Common to CSE, CSSE & IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: -

COURSE DESCRIPTION:

Practice sessions on PC hardware, Internet, World Wide Web, LibreOffice Suite. Demonstrations on installations of system software such as MS-Windows, Linux and device drivers, hardware and software troubleshooting, and protecting the personal computer from viruses and other cyber attacks are include.

COURSE OUTCOMES:

On successful completion of this course the students will be able to:

1. Demonstrate analytical skills in:
   a) Identification of functional parts of PC
   b) Internet and World Wide Web.
   c) Computer security issues and preventive measures.
   d) Operating Systems.
2. Design document and presentations effectively.
3. Apply modern tools to develop IT based applications.
4. Demonstrate effective communication skills through IT tools.
5. Update knowledge and skills in PC maintenance and usage of latest Operating Systems and Office automation tools.

LIST OF EXERCISES:

1. PC Hardware

a). Identify the peripherals of a personal computer, components in a Central Processing Unit (CPU) and its functions, block diagram of CPU along with the configuration of each peripheral.

b). Demonstrating assembling and disassembling of the Personal Computer.

c). Introduction to Operating Systems, components of OS, installation of Microsoft Windows-XP Operating System.

2. Operating System

a) Introduction to LINUX OS, installation of LINUX OS, Basic commands in LINUX - cat, ls, pwd, rm, rmdir, cd, cp, mv, who, date, cal, clear, man, wc

b) Introduction to DOS, Basic DOS commands – mkdir, cd, cls, del, copy, attrib, date, path, type, format, exit.

3. Hardware & Software Troubleshooting: Diagnosis of PC malfunction, types of faults, common issues and how to fix them. Basic Hardware & Software troubleshooting steps, PC diagnostic tools.

4. Libre Office:

a) Libre Writer

Introduction to **Writer**, importance of **Writer** as Word Processor, overview of toolbars, saving, accessing files, using help and resources.

i). Create a document using the features: Formatting fonts, drop cap, bullets and numbering, text effects, character spacing, borders and shading, tables, text direction, hyperlink, headers and footers, date and time.

ii). Create a document in using the features: picture effects, clipart, auto shapes & grouping, page setup, paragraph indentation, wrap text, footnote and equations.

5. **Libre Calc**

a). Introduction to **Calc** as a spreadsheet tool, overview of toolbars, accessing, saving **Calc** files, using help and resources.

i). Create a spreadsheet using the features: gridlines, format cells, auto fill, formatting text, formulae, table and charts.

ii). Create a spreadsheet using the features: split cells, text to columns, sorting,filter, conditional formatting, freeze panes, pivot tables, data validation.

6. **Libre Impress:**

a). Demonstration on **Impress** , utilities, overview of toolbars, PPT orientation, slide layouts, types of views.

i). Create a Presentation using the features: slide layouts, inserting text, formatting text, bullets and numbering, auto shapes, hyperlinks, pictures, clip art, audio, video, tables and charts.

ii). Create a Presentation using the features: slide design, slide hiding, slide transition, animation, rehearse timings and custom slideshow

7. **Libre Draw:** Draw vector graphics and flowcharts using Libre draw tools.

8. **LibreBase:** Create a sample database using Libre Base(Ex: Student database).

9. Introduction LaTeX Tool. Create a document using the features: formatting fonts, applying text\ effects, insert pictures and images, using date and time option.

10. **Internet & Computer Security**

Introduction to computer networking, demonstration on network components, drivers loading and configuration settings, mapping of IP addresses, configuration of Internet and Wi-Fi.

11. **Search Engines and Cyber Hygiene:**

Working of search engine, Awareness of various threats on Internet, types of attacks and how to overcome. Installation of antivirus software, configuration of personal firewall and Windows update on computers.

12. Students should implement exercises 6 to 9 using MS- Office tool.

REFERENCE BOOKS:

1. Vikas Gupta, *Comdex Information Technology Course Tool Kit,* WILEY Dreamtech, 2nd Edition, New Delhi, 2006.
2. ITL Education, *Introduction to Information Technology,* Pearson Education, 2nd Edition, New Delhi, 2005.
3. Leslie Lamport, *A Document preparation system LATEX users guide and reference manual*, 2nd Edition.
4. *IT Workshop Laboratory Manual*, Department of IT, SVEC, 2014.
5. www.libreoffice.org.

I B.Tech. - II Semester

16BT21232: **OBJECT ORIENTED PROGRAMMING LAB**

(Common to CSE, CSSE & IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: A Course on "OOPS through C++".

COURSE DESCRIPTION: Hands-on experience on creating Virtual machines on Windows and Linux platforms, Development of Service based web applications & their deployment and Mobile app development.

COURSE OUTCOMES:

On successful completion of this course the students will be able to:

1. Demonstrate practical knowledge on Object oriented programming concepts - Object, Class, Inheritance, Polymorphism, encapsulation, Abstraction, message passing.
2. Apply object oriented programming concepts to develop real world applications.
3. Demonstrate Problem solving skills using basic and advanced concepts of C++.
4. Work individually and in teams collaboratively in implementing the applications.
5. Demonstrate communication skills both oral and written for preparing and presenting reports.

LIST OF EXERCISES:

1) A. Write a C++ program that takes length as input in feet and inches. The program should then convert the lengths in centimeters and display it on screen. Assume that the given lengths in feet and inches are integers.
   B. Write a C++ program to find the sum for the given variables using function with default arguments.
2) Implement the Number Guessing Game in C++ with the given instructions. In this game the computer chooses a random number between 1 and 100, and the player tries to guess the number in as few attempts as possible. Each time the player enters a guess, the computer tells him whether the guess is too high, too low, or right. Once the player guesses the number, the game is over.
3) Write a program to perform arithmetic operations on two numbers. The program must be menu driven, allowing to select the operation (+, -, *, or /) and input the numbers. Furthermore, the program must consist of following functions:
   i) Function showChoice: This function shows the options and must explain how to enter data.
   ii) Function add: This function accepts two number as arguments and returns sum.
   iii) Function subtract: This function accepts two number as arguments and returns their difference.
   iv) Function multiply: This function accepts two number as arguments and returns product.
   v) Function divide: This function accepts two number as arguments and returns quotient.
4) Write a menu driven C++ program with following option
   a. Accept elements of an array
   b. Display elements of an array
   c. Sort the array using bubble sort method Write C++ functions for all options. The functions should have two parameters name of the array and number of elements in the array.
5) X. Y, Z are arrays of integers of size M, N, and M + N respectively. The numbers in array X and Y appear in descending order. Write a user-defined function in C++ to produce third array Z by merging arrays X and Y in descending order.
6) A. Write a program to enter any number and find its factorial using constructor.
   B. Write a program to generate a Fibonacci series using copy constructor.
7) Write a program to perform addition of two complex numbers using constructor overloading. The first constructor which takes no argument is used to create objects which are not initialized, second which takes one argument is used to initialize real and imaginary parts to equal values and third which takes two argument is used to initialized real and imaginary to two different values.
8) A. Write a program to overload unary increment (++) operator.
   B. Write a program to overload binary + operator.
9) A. Define a class TEST in C++ with following description:

Private Members
TestCode of type integer
Description of type string
NoCandidate of type integer
CenterReqd (number of centers required) of type integer
A member function CALCNTR() to calculate and return the number of centers as (No Candidates/100+1)
Public Members
- A function SCHEDULE() to allow user to enter values for TestCode, Description, NoCandidate & call function CALCNTR() to calculate the number of Centres
- A function DISPTEST() to allow user to view the content of all the data members

b. Define a class REPORT with the following specification:
Private members :

adno	4 digit admission number
name	20 characters
marks	an array of 5 floating point values
average	average marks obtained
GETAVG()	a function to compute the average btained in five subject

Public members:
READINFO(): function to accept values for adno, name, marks. Invoke the function GETAVG()
DISPLAYINFO(): function to display all data members of report on the screen.
You should give function definitions.

10) A. Create a base class basic_info with data members name ,rollno, gender and two member functions getdata and display. Derive a class physical fit from basic_info which has data members height and weight and member functions getdata and display. Display all the information using object of derived class.
B. Create a class called LIST with two pure virtual function store() and retrieve(). To store a value call store and to retrieve call retrieve function. Derive two classes stack and queue from it and override store and retrieve.
11) A. Write a program to define the function template for swapping two items of the various data types such as integer, float, and characters.
B. Write a program to define the class template for calculating the square of given numbers with different data types.
12) A. Write a C++ program to write number 1 to 100 in a data file NOTES.TXT.
B. Write a program to read a set of lines from the keyboard and to store it on a specified file.

***Any one of the following Mini Projects to be implemented by a group of four to five students.**

1) Mini Project : Banking System
Develop an application on BANKING SYSTEM which has account class with data members like account number, name, deposit, withdraw amount and type of account. Customer data is stored in a binary file. A customer can deposit and withdraw amount in his account. Must support the features of creation, modifying and deletion account any time.
2) Mini Project : Library Management System
Develop an application on LIBRARY MANAGEMENT SYSTEM which has book and student class with data members like book no, bookname, authorname. Books records is stored in a binary file. A student can issue book and deposit it within 15 days. Student is allowed to issue only one book. Student Records are stored in binary file. Administrator can add, modify or delete record.
3) Mini Project : Supermarket Billing System
Develop a simple console application for SUPERMARKET BILLING SYSTEM which has product class with data members like product no, product name, price, quantity, tax, discount. Product details is stored in a binary file. A customer can purchase product and his invoice generated. Administrator can create, modify, view and delete product record.

REFERENCE BOOKS:

1. John R Hubbard, *Programming with C++,* Tata McGraw-Hill, 3rd Edition, 2010.
2. Sourav Sahay, *Object Oriented Programming with C++,* Oxford University Press, 2nd Edition, 2012.

II B. Tech. – I Semester

(16BT3BS01) **PROBABILITY DISTRIBUTIONS AND STATISTICAL METHODS**

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: Intermediate/senior secondary mathematics

COURSE DESCRIPTION: Random variables; mathematical expectations; probability distributions; correlation and regressions; statistical quality control; sampling distributions; tests for small and large samples and their significances.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1.Acquire basic knowledge in
- (a) probability distributions, correlation and regressions
- (b) statistical quality control and testing of hypotheses
- (c) Simple linear regression
- (d) Tests of significance for small and large samples

CO2.Develop skills for analyzing the data with
- (a) mathematical expectations for realistic results
- (b) probability distributions for practical situations.
- (c) control charts of statistical quality control
- (d) correlation and regression concepts
- (e) suitable tests of significance for practical situations.

CO3. Develop skills in designing
- (a) probability distributions
- (b) limitations of statistical quality control
- (c) control charts,
- (d) X, R, np, and c charts

CO4. Develop analytical skills for solving problems involving
- (a) probability distributions, means, variances and standard deviations
- (b) statistical techniques employed for quality
- (c) sampling techniques for decision making
- (d) Tests of significances for small and large samples

CO5. Use relevant probability and statistical techniques for
- (a) Mathematical expectations of desired results
- (b) Fitting probability distributions for experimental data.
- (c) Quality control and testing of hypothesis.

DETAILED SYLLABUS

UNIT I: RANDOM VARIABLE AND MATHEMATICAL EXPECTATIONS (09 Periods)

Random Variables: Discrete and Continuous random variables, Distribution function of random variable, Properties, Probability mass function, Probability density function, Mathematical expectation, Properties of Mathematical expectation, Mean and Variance.

UNIT II: PROBABILITY DISTRIBUTIONS (09 Periods)

Discrete Distributions: Binomial and Poisson Distributions, Mean, variance and standard deviations.

Continuous Distributions: Normal Distribution, Mean, Variance and properties.

UNIT III: CORRELATION, REGRESSION AND STATISTICAL QUALITY CONTROL (09 Periods)

Definition of correlation, correlation coefficient, Rank correlation. Simple linear regression, regression lines and properties.

Introduction, advantages and limitations of statistical quality control, Control charts, specification limits, , R, np and c charts.

UNIT IV: SAMPLING DISTRIBUTIONS AND TEST OF SIGNIFICANCE FOR LARGE SAMPLES (09 Periods)

Population and Sample, Parameter and Statistic, Sampling Distribution of Statistic, Standard Error of Statistic, Null and Alternative Hypothesis, Type I and II errors, Level of Significance, Critical region, Degrees of freedom. Tests of significance for proportions and means.

UNIT V: TEST OF SIGNIFICANCE FOR SMALL SAMPLES (09 Periods)

Student’s t-test: single mean, difference of means, F-test for equality of population variance, Chi-Square Test for Goodness of fit, contingency table, Chi-Square Test for Independence of Attributes.

Total Periods: 45

TEXT BOOKS:

1. T.K.V. Iyengar, B. Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad, *Probability and Statistics*, S. Chand & Company, 4th Edition,2013.
2. S.P.Gupta, *Statistical Methods*, Sultan and Chand, New Delhi, 28th Edition, 2005.

REFERENCE BOOKS:

1. S.C.Gupta and V.K.Kapoor, *Fundamentals of Applied Statistics*, Sultan and Chand, New Delhi., 11th Edition, 2004.
2. Shahnaz Bathul, *A text book of Probability and Statistics*, Ridge Publications, 2nd Edition, 2007.

II B. Tech. – I Semester

(16BT30501) **COMPUTER ORGANIZATION**

(Common to CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Digital Logic Design

COURSE DESCRIPTION:

Basic structure and operation of a digital computer; Organization and functional principles of the arithmetic and logic unit, control unit, memory unit and I/O unit; Concepts of pipelining and parallel processing techniques;

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:

- Computer Arithmetic units
- Register Transfer and Computer Instructions
- Design of Control Unit
- Input Output Organization and Memory system
- Pipelining and Multiprocessing.

CO2. Analyze the functional units of a digital computer.

CO3. Design the functional modules in a digital computer - Arithmetic Units, Memory and I/O.

CO4. Investigate the performance of memory, I/O, and pipelined processors.

CO5. Select appropriate techniques of I/O, Pipelining and Multiprocessing to solve computing problems.

CO6. Apply contextual knowledge of computer systems development to societal applications.

DETAILED SYLLABUS:

UNIT I:REGISTER TRANSFER & MICROOPERATIONS AND COMPUTER ARITHMETIC (09 Periods)

Register Transfer And Microoperations: Register transfer, Bus and memory transfers, Arithmetic microoperations, Logic microoperations, Shift microoperations, Arithmetic logic shift unit.

Computer Arithmetic: Fixed point representation, Floating point representation, Addition and subtraction, Binary multiplication algorithms, Binary division algorithms.

UNIT II: BASIC COMPUTER ORGANIZATION & DESIGN AND MICRO PROGRAMMED CONTROL (09 Periods)

Basic Computer Organization and Design: Instruction codes, Computer registers, Computer instructions, Instruction formats, Addressing modes, Timing and control, Instruction cycle, Memory reference instructions, Input - Output and Interrupt.

Micro Programmed Control: Control memory, Address sequencing, Design of control unit, Hardwired control, Microprogrammed control.

UNIT III: INPUT-OUTPUT ORGANIZATION (08 Periods)

Peripheral devices, Input-Output interface, Modes of transfer, Priority interrupt, Direct Memory Access, Input-Output Processor (IOP).

UNIT IV: THE MEMORY SYSTEM (10 Periods)

Semiconductor RAM memories – Internal organization, Static memories, Synchronous and Asynchronous DRAMs, Structure of larger memories; Read-Only memories, Cache memories – Mapping functions; Secondary Storage – Magnetic Disks, Optical Disks.

UNIT V: PIPELINE & VECTOR PROCESSING AND MULTIPROCESSORS (09 Periods)

Pipeline and Vector Processing: Parallel processing, Pipelining, Arithmetic pipeline, Instruction pipeline, Vector processing, Array processors.

Multiprocessors: Characteristics of multiprocessors, Interconnection structures, Inter-processor arbitration, Inter-processor communication and synchronization.

Total Periods: 45

TEXT BOOKS:

1. Morris Mano, *Computer System Architecture*, Pearson Education, 3rd Edition, 2007.
2. Carl V. Hamacher, Zvonko G. Vranesic and Safwat G. Zaky, *Computer Organization*, McGraw-Hill, 5th Edition, 2002.

REFERENCE BOOKS:

1. William Stallings, *Computer Organization and Architecture: Designing For Performance*, Pearson Education, 7th Edition, 2007.

2. John P. Hayes, *Computer Architecture and Organization*, McGraw-Hill, 3rd Edition, 2012.

II B. Tech. – I Semester

(16BT30502) DATA STRUCTURES

(Common to CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Programming in C

COURSE DESCRIPTION:

Linked Lists; Type of lists; Operations and Applications; Stacks and Queues; Operations and Applications; Trees, Search trees and Heaps; Multi-way Trees and Graphs; Searching and Hashing.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on

- Principles of Data Structures.
- Linear and Non-linear Data Structures.
- Sorting and hashing techniques.

CO2. Analyze and Identify suitable data structure for computational problem solving.

CO3. Design solutions for complex engineering problems using linear and non-linear data structures.

CO4. Develop solutions for Complex computational problems by conducting explorative analysis.

CO5. Apply appropriate data structure to provide solutions for real time problems by using C Language.

CO6. Apply contextual knowledge of data structures to design applications for societal applications like payroll systems, web applications, banking and financial systems.

DETAILED SYLLABUS:

UNIT I: LINKED LISTS (08 Periods)

Pointers, Operations, Linked List definition, Single Linked Lists, Circular Linked List, Doubly Linked List, Circular Doubly Linked List, Application of Linked Lists.

UNIT II: STACKS AND QUEUES (08 Periods)

Stacks: Stack operations, Stack Linked List, Implementation, Stack applications.

Queues: Queue operations, Queue Linked List design, Queue applications.

UNIT III: TREES, SEARCH TREES AND HEAPS (10 Periods)

Trees: Tree concepts, Binary Trees.

Binary Search Trees (BST): Basic concepts, BST operations, BST applications.

AVL Search Trees: Basic concepts, AVL Tree implementations.

Heaps: Basic concepts, Heap implementation, Heap applications.

UNIT IV: MULTIWAY TREES AND GRAPHS (10 Periods)

Multiway Trees: B-Trees, Simplified B-Trees, B-Tree variations.

Graphs: Basic concepts, Operations, Graph storage structures, Graph algorithms - Create graph, Insert vertex, Delete vertex, Retrieve vertex, Depth-first traversal, Breadth-first traversal**.**

UNIT V: SORTING AND HASHING (09 Periods)

Internal Sorting: Quick Sort, Shell Sort, Merge Sort, Heap Sort.

External Sorting: Introduction, External storage device and sorting with tapes, Balanced Merge.

Hashing: Introduction, Hash Table structure, Hash functions, Linear Open Addressing, Chaining, Applications.

Total Periods: 45

TEXT BOOKS:

1. Richard Gileberg and Behrouz A. Forouzan, *Data Structures: A Pseudo-code Approach with C*, Cengage Learning, 2nd Edition, 2007.
2. G.A.V. Pai, *Data Structures and Algorithms*, Tata McGraw Hill, 2nd Edition, 2009.

REFERENCE BOOKS:

1. Debasis Samanta, *Classic Data Structures,* PHI Learning, 2nd Edition, 2009.

2. Aaron M. Tenenbaum, Yedidyah Langsam, and Moshe J. Augenstein, *Data Structures Using C,* Pearson Education, 2005.

II B. Tech. - I Semester

(16BT31201) DISCRETE MATHEMATICAL STRUCTURES

(Common to CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Multivariable Calculus and Differential Equations.

COURSE DESCRIPTION: Mathematical Logic; Predicates; Functions and Relations; Algebra Structures; Mathematical Reasoning; Recurrence Relations; Graphs; Graph Theory and its Applications.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on mathematical logic, algebraic structures, relations, recurrence relations and mathematical reasoning.
CO2. Analyze and prove given statement by contradiction and automatic theorem.
CO3. Design network applications using Prim's and Kruskal's algorithms.
CO4. Solve tree traversal problems using Graph Theory.
CO5. Apply permutation, combinations, counting principle, Lagrange's theorem and graph theory in solving real-time problems.

DETAILED SYLLABUS:

UNIT I: MATHEMATICAL LOGIC AND PREDICATES (09 Periods)

Mathematical Logic: Statements and notations, Connectives, Well formed formulae, Truth tables, Tautology, Equivalence of formulae, Normal forms.

Predicates: Predicate calculus, Free and bound variables, Rules of inference, Consistency, Proof of contradiction and automatic theorem proving.

UNIT II: FUNCTIONS AND RELATIONS (08 Periods)

Relations: Properties of binary relations, Equivalence relations, Compatibility relations, Partial ordering relations, Hasse diagram and related applications.

Functions: Inverse functions, Composition of functions, Recursive functions, Lattice and its properties.

UNIT III: ALGEBRAIC STRUCTURES (08 Periods)

Algebraic System: Examples and general properties, Semi groups and monoids, Groups, Subgroups, Homomorphism and isomorphism, Lagrange's theorem.

UNIT IV: MATHEMATICAL REASONING AND RECURRENCE RELATIONS (10 Periods)

Mathematical Reasoning: Methods of proof, Mathematical induction, Basics of counting, The inclusion- exclusion principle, The pigeon hole principle, Permutations and combinations, Generalized permutations and combinations.

Recurrence Relations: Generating functions of sequences, Calculating coefficients of generating function, Recurrence relation, Solving recurrence relations by substitution and Generating functions, Methods of characteristic roots, Solutions of inhomogeneous recurrence relation.

UNIT V: GRAPH THEORY AND ITS APPLICATIONS (10 Periods)

Graphs: Introduction to graphs, Types of graphs, Graph basic terminology and special types of simple graphs, Representation of graphs and graph isomorphism, Euler paths and circuits, Hamiltonian paths and circuits, Planar graphs, Euler's formula and graph coloring, 4-color theorem.

Trees: Introduction to trees, Properties of trees, Applications of trees, Spanning trees, Counting trees, Depth-first search, Breadth-first search, Minimum spanning trees, Kruskal's algorithm and prim's algorithm.

Total Periods: 45

TEXT BOOKS:

1. J.P. Trembly and R. Manohar, *Discrete Mathematical Structures with Applications to Computer Science*, Tata McGraw Hill, Thirty 7th Edition, 2008.
2. R. K. Bisht and H. S. Dhami, *Discrete Mathematics*, Oxford Higher Education, 2015.

REFERENCE BOOKS:

1. Joe L.Mott and Abraham Kandel, *Discrete Mathematics for Computer Scientists and Mathematicians*, Prentice Hall of India Private Limited, 2nd Edition, 2004.
2. Ralph P. Grimaldi and B.V.Ramana, *Discrete and Combinatorial Mathematics- an Applied Introduction,* Pearson Education, 5th Edition, 2006.
3. Kenneth H. Rosen, *Discrete Mathematics and its Applications*, Tata McGraw Hill, 6th Edition, 2007.

II B. Tech. – I Semester

(16BT41202) JAVA PROGRAMMING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Object Oriented Programming through C++.

COURSE DESCRIPTION: Introduction of Java, Classes and Objects; Inheritance, Packages, Interfaces; Exception handling, Multithreading; Event handling, AWT, Collection Classes; Applets, Servlets.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Object Oriented Programming concepts - classes, objects, inheritance, polymorphism, encapsulation and abstraction.
- Packages, interfaces, multithreading, exception handling, event handling.

CO2. Analyze complex engineering problems using object oriented concepts.

CO3. Design and develop reusable code to provide effective solutions for real world problems using inheritance and polymorphism**.**

CO4. Apply AWT and Applets to create interactive Graphical User Interfaces.

CO5. Use advanced programming languages to develop web applications.

CO6. Build Java Applications suitable for societal requirements.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION (10 Periods)

Data types, Variables, Arrays, Operators, Control statements.

Classes and Objects: Concepts of Classes, Objects, Constructors, Methods, this keyword, Garbage collection, Overloading Methods and Constructors, Parameter passing, Access control, Recursion, String Class.

UNIT II: INHERITANCE, PACKAGES AND INTERFACES (09 Periods)

Inheritance: Inheritance basics, Super keyword, Multi-level hierarchy, Abstract classes, Final keyword with inheritance.

Packages: Definition, Creating and accessing a package, Understanding CLASSPATH, Importing packages.

Interfaces: Definition, Implementing interfaces, Nested interfaces, Applying interfaces, Variables in interface and Extending interfaces.

UNIT III: EXCEPTION HANDLING AND MULTITHREADING (08 Periods)

Exception Handling: Concepts of exception handling, Exception types, Usage of Try, Catch, Throw, Throws and Finally, Built in exceptions, Creating own exception sub classes.

Multithreading: Java thread model, Creating threads, Thread priority, Synchronizing threads, Inter-thread communication.

UNIT IV: COLLECTION CLASSES, THE APPLET CLASS AND AWT (10 Periods)

Collection Classes: ArrayList Class, LinkedList Class, Hashset Class, LinkedHashSet Class, TreeSet Class, PriorityQueue Class, EnumSet Class.

The Applet Class: Types of applets, Applet basics, Applet architecture, Applet skeleton, Passing parameters to applets.

AWT Control Fundamentals: User interface components, Layout managers.

UNIT V: EVENT HANDLING AND SERVLETS (08 Periods)

Delegation event model: Event classes, Event Listener Interfaces – Mouse and Key; Adapter classes.

Servlets: Life cycle of a servlet, Using Tomcat for Servlet development, Create and compile the servlet source code, Servlet API, Javax.Servlet package.

Total Periods: 45

TEXT BOOK:

1. Herbert Schildt, *Java the Complete Reference*, Oracle Press, 9th Edition, 2014.

REFERENCE BOOK:

1. Sachin Malhotra and Saurab Choudhary, *Programming in Java*, Oxford University press, 2nd Edition, 2014.

II B. Tech. - I Semester
(16BT31501) OPERATING SYSTEMS

(Common to CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —

COURSE DESCRIPTION: Operating systems operations, scheduling; Critical section problem, deadlocks; Paging, segmentation; File Concept, Disk scheduling; I/O interface; concepts of protection.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on Operating system operations, services, file management, disk management, I/O management and protection.
CO2. Identify the functionality involved in process management concepts like scheduling and synchronization.
CO3. Design models for handling deadlock and perform memory management.
CO4. Synthesize and apply programming API's to perform Process management.
CO5. Use appropriate protection tools to provide access control to Operating system users.

DETAILED SYLLABUS:

UNIT I: OPERATING SYSTEMS OVERVIEW AND PROCESS MANAGEMENT (08 Periods)

Operating systems, operations, Distributed systems, Special purpose systems, Operating systems services, Systems calls, Operating system structure.

Process Management: Process scheduling, Process Control Block, Inter process communication, Signals, Forks, Multithreading models, Threading issues, Scheduling criteria, Scheduling algorithms, Multilevel queue, Multilevel feedback queue.

UNIT II: SYNCHRONIZATION AND DEADLOCKS (10 Periods)

Synchronization: The critical-section problem, Peterson's Solution, Synchronization hardware, Semaphores, Classic problems of synchronization, Monitors.

Deadlocks: System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock detection, Deadlock avoidance, Deadlock recovery.

UNIT III: MEMORY MANAGEMENT (09 Periods)

Memory-Management Strategies: Swapping, Contiguous memory allocation, Paging, Structure of the page table, Segmentation.

Virtual Memory Management: Demand paging, Copy-on-Write, Page replacement Algorithms, Thrashing.

UNIT IV: STORAGE MANAGEMENT (10 Periods)

File System: File Concept, Access methods, Directory structure, File system structure, i-node, File Descriptors, File system implementation, Directory implementation, Allocation methods.

Secondary Storage Structure: Disk structure, Disk attachment, Disk scheduling, Swap-space management, Stable-storage implementation, Tertiary storage structure.

UNIT V: I/O SYSTEMS AND PROTECTION (08 Periods)

I/O Systems: I/O Hardware, Application I/O interface, Kernel I/O subsystem.

Protection: Goals of protection, Principles of protection, Domain of protection, Access matrix, Implementation of access matrix, Access control, Revocation of access rights.

Total Periods: 45

TEXT BOOK:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, *Operating System Principles*, Wiley India Edition, 7th Edition, 2011.

REFERENCE BOOKS:

1. William Stallings, *Operating Systems, Internals and Design Principles*, Pearson Education, 7th Edition, 2013.

2. Andrew S. Tanenbaum, *Modern Operating Systems*, PHI, 3rd Edition, 2009.

II B. Tech. – I Semester

(16BT30531) DATA STRUCTURES LAB

(Common to CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on Data Structures

COURSE DESCRIPTION:
Hands on practice on Linked Lists; Type of lists; Stacks and Queues; Trees and Search trees; Graphs; Searching and Hashing.

COURSE OUTCOMES:
On successful completion of this course, students will be able to:

CO1. Demonstrate practical knowledge on Stacks, Queues, Linked lists, Trees Sorting and Hashing Techniques.
CO2. Analyze suitable data structure to solve real world computing problems.
CO3. Design solutions for complex computational problems using linear and non-linear data structures.
CO4. Solve for Complex computational problems by conducting explorative analysis.
CO5. Use C language for implementing linear and non-linear data structures.
CO6. Apply contextual knowledge of data structures to design applications for societal requirements.
CO7. Communicate effectively using data structures with engineering community, being able to comprehend and write effective programs and Prepare Reports.
CO8. Engage in learning advances in Data structures.

LIST OF EXERCISES:

1. Write program to implement the following data structures:
   (a) Single Linked List
   (b) Double Linked List
   (c) Circular Linked List
2. Write a program to implement Stack and Queue using Linked List.
3. Write a program to evaluate a given postfix expression using Stack.
4. Write a program to convert a given infix expression to postfix form using Stack.
5. Write a program to implement
   (a) Stack using two Queues
   (b) Queue using two Stacks
6. Write a program to implement In-order, pre-order, post-order tree traversal of Binary Trees.
7. Write a program to perform operations on a Binary Search Tree (BST).
8. Write programs for implementation of graph traversals by applying:
   (a) Breadth First Search
   (b) Depth First Search
9. Implement the following sorting algorithms:
   (a) Merge Sort
   (b) Heap Sort
   (c) Quick Sort
10. Write a program to implement hashing with
   (a) Separate Chaining Method
   (b) Open Addressing Method

REFERENCE BOOKS:

1. Richard Gileberg and Behrouz A. Forouzan, *Data Structures: A Pseudocode Approach with C,*Cengage Learning, 2nd Edition, 2007.
2. G.A.V. Pai, *Data Structures and Algorithms,* Tata McGraw Hill, 2nd Edition, 2009.

II B. Tech. – I Semester

(16BT31231) JAVA PROGRAMMING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITE: A course on Java Programming.

COURSE DESCRIPTION: Hands on experience on Polymorphism; Inheritance and Interfaces; Exception Handling; Multithreading; Event Handling; AWT; Applets; Servlets.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

CO1. Demonstrate knowledge on basic concepts of Java programming.
CO2. Design and develop efficient programs with multitasking ability and handle exceptions.
CO3. Demonstrate independent problem solving skills in developing interactive applications.
CO4. Apply object oriented approach to develop user friendly interface and learn how to communicate with systems over the network.
CO5. Build Java applications suitable for societal requirements.
CO6. Work effectively as an individual and as a member in team for case studies implementation.
CO7. Demonstrate communication skills, both oral and written for preparing and presenting reports.

LIST OF EXERCISES:

1.a. Write a Program to accept two integers through the command line arguments and print the sum of the two numbers.
b. Write a Program to accept a String as a Command line argument and the program should print a Welcome message.
2. Write a program that displays a menu with options 1. Add 2. Sub. Based on the options chosen, read 2 numbers and perform the relevant operation. After performing the operation, the program should ask the user if he wants to continue. If the user presses y or Y, then the program should continue displaying the menu else the program should terminate.[Use Scanner class]
3.a. Write a program to print the element of an array that has occurred highest number of time.
b. Write a program to find greatest number in a 3*3 array. The program is supposed to receive 9 integer numbers as command line arguments.
4.a. Create a class "Amount In Words" to convert the amount into words. (Consider the amount to be not more than 100000.)
b. Write a Program to count tokens- number of words and characters in a string.
5. Implement any one of the case study with the specifications given below:
a) Create classes, objects and their properties.
b) Add methods to classes and implement them.
c) Refine the objects by adding constructors and local variables.
d) Show communication between the objects by calling instance of one object from another class.
e) Handle Exceptions and Implement relationships like inheritance.

Case study 1: Banking Application:

The banking application consists of five divisions. They are customer details, creating a new account, withdrawing money, loan details and depositing money. The customer details consist of customer name, address, phone number, account number. To withdraw money checks the balance in the account and then get the money. The loan details consist of loan types like home loans, car loans, education loans etc. To deposit money enter the account number and give the account to be deposited.

Case study 2: Library Application:

The Library Application consists of Student, faculty and book details, Issue book, and return book. The student and faculty details consist of name, ID, Branch and maximum number of books can be issued to them. The book details consist of ID, Book name and Author name. To Issue a book to members, the librarian checks the availability of book and if the book is not available, then an error message will be displayed. To return the book, the librarian verifies the validity and if the validity is expired then the fine amount message will be displayed. The student and faculty can view the book details issued to them and also can check the count of remaining books that can be taken for issue.

6. A. Write a program that correctly implements producer consumer problem using the concept of inter-thread communication.
B. Write a program that demonstrates time slicing among equal priority threads, show that a lower priority thread's execution is deferred by the time slicing of higher-priority threads.
7. Develop an Applet that receives an integer in one text field, and computes its factorial value and returns it in another text field, when the button named "Compute" is clicked.
8. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -, *, % operations. Add a text field to display the result.
9. Create a Servlet that recognizes first time visitor to web application and responds by saying "Welcome to new user" otherwise "welcome back".

REFERENCE BOOKS:

1. Herbert Schildt, *Java the Complete Reference*, Oracle Press, 9th Edition, 2014.
2. Sachin Malhotra and Saurab Choudhary, *Programming in Java*, Oxford University press 2nd Edition, 2014.

II B. Tech. - I Semester

(16BT31531) OPERATING SYSTEMS LAB

(Common to CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITE: A course on Operating Systems.

COURSE DESCRIPTION: Hands on practice in simulating algorithms for CPU Scheduling, Memory Management, I/O Management, Deadlock Handling mechanisms; Implementing Synchronization problems; practice on UNIX commands.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge of the following algorithms to solve problems:
   i. CPU Scheduling
   ii. Memory Management
   iii. I/O Management

CO2. Formulate and analyze solutions to problems pertaining to Memory and I/O.

CO3. Designing models for deadlock handling mechanisms.

CO4. Develop skills in basic UNIX commands.

CO5. Use appropriate APIs' available in modern operating systems (such as threads, system calls, semaphores, etc…) for software development.

CO6. Communicate effectively on complex operating system problems with implication to User-friendliness.

CO7. Develop and demonstrate user defined libraries to communicate with the kernel or effective implementation of projects across multidisciplinary environments

LIST OF EXPERIMENTS:

1. Write a program to implement the following system calls:
   a) fork b) exec c) getpid d) wait
2. a. Write a program to demonstrate File Permissions.
   b. Write a program to implement named and unnamed pipes.
3. Implement the following CPU Scheduling Algorithms:
   a) FCFS b) SJF (Preemptive) c) Round Robin d) Priority.
   Use the following set of processes, compare the performance of above scheduling policies

Process Name	Arrival Time	Processing Time	Priorities
A	0	3	2
B	1	5	4
C	3	2	1
D	9	5	5
E	12	5	3

4. Implement the following synchronization problems:
   a) Producer Consumer Problem b) Dining Philosopher's Problem.

Implement Banker's Algorithm for Deadlock Avoidance and Detection. Find the safe sequence. If Max. request of any one process is changed, detect whether deadlock is occurred or not. Consider number of resources are three and Jobs are five as shown in the figure:

Process	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P0	0	1	0	7	5	3	3	3	2
P1	2	0	0	3	2	2			
P2	3	0	2	9	0	2			
P3	2	1	1	2	2	2			
P4	0	0	2	4	3	3			

6. Implement the following Algorithms:
   a) First Fit b) Best Fit c) Worst Fit
7. Implement multiprogramming with fixed number of tasks and variable number of tasks. The size of the memory is 1000K. Operating system size is 200K. Number of processes are P1, P2, P3 with sizes 150K, 100K and 70K.
8. Implement the following Page Replacement Algorithms:

a) FIFO b) LFU c) LRU d) Optimal

Consider number of frames are three and Reference string is

2 3 2 1 5 2 4 5 3 2 4 2 4 5

II B.Tech - II Semester

(16BT3HS01) ENVIRONMENTAL STUDIES

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	0	-	3

PRE-REQUISITE: A course on Engineering Chemistry

COURSE DESCRIPTION: Multidisciplinary nature of environment; Natural resources; Ecosystems; Biodiversity; Environment pollution and control; Social issues and environment; Human population and environment; Field studies.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Acquire knowledge on nature of environment, natural resources, ecosystems, biodiversity, environmental pollution and control, social issues and human population.

CO2. Analyze natural resources, ecosystems, biodiversity, environmental pollution and control, social issues and human population.

CO3. Develop strategies for environmental pollution control and natural resource management.

CO4. Solve environmental problems through proper analysis and interpretation of environmental data.

CO5. Choose appropriate techniques in environmental pollution control and natural resource management.

CO6. Understand the impact of social issues and population on environment.

CO7. Provide solutions to individuals, industries and government for environmental sustainable development.

CO8. Follow environmental protection laws for sustainable development.

CO9. Communicate effectively on environmental issues in the form reports.

DETAILED SYLLABUS:

UNIT I: MULTIDISCIPLINARY NATURE OF ENVIRONMENT AND NATURAL RESOURCES (11 Periods)

Multidisciplinary Nature of Environment: Multidisciplinary nature of environment, Segments of environment - Lithosphere, Hydrosphere, Atmosphere, Biosphere; Need for public awareness.

Natural Resources: Renewable and non-renewable resources and associated problems - (a) Forest resources: Use and over exploitation, Deforestation-causes, effects and remedies, Case studies, (b) Water resources: Use and over utilization of surface and groundwater, Conflicts over water, Benefits and problems of large dams, Case studies, (c) Mineral resources: Mining, Adverse effects, Case studies, (d) Food resources: World food problems, Changes caused by agriculture and overgrazing, Effects of modern agriculture, Water logging and salinity, Case studies, (e) Energy resources: Growing needs, Renewable energy resources – Solar, Wind, Hydropower, Hydrogen fuel; Non-renewable energy resources - Coal, Natural gas, Nuclear energy, Role of an individual in conservation of natural resource and equitable use of resources for sustainable lifestyles.

UNIT II: ECOSYSTEMS AND BIODIVERSITY (10 Periods)

Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem - Producers, Consumers, Decomposers; Food chains, Food webs, Ecological pyramids – Types; Characteristic features, Structure and functions of forest ecosystem, Desert ecosystem, Aquatic ecosystem, Energy flow in the ecosystem, Ecological succession.

Biodiversity: Concept and value of biodiversity, Role of biodiversity in addressing new millennium challenges, Hot spots of biodiversity, Threats to biodiversity, Man-wild life conflicts, Endemic, Endangered and extinct species of India, Conservation of biodiversity – In-situ and ex-situ.

UNIT III: ENVIRONMETAL POLLUTION AND CONTROL (08 Periods)

Causes, Adverse effects and control measures of pollution - Air pollution, Water pollution, Soil pollution, Noise pollution, Thermal pollution, Nuclear pollution; Solid waste management – Causes, Effects and control measures of urban and industrial wastes; Hazards and disaster management – Floods, Earthquakes, Tsunamis, Case studies.

UNIT IV: SOCIAL ISSUES AND THE ENVIRONMENT (08 Periods)

Sustainable development, Urban problems related to energy, Environmental ethics – Issues, Solutions; Global warming, Acid rain, Ozone layer depletion, Nuclear accidents and case studies, Wasteland reclamation, Consumerism and waste products, Concept of green technologies, Environment protection act, Air act, Water act, Wildlife protection act, Forest conservation act, Issues involved in enforcement of environmental legislation, Public environmental awareness.

UNIT V: HUMAN POPULATION AND THE ENVIRONMENT (08 Periods)

Population growth, Population characteristics and variation among nations, Population explosion, Family welfare programme, Environment and human health, Human rights, Value education, HIV/AIDS, Women and child welfare, Role of information technology in environment and human health, Case studies, **Field Work/Assignment/Seminar:** Environmental assets – Pond/Forest/Grassland/Hill/ Mountain/Environment impact assessment procedures for local environmental issues. **Total Periods: 45**

TEXT BOOKS:

1. A. Kaushik and C. P. Kaushik, *Environmental Studies*, New Age International (P) Ltd Publications, 4th Edition, 2014.
2. Erach Barucha, *Environmental Studies*, Orient Blackswan, 2nd Edition, 2013.

REFERENCE BOOKS:

1. R. Rajagopalan, *Environmental Studies*, Oxford University Press, 2nd Edition, 2011.

2. Benny Joseph, *Environmental Studies,* Tata McGraw- Hill, 2nd Edition, 2009.
3. B. S. Chauhan, *Environmental Studies*, University Science Press, 2008.
4. M. Anji Reddy, *Text Book of Environmental Sciences and Technology*, BS Publications, 2007.

II B. Tech. - II Semester

(16BT41204) THEORY OF COMPUTATION

(Common to IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Discrete Mathematical Structures.

COURSE DESCRIPTION: Fundamentals of Computation; Finite State Automaton; Regular Expressions; Grammars; Push Down Automaton; Turing Machine.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on Formal languages and automata.
CO2. Analyze the classification of languages, automata's and their computing power.
CO3. Design grammars and automata (recognizers) for regular expressions and formal languages.
CO4. Solve computational problems using automata.
CO5. Apply theorems to translate automata's and identify the class of languages.

DETAILED SYLLABUS:

UNIT I: FINITE AUTOMATA (10 Periods)

Introduction to Finite automata, The central concepts of automata theory, Deterministic finite automata, Nondeterministic Finite automata, The equivalence of DFA and NDFA, Finite automata with epsilon-transitions, Conversion of epsilon-NFA to NFA and DFA, Mealy and Moore models.

UNIT II: REGULAR EXPRESSIONS AND LANGUAGES (09 Periods)

Regular expressions, Identity rules, Finite automata and Regular expressions, Applications of regular expressions, Pumping lemma for regular languages, Applications of the pumping lemma, Closure properties of regular languages, Equivalence of two regular expressions, Equivalence of two finite automata and minimization of automata.

UNIT III: CONTEXT-FREE GRAMMARS (09 Periods)

Context-free grammars, Parse trees, Applications of context-free grammars, Ambiguity in grammars and languages, Normal forms for context-free grammars, The pumping lemma for context-free languages.

UNIT IV: PUSH DOWN AUTOMATA (07 Periods)

Definition of the pushdown automaton, The languages of a PDA, Equivalence of PDA's and CFG's, Deterministic pushdown automata, Chomsky hierarchy of languages, The model of linear bounded automaton.

UNIT V: TURING MACHINE (10 Periods)

Turing machine model, Representation of turing machine, Language acceptability by turing machine, Design of turing machine, Programming techniques for turing machine, Turing machine with semi-infinite tapes, Multi stack machines and counter machines, Universal turing machine.

Total Periods: 45

TEXT BOOKS:

1. John E. Hopcroft, Rajeev Motwani and Jeffrey D Ullman, *Introduction to Automata Theory, Languages and Computation,* Pearson Education, 3rd Edition, 2011.
2. K.L.P. Mishra and N.Chandrasekaran, *Theory of Computer Science: Automata Languages and Computation,* PHI Learning, 3rd Edition, 2009.

REFERENCE BOOK:

1. John C Martin, *Introduction to Languages and the Theory of Computation*, TMH, 3rd Edition, 2009.

II B. Tech. – II Semester

(16BT40502) DATABASE MANAGEMENT SYSTEMS

(Common to CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —

COURSE DESCRIPTION:

Database Systems; Database Design; Relational Model; SQL Queries, Constraints and Triggers; Schema Refinement and Normal Forms; Transaction Management; Concurrency Control; Overview of Storage and Indexing.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on
- Data models and Database Languages
- Database design
- Normal forms
- Storage and Indexing

CO2. Analyze databases using normal forms to provide solutions for real time applications.

CO3. Design solutions for database problems using database design, views design and framing queries.

CO4. Use database techniques for designing databases, managing databases and its security.

CO5. Select SQL, Hash based Indexing and Tree based Indexing to manage data in databases.

CO6. Apply contextual knowledge to develop database applications related to societal applications like Information Retrieval Systems, Banking and Financial systems.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION TO DATABASE SYSTEMS & DATABASE DESIGN (09 Periods)

Database Systems: Database system applications, Purpose of database systems, View of data-Data abstraction, Instances and Schemas, Data models; Database languages - DDL, DML; Database architecture, Database users and administrators.

Database Design: ER diagrams, Beyond ER design, Entities, Attributes and entity sets, Relationships and relationship sets, Additional features of ER model, Conceptual design with ER model.

UNIT II: THE RELATIONAL MODEL & RELATIONAL ALGEBRA AND CALCULUS (08 Periods)

Relational Model: Integrity constraints over relations, Enforcing integrity constraints, Querying relational data, Logical database design, Introduction to views, Destroying/altering tables and views.

Relational Algebra and Calculus: Preliminaries, Relational Algebra operators; Relational Calculus - Tuple and Domain Relational Calculus; Expressive power of Algebra and calculus.

UNIT III: SQL & SCHEMA REFINEMENT (10 Periods)

SQL: Form of basic SQL query- Examples of basic SQL queries; Nested queries- Introduction to nested queries, Correlated nested queries, Set-comparison operators; Aggregate operators, NULL values- Comparison using NULL values, Logical connectives AND, OR and NOT, Impact on SQL constructs, Outer joins, Disallowing NULL values; Complex integrity constraints in SQL ,Triggers and active databases.

Schema Refinement: Problems caused by redundancy, Decompositions, Problem related to decomposition, Functional dependencies, Reasoning about FDS, Normal forms – First, second and third normal forms, BCNF; Multi valued dependencies, Fourth normal form, Join dependencies, Fifth normal form.

UNIT IV: TRANSACTIONS AND CONCURRENCY CONTROL (09 Periods)

Transactions: Transaction concept, Transaction state, Implementation of atomicity and durability, Concurrent executions, Serializability, Recoverability, Implementation of isolation, Testing for serializability.

Concurrency Control: Lock based protocols, Timestamp based protocols, Validation based protocols, Multiple granularity, Deadlock handling.

UNIT V: STORAGE AND INDEXING (09 Periods)

Storage and Indexing: Data on external storage, File organization and indexing – Clustered indexes, Primary and secondary indexes; Index data structures – Hash based indexing, Tree based indexing; Comparison of file organizations.

Tree Structured Indexing: Intuition for tree indexes, Indexed Sequential Access Method (ISAM), B+ Trees- A dynamic index structure; Search, Insert, Delete; B-Tree index files. **Total Periods: 45**

TEXT BOOKS:

1. Raghu Ramakrishnan and Johannes Gehrke, *Database Management Systems*, Tata McGraw Hill, 3rd Edition, 2014.
2. A. Silberschatz, H.F.Korth and S. Sudarshan, *Database System Concepts*, Tata McGraw Hill, 5th Edition, 2006.

REFERENCE BOOKS:

1. Ramez Elmasri and Shamkant B. Navathe, *Database Systems*, Pearson Education, 6th Edition, 2013.

2. Peter Rob and Carlos Coronel, *Database Systems Design*, Implementation and Management, Cengage Learing, 7th Edition, 2009.

II B. Tech. – II Semester

(16BT41201) **DESIGN AND ANALYSIS OF ALGORITHMS**

(Common to CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Data Structures.

COURSE DESCRIPTION: Introduction to Algorithms and Asymptotic Notations; Disjoint Sets and Graphs; Divide and Conquer Greedy Method; Dynamic Programming, Back Tracking; Branch and Bound.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Algorithm Complexities and Asymptotic notations.
- Algorithm Design techniques-Divide and Conquer, Greedy Method, dynamic programming, Back tracking, Branch and Bound.

CO2. Analyze the performance of algorithms with respect to Time and Space complexities.

CO3. Design the algorithms for solving real world problems.

CO4. Solve sorting and searching problems using Divide and Conquer method.

CO5. Use dynamic programming and backtracking in finding shortest paths.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION TO ALGORITHMS (08 Periods)

Algorithm, Algorithm Specifications-Pseudocode conventions; Performance Analysis-Space complexity, Time complexity; Asymptotic Notations - Big Oh, Omega, Theta, Little oh, and Little omega; Recurrences.

UNIT II: DISJOINT SETS AND GRAPHS (09 Periods)

Disjoint Sets: Operations, union and find algorithms.

Graphs: Breadth first search and Traversal, Depth first search and Traversal, Introduction to spanning trees, connected components and Bi-connected components.

UNIT III: DIVIDE AND CONQUER & GREEDY METHOD (10 Periods)

Divide and Conquer: General method, Applications - Analysis of binary search, Quick sort, Merge sort, Strassen's matrix multiplication.

Greedy Method: General method, Applications-Job sequencing with deadlines, knapsack problem, Minimum cost spanning trees, Single source shortest paths.

UNIT IV: DYNAMIC PROGRAMMING AND BACK TRACKING (10 Periods)

Dynamic Programming: General Method, Applications - Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem.

Back Tracking: General Method, Applications – N Queen problem, Sum of subsets problem, Graph coloring, Hamiltonian cycles.

UNIT V: BRANCH AND BOUND TECHNIQUES (08 Periods)

General method, Applications - Travelling sales person problem, 0/ 1 knapsack problem; LC Branch and Bound solution, FIFO Branch and Bound solution.

Total Periods: 45

TEXT BOOK:

1. Ellis Horowitz, Satraj Sahni and Rajasekharam, *Fundamentals of Computer Algorithms*, Galgotia Publications Pvt. Ltd, New Delhi, 2nd Edition, 2007.

REFERENCE BOOKS:

1. M. T. Goodrich and R. Tomassia, *Algorithm Design: Foundations, Analysis and Internet Examples*, John Wiley and Sons, 2002.
2. S. Sridhar, *Design and Analysis of Algorithms*, Oxford Press, 2015.

3. Harsh Bhasin, *Algorithms: Design and Analysis*, Oxford University Press, 2015.

II B. Tech. – II Semester
(16BT51202) OBJECT ORIENTED ANALYSIS AND DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Software Engineering and Object Oriented Programming through C++.

COURSE DESCRIPTION: Introduction to UML, Basic structural modeling; Advanced structural modeling, Class and object diagrams; Basic behavioral modeling; Advanced behavioral modeling; Architectural modeling.

COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on principles of object oriented analysis and design through UML Diagrams.
CO2. Analyze user requirements and identify suitable structuraland behavioral modeling components.
CO3. Design and develop UML models for real time software applications.
CO4. Solve real world problems by applying structural and behavioral modeling techniques.
CO5. Use unified modeling language in preparing blue prints for software solutions.
CO6. Design and develop UML models to solve societal problems.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION TO UML AND BASIC STRUCTURAL MODELING (11 Periods)
Introduction to UML: Importance of modeling, Principles of modeling, Object oriented modeling, An overview of UML, Conceptual model of the UML, Architecture, Software development life cycle.
Basic Structural Modeling: Classes-Terms and concepts, Common modeling techniques; Relationships-Modeling simple dependencies, Single inheritance and structural relationships; Common mechanisms, Diagrams.

UNIT II: ADVANCED STRUCTURAL MODELING, CLASS AND OBJECT DIAGRAMS (07 Periods)
Advanced Structural Modeling: Advanced classes, Advanced relationships, Interfaces, Types and roles, Packages, Instances.
Class and Object Diagrams: Terms and concepts, Modeling techniques for class diagram-Modeling simple collaboration, Logical database schema, Forward and reverse engineering; Introduction to object diagrams.

UNIT III: BASIC BEHAVIORAL MODELING (09 Periods)
Basic Behavioral Modeling-I: Interactions-Terms and concepts, Modeling a flow of control; Interaction diagrams-Terms and concepts, Modeling flows of control by time ordering and control by organization, Forward and reverse engineering.
Basic Behavioral Modeling-II: Use cases-Terms and concepts, Modeling the behavior of the element; Use case Diagrams-Terms and concepts, Modeling the context of a system, Requirement of a system, Forward and reverse engineering; Activity Diagrams-Terms and concepts, Modeling a workflow, modeling an operation, Forward and reverse engineering.

UNIT IV: ADVANCED BEHAVIORAL MODELING (07 Periods)
Events and signals-Modeling a family of signals, exceptions; State machines-Modeling the lifetime of an object; Introduction to processes and threads, Time and space-Modeling timing constraints, Distribution of objects and objects that migrate; State chart diagrams-Modeling reactive objects, Forward and reverse engineering.

UNIT V: ARCHITECTURAL MODELING (11 Periods)
Component-Terms and concepts, Modeling executables and libraries, Modeling tables, Files and documents, Modeling an API; Deployment-Modeling processors and devices, Modeling the distribution of components; Component diagrams-Modeling source code, Executable release, Physical database, Adaptable systems, Forward and reverse engineering; Deployment diagrams-Modeling an embedded systems, Client/Server system, Fully distributed systems, Forward and reverse engineering.
Case Studies: Online student course registration system for university, Hospital Management.

Total Periods: 45

TEXT BOOK:

1. Grady Booch, James Rumbaugh and Ivar Jacobson, *The Unified Modeling Language User Guide*, Pearson Education, 2nd Edition, 2009.

REFERENCE BOOKS:

1. Magnus Penker, Brian Lyons, David Fado and Hans-Erik Eriksson, *UML 2 Toolkit*, Wiley-Dreamtech India Pvt. Ltd., 2006.

2. Pascal Roques, *Modeling Software Systems Using UML2*, Wiley-Dreamtech India pvt. Ltd, 2004.

II B. Tech. – II Semester

(16BT41203) SOFTWARE ENGINEERING

(Common to CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —

COURSE DESCRIPTION: Concepts of Software Engineering; Software Process Models; Conventional and Agile Process Models; Software Requirements Engineering Process; System Analysis; Architectural Design; User Interface Design and Re-engineering; Software Testing; Risk and Quality Management.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:
- Fundamental concepts of software engineering.
- Process models.
- Software development life cycle.

CO2. Analyze software requirements and process models required to develop a software system.

CO3. Design and develop a quality software product using design engineering principles.

CO4. Develop software product as per user and societal requirements.

CO5. Follow standards for software development and quality management.

CO6. Demonstrate skills in applying risk and quality management principles for effective management of software projects.

DETAILED SYLLABUS:

UNIT I: SOFTWARE ENGINEERING AND SOFTWARE PROCESS (11 Periods)

A Generic View of Process: The nature of software, Software engineering- Software engineering layers; The software process, Software engineering practice, Software myths.

Process Models: A Generic process model, Incremental process models, Evolutionary Process models; The unified process, Agile Development-Agility, Agile process, Scrum, Agile modeling (AM), Agile Unified Process (AUP), The Cleanroom strategy.

UNIT II: REQUIREMENTS ENGINEERING AND MODELING (07 Periods)

Requirements Engineering: Functional and non-functional requirements, The software requirements document, Requirements specifications, Requirements engineering processes, Requirements elicitation and analysis, Requirements validation, Requirements management.

Requirements Modeling: Data modeling concepts, Flow-oriented modeling, Case study on requirements modeling for WebApps.

UNIT III: DESIGN ENGINEERING AND METRICS (08 Periods)

Design Engineering: Design within the context of software engineering, The Design process, Design concepts, Software architecture, Architectural styles, Architectural design.

Process and Project Metrics: Metrics in the process and project domains, Software measurement, Metrics for software quality.

UNIT IV: SOFTWARE TESTING STRATEGIES AND APPLICATIONS (09 Periods)

Testing Strategies: A strategic approach to software testing, Strategic issues, Test strategies for conventional software, Test strategies for object oriented software, Validation testing, System testing, The art of debugging.

Testing Conventional Applications: Software testing fundamentals, Basis path testing, White box and Black box testing, Object oriented testing methods.

UNIT V: RISK, QUALITY MANAGEMENT AND REENGINEERING (10 Periods)

Risk and Quality Management: Reactive and proactive risk strategies, Software risks, Risk Mitigation Monitoring and Management (RMMM), RMMM plan, Software quality factors, Defect amplification Model, Formal Technical Reviews (FTR), Software Quality Assurance (SQA)-Tasks, Goals and metrics; Software reliability.

Reengineering: Introduction, Business Process Reengineering (BPR), Software reengineering, Restructuring, Reverse engineering, Forward engineering. **Total Periods: 45**

TEXT BOOKS:

1. Roger S. Pressman, *Software Engineering-A Practitioner's Approach*, McGraw-Hill International Edition, 7th Edition, 2010.
2. Ian Sommerville, *Software Engineering*, Pearson Education, 9th Edition, 2011.

REFERENCE BOOKS:

1. K. K. Aggarwal and Yogesh Singh, *Software Engineering*, New Age International Publishers, 3rd Edition, 2007.
2. Shely Cashman Rosenblatt, *Systems Analysis and Design*, Thomson Publications, 6th Edition, 2006.

II B. Tech. II Semester

(16BT40531) DATABASE MANAGEMENT SYSTEMS LAB

(Common to CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITE: A course on Database Management Systems

COURSE DESCRIPTION:

Hands on experience on - DDL, DML commands; Query processing using operators; Joins, Views, Single Row functions, Group Functions and SET functions; PL/SQL concepts - Basic Programs, Triggers, Functions, Cursors and Stored Procedures.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate practical knowledge on creation and alteration of tables, insertion and Querying of data.

CO2. Analyze and evaluate the databases using SQL DML/ DDL commands.

CO3. Design database schemas for the sales database, customer database and product database.

CO4. Develop solutions for database problems using stored procedures, stored functions, cursors and triggers.

CO5. Implement DDL and DML commands in SQL and PL/SQL, ORACLE to manage data in databases.

CO6. Apply contextual knowledge to develop database applications related to societal applications like Information Retrieval Systems, Banking and Financial systems.

CO7. Demonstrate communication skills, both oral and written for preparing and presenting reports on databases.

DESCRIPTION OF SALES DATABASE:

ABC is a company operating in the country with a chain of shopping centers in various cities. Everyday large numbers of items are sold in different shopping centers. The Sales database comprises of various tables like CUST, PROD, SALES_DETAIL, STATE_NAME with the following schemas

CUSTOMERS Name	**Type**	**Remark**
CID	VARCHAR2(6)	PRIMARY KEY
CNAME	VARCHAR2(10)	
CCITY	VARCHAR2(8)	
PRODUCTS		
Name	**Type**	**Remark**
PID	VARCHAR2(6)	PRIMARY KEY
PNAME	VARCHAR2(6)	
PCOST	NUMBER(5,2)	
PROFIT	NUMBER(3)	
SALES DETAILS		
Name	**Type**	**Remark**
CID	VARCHAR2(6)	COMPOSITE PRIMARY KEY
PID	VARCHAR2(6)	COMPOSITE PRIMARY KEY
SALE	NUMBER(3)	
SALEDT	DATE	COMPOSITE PRIMARY KEY
STATES		
Name	**Type**	**Remark**
CCITY	VARCHAR2(8)	PRIMARY KEY
STATE	VARCHAR2(15)	

LIST OF EXERCISES:

1. Execute: Data Definition Language (DDL) commands

I. Create the tables in sales database.

II. View the structure of the each table.
III. Change the structure of the table like add new column, change the width of a data type, change the data type of a column, delete column from the table, rename the column name and table names.
IV. Delete all records stored in a table, but the structure of the table is retained.
V. Remove a table from the database.

2. Execute: Data Manipulation Language (DML) commands

STATES PRODUCTS

CCITY	STATE
Mysore	Karnataka
Kolkata	Westbengal
Pune	Maharashtra
Tirupathi	Andhra Pradesh
Chennai	Tamilnadu

CUSTOMERS SALES DETAILS

PID	PNAME	PCOST	PROFIT
p1	pen	100	10
p2	pencil	15.5	2
p3	pendrive	950	50
p4	DVD	35	5
p5	mouse	500.5	Null

CID	CNAME	CCITY
c1	gopal	mysore
c2	haitvik	kolkata
c3	rohan	pune
c4	rajini	chennai
c5	mohan	tirupathi
c6	sanjay	mysore
c7	samhita	Kolkata

CID	PID	SALE	SALEDT
c1	p1	10	1-Sep-16
c2	p3	20	18-Mar-17
c5	p5	30	20-Dec-16
c3	p2	45	1-Sep-16
c4	p4	15	1-Sep-16
c7	p3	22	18-Mar-17
c1	p2	23	1-Sep-16
c2	p1	33	14-Jul-17
c3	p5	14	18-Mar-17
c6	p4	10	14-Jul-17
c1	p2	5	18-Mar-17
c4	p2	50	18-Mar-17
c5	p1	20	14-Jul-17
c3	p3	9	1-Sep-16
c6	p5	10	18-Mar-17
c3	p4	8	20-Dec-16

c7	p3	6	1-Sep-16
c1	p5	9	14-Jul-17

I. Write a query to display all customers.
II. Write a query to display pname of all products.
III. Write a query to display cname and ccity of all customers.
IV. Write a query to display cname, ccity of all customers who lives in mysore.
V. Write a query to display cname and ccity of all customers who live in Kolkata or Chennai.
VI. Find the cost of pencil.
VII. Display CID as Customer_Id, CNAME as Name for all customers.
VIII. Change the name of the product p3 from 'pendrive' to 'modem'.
IX. Find the product ids in sales detail table (eliminating duplicates).
X. Remove the record from sales detail table whose sale value is 5.

2. Implement table level and Column level constraints like NOT NULL, UNIQUE, PRIMARY KEY, FOREIGN KEY, CHECK, DEFAULT.

4. Operators

I. Display the sum of pcost and profit of all products.
II. Display the column heading as "Selling Price" instead of PCOST+PROFIT.
III. Find out what percent of pcost is profit for all products.
IV. List the cids of customers who purchased products on '14-jul-2017'.
V. List only the products whose cost is more than 50.00.
VI. List all the customers who are not belongs to 'pune'.
VII. Write a query to display the pname and pcost of all the products where pcost lies between 5 and 25.
VIII. Write a query to display distinct customer id where product id is p3 or sale date is '18-mar-2017'.
IX. Write a query to display cname, ccity of those customers whose cid is in c1 or c2 or c4 or c5 (using IN operator).
X. List customers whose name starts with 'h'.
XI. Write a query to display all records of prod table in which first and third character of pname is any character and second character is 'e'.
XII. Write a query to display all cname which includes two 'a' in the name.
XIII. List the products with unknown profit.
XIV. Display the profit of products as zero if unknown.

5. Joins and Views

I. Write a query to display cname, pname, sale, saledt for all customers.
II. Write a query to display cname who have purchased Pen.
III. Write a query to display cname, pname, sale for all customers who sold after '01-sep-2016'.
IV. Write a query to display cname,ccity,state of all customers.
V. Write a query to display cname,ccity of all customers who belongs to Karnataka.
VI. Create a view on product table which includes pid, pname and pcost of products.
VII. Insert a row into the view.
VIII. Update the rows in a view.
IX. Delete the rows from view.

6. Order by, group by and having clauses.

I. Write a query to display pname of all records. Sort all records by pname. (use order by clause)
II. Write a query to display cname and ccity of all records. Sort by ccity in descending order.
III. Write a query to display saledt and total sale on the date.
IV. Write a query to display saledt and total sale on the date labeled as sale of all items.
V. Write a query to display saledt and total sale on the date sold after 01-sep-2016.
VI. Write a query to display saledt and total sale on the date labeled as sale of all items other than DVD.
VII. Write a query to display total number of customers who purchase pen.

7. Single Row Functions: Date Function, Numeric and Character Function

I. Write a query to display system date
II. Write a query to display the system date by rounding it to next month.
III. Write a query to display the system date by rounding it to next year.

IV. Write a query to display the last date of the system date.
V. Write a query to display the next date of system date which is Friday.
VI. Write a query to display sale date and date after 02 months from sale date.
VII. Write a query to display system date, sale date and months between two dates.
VIII. Write a query to display the greatest date between sale date and system date, name it as BIG, also display sale date and SYSDATE.
IX. Write a query to display the least date between sale date and system date name it as SMALL, also display sale date and SYSDATE.
X. Write a query to display the product name along with the rounded value of product cost for product name is "Pencil".
XI. Write a query to display product cost along with MOD value if divided by 5.
XII. Write a query to display cname in uppercase, lowercase, titlecase from cust table where customer name is "rohan".
XIII. Write a query to display all concatenated value of cname, ccity by converting cname into titlecase and ccity into uppercase.
XIV. Write a query to display the first 3 characters of cname.
XV. Write a query to display the position of 'm' in the cname of the customer whose name is "samhita".
XVI. Write a query to display the length of all customer names.
XVII. PAD # character in left of product cost to a total width of 5 character position.

8. Group Functions and Set Functions

I. Write a query to display the total count of customer.
II. Write a query to display the minimum cost of product.
III. Write a query to display average value of product cost rounded to 2nd decimal places.
IV. Write a query to display product name with total sale detail in descending order.
V. Write a query to display product name, sale date and total amount collected for the product.
    1. Write a query to display sale date and total sale date wise which was sold after "14-jul-2016".
I. Write a query to display the customer name who belongs to those places whose name is having 'i' or 'p'.
II. Write a query to display customer name who belongs to a city whose name contains characters 'c' and whose name contains character 'a'.
III. Write a query to display the customer name who does not belong to 'pune'.

9. PL/SQL basic programs

I. Write a PL/SQL program to find largest number among three. (Hint: Use Conditional Statement)
II. Write a PL/SQL program to display the sum of numbers from 1 to N using for loop, loop…end and while…loop.

10. SQL Cursor based programs

1. Write a PL/SQL program to display the costliest and cheapest product in PROD table.
b) Write a PL/SQL program which will accept PID and display PID and its total sale value i.e. sum.

11. Functions

I. Write a function that accepts two numbers A and B and performs the following operations.
    1. Addition
    2. Subtraction
    3. Multiplication
    4. Division
II. Write a function that accepts to find the maximum PCOST in PROD table.

12. Procedures

1. Write a procedure that accepts two numbers A and B, add them and print.
2. Write procedures to demonstrate IN, IN OUT and OUT parameter.

13. Triggers

a) Develop a PL/SQL program using BEFORE and AFTER triggers.
b) Create a row level trigger for the PROD table that would fire for INSERT or PDATE or DELETE operations performed on the PROD table. This trigger will display the profit difference between the old values and new values.

REFERENCE BOOKS:

1. Satish Ansari, *Oracle Database 11g: Hands-on SQL and PL/SQL,* PHI Publishers, 2010.

II B. Tech. – II Semester

(16BT50533) OBJECT ORIENTED ANALYSIS AND DESIGN LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITE: A course on Object Oriented Analysis & Design

COURSE DESCRIPTION:

Hands on Practice to Design and Implement - Automated Teller Machine, Library Information System, Online Ticket Reservation System, Point of Sales, Airport Simulation, Course Registration System, Home Appliance Control System and Hospital Management System using Object-Oriented Language.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate practical knowledge on principles of object oriented analysis and design through UML diagrams.
CO2. Analyze user requirements and identify suitable structural and behavioral modeling components.
CO3. Design and develop UML models for real time applications.
CO4. Solve real world problems by applying structural and behavioral modeling techniques.
CO5. Use UML to design the software system.
CO6. Apply contextual knowledge of UML models to assess societal issues.
CO7. Involve as individual to solve case studies.
CO8. Develop a model for complex computational activities by preparing and presenting reports through effective communication.

LIST OF EXERCISES:

Case studies given below should be Modeled using Visual Modeling tools in different views i.e. Use case view, logical view, component view, Deployment view.

CASE STUDY 1: AUTOMATED TELLER MACHINE (ATM)

Problem Statement:

Software is designed for supporting a computerized ATM banking network. All the process involved in the bank is computerized these days. All the accounts maintained in the bank and also the transactions effected, including ATM transactions are to be processed by the computers in the bank. An ATM accepts a relevant cash card, interacts with user, communicates with the central system to carry out the transaction, dispenses cash, and prints receipts. The system to be designed and implemented must include appropriate record keeping and security provisions. The system must handle concurrent access to the same account.

CASE STUDY 2: LIBRARY INFORMATION SYSTEM Problem Statement:

A library lends books and magazines to members, who are registered in the system. Also it handles the purchase of new titles for the library. Popular titles are bought in multiple copies. A member can reserve a book or magazine that is not currently available in the library, so that when it is returned back to the library, that person is notified. The library can easily create, update and delete information about the titles, members, loans and reservations in the systems.

CASE STUDY 3: ONLINE TICKET RESERVATION FOR RAILWAYS

Problem Statement:

Computer play an integral part of the day in today's life. It makes the entire job easier and faster, every job is computerized so that the ticket reservation can be done over the online ticket reservation system. During the booking of the ticket reservation, passenger has to select origin, date of journey, destination, class of train etc. The reservation counter keeps track of passenger's information. Thus, the system will have all the details about the trains and facilities provided by them. There are various trains with the different level of convenience for the passengers. The whole database will be maintained by database administrator. There are varieties of trains where the passengers can select the train according to the convenience for their destination journey. The journey could be within the state or across the India. Each train has the three types of classes i.e. Sleeper class, First class and AC compartment. Design the application for the above problem description.

CASE STUDY 4: A POINT OF SALE (POS) SYSTEM

Problem Statement:

A POS System is a computerized application used to record sales and handle payments; it is typically used in a retail store. It includes hardware components such as a computer, bar code scanner and software to run the system. It interfaces to various service applications, such as a third-party tax calculator and inventory control. These systems must be relatively fault tolerant; that is, even if remote services and temporarily unavailable they must still be of capturing sales and handling at least cash payments. A POS system must support multiple and varied client-side terminals and interfaces such as browser, PDA's and touch-screens.

CASE STUDY 5: A MULTI-THREADED AIRPORT SIMULATION

Problem Statement:

Simulate the operations in an airport. Your application should multiple aircrafts using several runways and gates avoiding collisions/conflicts. Loading: an aircraft uses the runway, lands and then taxis over to the terminal. Take-Off an aircraft taxies to the runway and then takes off.

CASE STUDY 6: ONLINE STUDENT COURSE REGISTRATION SYSTEM FOR UNIVERSITY

Problem Statement:

At the beginning of each Semester students may request A course catalogue containing a list of course offerings for the Semester. Information about each course, such as professor, department, and prerequisites will be included to help students make informed decisions. The new on-line registration system will allow students to select four course offerings for the coming Semester. In addition, each student will indicate two alternative choices in case A course offering becomes filled or cancelled. No course offering will have more than ten students. No course offering will have fewer than three students. A course offering with fewer than three students will be cancelled. Once the registration process is completed for a student, the registration system sends information to the billing system, so the student can be billed for the Semester. Professors must be able to access the on-line system to indicate which courses they will be teaching. They will also need to see which students signed up for their course offering. For each Semester, there is a period of time that students can change their schedules. Students must be able to access the on-line system during this time to add or drop courses. The billing system will credit all students for courses dropped during this period of time.

CASE STUDY 7: HOME APPLIANCE CONTROL SYSTEM

Problem Statement:

A home appliance control system (HACS) is a system which provides various services to remotely operate on home appliances, such as microwave oven, TV, and garage door etc through remote devices such as mobile phone, desktop and palm-top.A home appliance control system (HACS) is a system which is controlled by a remote system such as a mobile phone or a palm-top, and at the same time controls, monitors and coordinates home appliances such as air conditioner, microwave oven, garage doors, TV set, VCR, audio controller, indoor/outdoor lights, water sprinkler, home security system, bath tub controller, etc. In order to activate home appliances and to allow for different ways of cooking, the HACS needs mechanisms for communication between the different devices in the system, and for coordination among the various processes running on such devices. The system administrator of the HACS system has the ability to add a new appliance or delete an existing one. The system administrator has the ability to add a new remote device and configure it with HACS or delete an existing one when it is not used. Also the system administrator can create an account for a new user or delete existing account if it is no longer used.

CASE STUDY 8: HOSPITAL MANAGEMENT SYSTEM

Problem Statement:

Hospital Management System (HMS) is state-of-the-art software that offers comprehensive solutions to various segments of Healthcare Industry such as Super Specialty, Multi-specialty and General Hospitals of varied capacities, small Nursing Homes, HMOs, Polyclinics and General Practitioners. This HMS solution addresses the issues from multi-discipline angels namely patients, Doctors, Pharmacy, Hospital Management and Services. The software provides both clinical as well as patient care aspects to hospital management. The software is divided into different modules, each addressing a specific activity of the hospital and there by facilitating better patient care. Each module can be used as a standalone solution or can be integrated in a phased manner. Modules are designed so that they meet the present and future requirements of the hospital. HMS offers various sub-systems and a seamless integration. By being modular, each module can be used as a standalone solution or can be integrated in a phased manner. Modules are also so designed to meet the present as well as future requirements of the organization and process a unique ability with the business growth. HMS consists of the Base modules, Add-on modules and Specialty modules. Additional modules both add-on and specialty modules can be seamlessly integrated to the HMS at any time. The Integration Manager takes care of all the data consistency issues.

REFERENCE BOOKS:

1. Grady Booch, James Rum Baugh and Ivar Jacobson, *The Unified Modeling Language User Guide, Pearson Education*, 2nd Edition, 2009.
2. Hans-Erik Eriksson, Magnus Penker, Brian Lyons and David Fado, *UML 2 Toolkit*, Wiley Dreamtech India Pvt. Ltd., 2004.

II B. Tech. – II Semester

(16BT4HS31) **SOFT SKILLS LAB**

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITE: English Language Laboratory in I B.Tech or English Laboratory at Diploma Level.

COURSE DESCRIPTION: This course covers Body Language; Assertiveness; Goal Setting; Creative Thinking; Interpersonal Skills; Team Work; Conflict Management; Etiquette; Report Writing; Group Discussions; Interviewing Skills.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Acquire knowledge in
- Goal Setting
- Creative Thinking
- Leadership Skills and
- Team Work

CO2. Analyze the situations and develop skills for
- Body Language
- Personality Development and
- Stress Management

CO3. Apply the techniques of soft skills in a problem situation enhanced through multimedia software.

CO4. Function effectively as an individual and as a member in diverse teams.

CO5. Communicate effectively in public speaking in formal and informal forums.

LIST OF EXERCISES:

1. Body Language
2. Assertiveness
3. Goal Setting
4. Creative Thinking
5. Interpersonal Skills
6. Team Work
7. Conflict Management
8. Etiquette
9. Report Writing
10. Resume Writing
11. Group Discussions
12. Interviewing Skills

Total Lab Slots: 10

REFERENCE BOOKS:

1. R. C. Sharma & Krishna Mohan, *Business Correspondence and Report Writing*, Tata McGraw-Hill Publishing Company Limited, 3rd Edition, New Delhi, 2012.
2. Gopalswamy Ramesh and Mahadevan Ramesh, *The Ace of Soft Skills*, Pearson, 2010.
3. Jeff Butterfeild, *Soft Skills for Everyone,* Cengage learning, Delhi, 2011.
4. Barun K. Mitra, *Personality Development and Soft Skills*, Oxford University Press, 2012.

III B. Tech. – I Semester

(16BT5HS01) MANAGEMENT SCIENCE

(Common to CSE and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —

COURSE DESCRIPTION: Concepts of Management; Environmental Scanning; Concepts Related to Organization; Operations Management; Work Study; Statistical Quality Control; Inventory Management; Marketing; Human Resource Management; Project Management; Project Crashing; Entrepreneurship; Contemporary Management Practices.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate the concepts of operations management, human resources management, project management and contemporary management practices in managerial context.

CO2. Identify and analyse management problems in the business organizations reaching substantiated conclusions using principles of management.

CO3. Design appropriate organization structure for meeting the needs of the organization with consideration of the employees of the organization.

CO4. Competently employ broad based analytical tools for decision making, system design, analysis and performance.

CO5. Provide solution to organizations for sustainable development.

CO6. Apply knowledge of engineering and management principles to manage the projects in multidisciplinary environments.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION TO MANAGEMENT AND ORGANIZATION (09 Periods)

Concepts of management and Administration, Nature and Importance of management, Evolution of management thought, Functions of management, Contributions of F.W. Taylor and Henry Fayol to the management, Systems approach to management, Managerial skills, Elements of corporate planning process, Environmental scanning, SWOT Analysis, Social responsibilities of management.

Basic concepts related to organization, Objectives and Principles, Types of organizations- Line Organization, Line and Staff Organization, Functional Organization, Matrix Organization, Network organization.

UNIT II: OPERATIONS MANAGEMENT (12 Periods)

Plant location- Factors and Principles; Plant Layout- Principles and Types; Methods of production, Work study- Basic procedure involved in method study and work measurement; Statistical Quality Control- Factors affecting quality, Control charts for variables and attributes, Acceptance sampling; Materials management- objectives, Inventory- Types of inventory, Classical EOQ model, ABC analysis; Purchase procedure, Stores management, Marketing- Functions, Channels of distribution.

UNIT III: HUMAN RESOURCE MANAGEMENT (HRM) (06 Periods)

Nature and scope of HRM, Functions of HRM, Role of HR Manager in an organization, Job evaluation, Merit rating, Maslow's hierarchy of human needs, McGregor's theory X and theory Y, Herzberg's two-factor theory of motivation.

UNIT IV: PROJECT MANAGEMENT (PERT/CPM) AND ENTREPRENEURSHIP (09 Periods)

Network analysis - Critical path method (CPM), Program evaluation and review technique (PERT); Project cost analysis - Project crashing.

Introduction to Entrepreneurship, Entrepreneurial Traits, Entrepreneur vs Manager, Role of Entrepreneurship in Economic Development, Women as an Entrepreneur.

UNIT V: CONTEMPORARY MANAGEMENT PRACTICES (09 Periods)

Basic concepts of Material Requirements Planning, Enterprise resource planning (ERP), Just In Time (JIT) system, Total Quality Management (TQM), Value Chain Analysis, Business Process Outsourcing (BPO), Globalization, Management Challenges, Supply Chain Management (SCM), Role of Information Technology in managerial decision making, Six Sigma Concept, Maintenance Strategies- Preventive, Periodic and Breakdown Maintenance. **Total Periods: 45**

TEXT BOOKS:

1. O.P. Khanna, *Industrial Engineering and Management*, Dhanpat Rai and Sons, 2010.
2. Martand T.Telsang, *Industrial Engineering and Production Management*, S.Chand, 2nd Edition, 2006.

REFERENCE BOOK:

1. Koontz and Weihrich, *Essentials of Management*, TMH, 6th Edition, New Delhi, 2007.
2. N.D. Vohra, *Quantitative Techniques in Management*, TMH, 2nd Edition, New Delhi.

III B. Tech. – I Semester

(16BT50501) COMPUTER NETWORKS

(Common to ECE, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Computer Organization and Operating Systems

COURSE DESCRIPTION:
Introduction to Computer Networks; The Physical Layer; The Data Link Layer; The Medium Access Control Sub-layer; The Network Layer; The Transport Layer; The Application Layer.

COURSE OUTCOMES:
On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Functionalities of Various OSI and TCP/IP layers
- 3G Mobile phone networks, 802.11
- TCP,UDP and SMTP

CO2. Analyze the issues related to data link, medium access and transport layers by using channel allocation and connection management schemes.
CO3. Design and compute subnet masks and addresses for networking requirements.
CO4. Solve problems related to Flow control, Error control, congestion control and Network Routing.
CO5. Apply Network Standards - 802.3 and 802.11 for developing computer Networks.
CO6. Assess the impact of wired and wireless Networks in the context of societal applications like VoIP, Multi-user Network Games, Internet of Things.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION AND PHYSICAL LAYER (09 Periods)
Introduction: Network hardware, Network software, Reference models - OSI, TCP/IP; Example networks – Internet; Wireless LANs - 802.11.
Physical Layer: Guided transmission media, Wireless transmission.

UNIT II: DATA LINK LAYER AND MEDIUM ACCESS CONTROL SUBLAYER (10 Periods)
Data Link Layer: Data link layer design issues, Error detection and correction-CRC, Hamming codes, Elementary data link protocols, Sliding window protocols.
Medium Access Control Sublayer: ALOHA, Carrier sense multiple access protocols, Collision-free protocols, Ethernet, Data link layer switching-Repeaters, Hubs, Switches, Routers, and Gateways.

UNIT III: NETWORK LAYER (10 Periods)
Network layer design issues, Routing algorithms - Shortest path, Flooding, Distance vector, Link state routing, Hierarchical, Broadcast, Multicast, Anycast; Congestion control algorithms, Network layer in the internet - The IP version 4 protocol, IP addresses, IP version 6, Internet control protocols.

UNIT IV: TRANSPORT LAYER (09 Periods)
UDP – Segment header, Remote procedure call, Real-time transport protocols; TCP **–** service model, Protocol, Segment header, Connection establishment, Connection release, Sliding window, Timer management, Congestion control.

UNIT V: APPLICATION LAYER (07 Periods)
Domain Name System (DNS)-Name space, Domain resource records, Name servers; Electronic mail-Architecture and services, User agent, Message formats, Message transfer, Final delivery; The World Wide Web- Architectural overview, HTTP.

Total Periods: 45

TEXT BOOK:
1. Andrew S. Tanenbaum and David J. Wetherall, *Computer Networks*, Pearson Education, 5th Edition, 2015.

REFERENCE BOOKS:
1. Behrouz A. Forouzan, *Data Communication and Networking*, Tata McGraw-Hill, 4th Edition, 2010.

2. James F. Kurose and Keith W. Ross, *Computer Networking: A Top-Down Approach Featuring the Internet,* Pearson Education, 2nd Edition, 2012.

III B. Tech. - I Semester

(16BT51501) COMPILER DESIGN

(Common to CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Theory of Computation

COURSE DESCRIPTION:
Lexical analysis; Parsers; Run Time Environments; Syntax Directed Translation; Type checking; Code Optimization; Code Generation and Compiler tools.

COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on the phases involved in design of compilers.
CO2. Analyze code optimization Techniques.
CO3. Design experiments for implementing parsing techniques.
CO4. Synthesize rules in compiler to demonstrate semantic attribution during Parsing.
CO5. Use compiler construction tools such as LEX and YACC for designing a Parser.
CO6. Apply Ethical principles for usage of stack and other storage memory.

DETAILED SYLLABUS:
UNIT I– INTRODUCTION TO COMPILER AND LEXICAL ANALYSIS (09 Periods)
Structure of a compiler, Interpretation- Interpreters, Recursive interpreters, Iterative interpreters.
Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Specification of Tokens, The Lexical-Analyzer Generator LEX.

UNIT II – SYNTAX ANALYSIS (09 Periods)
The Role of the Parser, Eliminating Ambiguity, Eliminating of Left Recursion and Left Factoring.
Top-Down Parsing: Recursive descent parsing, Non Recursive Predictive parsing, LL (1) Grammars, A traditional top-down parser generator—YACC
Bottom-Up Parsing: Shift reduce parsing, LR parsers – Simple LR parser, Canonical LR parser, LALR parser, Using Ambiguous Grammars.

UNIT III – SYNTAX DIRECTED TRANSLATION AND TYPE CHECKING (09 Periods)
Syntax directed definition, S-attributed and L-attributed definitions, Construction of syntax trees.
Type Checking: Type Expressions, Type Equivalence, Rules for Type Checking, Type Conversions, Overloading of Functions and Operators.

UNIT IV – INTERMEDIATE CODE GENERATOR AND RUN TIME ENVIRONMENTS (09 Periods)
Preprocessing the intermediate code,Preprocessing of expressions, Preprocessing of if-statements and goto statements, Preprocessing of routines**,**Variants of Syntax Trees, Three Address Code, Boolean expressions, Flow-of-Control Statements, Control- Flow Translation of Boolean Expressions.
Run time Environments:
Storage organization, Stack Allocation of Space, Access to Nonlocal Data on the Stack.

UNIT V – CODE OPTIMIZATION AND CODE GENERATION (09 Periods)
Basic Blocks and Flow Graphs, Optimization of Basic Blocks, The principal sources of optimization, Introduction to data flow analysis.
Code Generation:
Issues in the Design of a Code Generator, The Target Language, Simple Code Generator, Peephole optimization, Register allocation and assignment. **Total No. Of Periods:45**

TEXT BOOK:
1. Alfred V. Aho, Monica S.Lam, Ravi Sethi, Jeffrey D.Ullman, *Compilers–Principles, Techniques and Tools*, Pearson Education, 2nd Edition, 2012.

REFERENCE BOOKS:
1. Dick GruneKees van Reeuwijk Henri, *Modern Compiler Design,* Springer, 2nd Edition, 2012.

2. David Galles, Modern Compiler Design, Pearson Education Asia, 2007.

III B. Tech. – I Semester

(16BT50442) MICROPROCESSORS AND INTERFACING

(Common to CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Digital Logic Design and Computer Organization.

COURSE DESCRIPTION: INTEL 8086 & 8051- Architectures; Instruction set; Programmable Interfacing Concepts; ADC, DAC, 8255, 8257,8259 ,8279,8251, Advanced peripheral Interfacing; Applications.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO 1: Demonstrate knowledge in
  a) Internal Hardware details of Intel 8086, 8051 & programming devices like 8255, 8257, 8259, 8279 and 8251.
  b) Interfacing various peripherals to build standalone systems.

CO2. Analyze various peripherals and interfacing techniques.

CO3. Design application based Microcomputer system using 8086 and 8051.

CO4. Solve problems by providing microcomputer-based real time solutions.

CO5. Apply programming tools, appropriate techniques and resources to complex engineering activities for microprocessor and microcontroller based systems with understanding of limitations.

C06: Solving societal problems by applying concepts of microprocessors and microcontrollers.

DETAILED SYLLABUS:

UNIT I – INTEL 8086 ARCHITECTURE AND PROGRAMMING (09 Periods)

Evolution of Microprocessors, Architecture of 8086 microprocessor, Register organization, Physical Memory Organization, Signal description of 8086, General Bus Operation Minimum and Maximum mode operation of 8086, Timing diagram, Addressing modes.

UNIT II – ASSEMBLY LANGUAGE PROGRAMMING WITH 8086 AND INTERRUPTS (11 Periods)

Instruction set of 8086, Assembler directives and Operators; Interrupts and Interrupt service routines, Interrupt Cycle of 8086, Non Maskable interrupt, Maskable interrupt (INTR), Interrupt Programming, Passing Parameters to procedures, MACROS.

UNIT III–BASIC PERIPHERALS AND THEIR INTERFACING WITH 8086 (08 Periods)

Semiconductor memory Interfacing, Dynamic RAM interfacing, Interfacing I/O ports, Programmable Input-Output Port (PIO) 8255, Modes of operations of 8255, Interfacing analog to digital and digital to analog converters, stepper motor interfacing.

UNIT IV – SPECIAL PURPOSE PROGRAMMABLE PERIPHERAL DEVICES (09 Periods)

Programmable Interrupt Controller 8259A; The keyboard/Display Controller 8279-Architecture, Signal Description, Modes of operations; Programmable Communication Interface 8251 USART; DMA Controller 8257, DMA Transfers and Operations.

UNIT V – INTRODUCTION TO 8051 MICROCONTROLLER (09 Periods)

Microprocessors Vs Microcontrollers, The 8051 Architecture: Introduction, 8051 Microcontroller Hardware, input/output pins, Ports and circuits, External Memory, , Counters and Timers, Serial Data Input / Output, Interrupts; Addressing Modes, Instruction set of 8051, simple programs on arithmetic operations using 8051.

Total Periods: 46

TEXT BOOKS:

1. A.K. Ray & K.M.Bhurchandi, *Advanced Microprocessors and Peripherals- Architecture, Programming and Interfacing*, TMH, 2002 reprint.
2. Kenneth J. Ayala, *The 8051 Microcontroller-Architecture, Programming & Applications*, 3rd Edition, Cengage learning, June 2004.

REFERENCE BOOKS:

1. Douglas V.Hall, *Microprocessors and Interfacing: Programming and Hardware*, revised 2nd Edition, TMH.

2. Yu-cheng Liu, Glenn A. Gibson, *Microcomputer systems:The 8086/8088 Family architecture,* Programming and Design, PHI, 2006.
3. Mazidi and Mazidi, *The 8051 Microcontroller and Embedded Systems*, PHI, 2000.

III B. Tech. - I Semester

(16BT51502) SYSTEMS SOFTWARE

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Operating Systems.

COURSE DESCRIPTION:
Kernel and Shell; The shell interpretive cycle ; Shell scripts; System calls for the File System - Open, Read, Write, File and record locking ; Process states and transitions;Process Creation; TCP/IP Basics; Resolving IP Addresses, Maintaining Security.

COURSE OUTCOMES:
On successful completion of this course, students will be able to
CO1. Demonstrate knowledge on commands for text processing and Files.
CO2. Analyze and Interpret process and System management techniques used in System Software
CO3. Use inbuilt UNIX system APIs to control system and its process.
CO4. Apply algorithms to manipulate the process context in system Software.
CO5. Perform effective troubleshooting using system error defines available with the operating system.

DETAILED SYLLABUS:
UNIT I: UNIX ARCHITECTURE AND COMMAND USAGE (09 Periods)
Division of Labor : Kernel and Shell, The file and process, The System calls, Features of UNIX, Internal And External Commands, Command Structure, General-Purpose Utilities: cal, date, echo, printf, bc, script, Email Basics, mailx, passwd, who, uname, tty, sty.
Handling Files: The file, File Name, The parent-child relationship, The home variable, pwd, cd, mkdir, rmdir, ls, cat, cp, rm, mv, more, file, wc, od, cmp, comm, diff, gzip, gunzip, tar, zip and unzip.

UNIT II: UNIX KERNEL AND SYSTEM CALLS (09 Periods)
Introduction to system concepts, Kernel Data Structures, System Administration
System calls for the File System: Open, Read, Write, File and record locking, Adjusting the position of file I/O, Close, File creation, Creation of special files, Change directory and change root, Change owner and change mode, Stat and fstat , Pipes, Dup, Mounting and unmounting file systems, Link, Unlink, File system abstractions, File system maintenance

UNIT III: PROCESS DESCRIPTION (09 Periods)
Process states and transitions, Layout of system memory, The context of a process, Saving the context of process, Manipulation of the process address, Sleep

UNIT IV: PROCESS CONTROL (08 Periods)
Process creation, Signals, Process termination, Awaiting process termination, Invoking other programs, The user id of a process, Changing the size of a process, The shell, System boot and init process.

UNIT V: ADVANCED SYSTEM MANAGEMENT (10 Periods)
Networking Tools: TCP/IP Basics, Resolving IP Addresses, The Applications, Ping: Checking the Network, telnet:Remote Login, ftp:File Transfer Protocol, SSH: The Secure Shell, The SSH Tools, The Domain Name System(DNS).
Maintaining Security, Partitions and File Systems, The Standard File Systems and Their Types, fdisk: Creating Partitions, mkfs: Creating a File System, Mounting and Unmounting File Systems, fsck: File System Checking.

Total Periods: 45

TEXT BOOKS:
1. Sumitabha Das*, Unix Concepts and Applications*, TMH, 4th Edition, 2006.
2. Maurice J. Bach, *The Design Of The Unix Operating System*, PHI, 2008.

REFERENCE BOOKS:
1. Graham Glass, King Ables, *Unix for programmers and users*, Pearson, 3rd Edition, 2009.
2. N.B Venkateswarlu*, Advanced Unix programming*, BS Publications, 2nd Edition, 2010.
3. Yashwanth Kanitkar, *Unix Shell programming,* BPB Publications, 2010.

III B. Tech. – I Semester
(16BT30503) **PYTHON PROGRAMMING**
(Interdisciplinary Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Object Oriented Programming through C++.

COURSE DESCRIPTION:
Data types and Expressions; Control Statements; Strings; Text Files; Lists; Dictionaries; Functions; Objects and their use; Exception Handling; Design with Classes; Graphical User Interface.

COURSE OUTCOMES:
On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge in:
- Data Types, Variables, Expressions
- Control statements, Strings and Text files.
- Lists, Dictionaries and Functions.
- Objects and Design with classes
- Exception Handling and GUI

CO2. Analyze complex computational problems.
CO3. Design solutions for real life computational problems
CO4. Solve complex problems using python scripting constructs.
CO5. Implement python scripts using Integrated Development Environment.
CO6. Apply Python programming knowledge to solve problems related to societal applications like Medical and Weather Forecasting.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION, DATA TYPES AND EXPRESSIONS (08 Periods)
Introduction: Computer science, Computer algorithms, Computer software, The Python programming language, First program in Python.
Data Types and Expressions: Literals, Variables and Identifiers, Operators, Expressions and Data types.

UNIT II: CONTROL STRUCTURES, LISTS, DICTIONARIES AND SETS (08 Periods)
Control Structures: Control structures, Boolean expressions, Selection control and Iterative control.
Lists: List structures, Lists in Python, Iterations over lists, Assigning and copying lists, List comprehensions.
Dictionaries, Tuples and Sets: Dictionary types in Python, Implementation of Dictionary, Tuples, Set data type - the Set data type in Python, Implementation of sets.

UNIT III: DESIGN WITH FUNCTIONS, STRINGS AND TEXT FILES (09 Periods)
Program routines, Functions, Recursion-Recursive functions, Recursive problem solving, Iteration Vs Recursion, A case study of Towers of Hanoi using recursion; Using text files, String processing, Exception handling, A Case study on cigarette Use/Lung cancer Correlation program.

UNIT IV: OBJECTS AND THEIR USE, OBJECT ORIENTED PROGRAMMING (09 Periods)
Objects and Their Use: Software objects, Turtle graphics- Creating a turtle graphics window, The default turtle, Fundamental turtle attributes and behavior, Additional turtle attributes, Creating multiple turtles.
Object Oriented Programming: Encapsulation, Inheritance, and Polymorphism.

UNIT V: GUI PROGRAMMING (11 Periods)
Tkinter Overview - tkinter pragmatics, Documentation, Extensions, structure; tkinter coding alternatives, adding buttons and callbacks-lambda, bound method, callable class object, Binding events; adding multiple widgets, Reusable GUI Components with classes, Dialogs, Entry, check buttons and Radio buttons, Scales, Menus.

Total Periods: 45

TEXT BOOKS:

1. Charles Dierbach, *Introduction to Computer Science using Python: A Computational Problem-Solving Focus,* Wiley India Edition, 2016.
2. Mark Lutz, *Programming Python*, O'Reilly Publications, 4th Edition, 2011.

REFERENCE BOOK:

1. Kenneth Lambert and B.L. Juneja, *Fundamentals of Python*, Cengage Learning, 3rd Edition, 2012.

III B. Tech. – I Semester

(16BT71203) INFORMATION RETRIEVAL SYSTEMS

(Interdisciplinary Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Data Structures and Database Management Systems.

COURSE DESCRIPTION: Architecture of Information Retrieval Systems; Functional Capabilities; Data Structures; Mathematical Algorithms; Indexing; Similarity and Clustering; Human Perception and Presentation; Text Search Techniques and Evaluation Measures.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:

- Information Retrieval System Architecture
- Functional capabilities
- Indexing and data presentation methods.
- Evaluation measures of Information Retrieval Systems.

CO2. Analyze indexing methods and clustering algorithms to group similar data items for efficient search.

CO3. Design and develop data structures used to store and retrieve data items.

CO4. Demonstrate problem solving skills in the usage of mathematical algorithms for information retrieval.

CO5. Use text search algorithms and collaborative filtering techniques for information retrieval and visualization methods for information presentation.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION (09 Periods)

Primary information retrieval problems, Objectives of information retrieval system, Functional overview, Understanding the search functions, Relationship to DBMS, Digital libraries and data warehouses, Data structures and mathematical algorithms.

UNIT II: INGEST AND INDEXING (09 Periods)

Ingest: Introduction, Item receipt, Duplicate detection, Item normalization, Zoning and creation of processing tokens, Stemming, Entity processing, Categorization, Citational metadata.

Indexing: Manual indexing process, Automatic indexing of text and multimedia.

UNIT III: SEARCH AND CLUSTERING (12 Periods)

Search: Similarity measures and ranking, Hidden markov models, Ranking algorithms, Relevance feedback, Selective dissemination of information search, Weighted searches for boolean systems, Multimedia searching.

Clustering: Introduction to clustering, Thesaurus generation, Item clustering, Hierarchy of clusters.

UNIT IV: INFORMATION PRESENTATION (07 Periods)

Introduction, Presentation of the hits, Display of the item, Collaborative filtering, Multimedia presentation, Human perception and presentation.

UNIT V: SEARCH ARCHITECTURE AND EVALUATION (08 Periods)

Search Architecture: Index search optimization, Text search optimization, GOOGLE Scalable multiprocessor architecture.

Evaluation: Information system evaluation, Measures used in system evaluation

Total Periods: 45

TEXT BOOK:

1. Gerald Kowalski, *Information Retrieval Architecture and Algorithms,* Springer, 2013.

REFERENCE BOOKS:

1. Christopher D. Manning, Prabhakar Raghavan and Hinrich Schütze, *An Introduction to Information Retrieval,* Cambridge University Press, 2012.

2. Ricardo Baeza-Yates and Berthier Ribiero- Neto, *Modern Information Retrieval the concepts and technology behind search,* Addison Wesley, 2nd Edition, 2010.

III B. Tech. - I Semester

(16BT51503) INTELLIGENT COMPUTING SYSTEMS

(Interdisciplinary Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:
Courses on Discrete Mathematical Structures and Design and Analysis of Algorithms

COURSE DESCRIPTION: AI Problems; Problem Characteristics Search Algorithms; Inference in Propositional Logic; Forward and Backward Chaining Algorithms; Truth Maintenance Systems; Basic Probability Notations; Forms of Learning; Evolutionary Computing.

COURSE OUTCOMES:
On successful completion of this course, students will be able to:

CO1. Demonstrate Knowledge on
- Artificial Intelligent Techniques
- Searching algorithms
- Inference in Propositional and First Order Logic
- Evolutionary Computing

CO2. Analyze and solve problems involving search algorithms.
CO3. Design and develop knowledge based solutions for AI based systems.
CO4. Apply knowledge representation, reasoning, and machine learning techniques to solve real world problems.
CO5. Use appropriate evolutionary algorithms in intelligent computing systems.
CO6. Demonstrate the use of intelligent systems' principles in societal context to solve diverse problems.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION (09 Periods)
The AI Problems, The Underlying Assumption, The Levels of the Model, Criteria of Success, Some General References, One Final Word and Beyond. Problems, Problem Spaces, and Search: Defining the Problem as a State Space Search, Production Systems, Problem Characteristics, Production System Characteristics.

UNIT II: SEARCHING AND PROBLEM SOLVING (09 Periods)
Issues in the Design of Search Programs. Uninformed Search Strategies, Avoiding Repeated States. Informed Search and Exploration: Informed (Heuristic) Search Strategies, Heuristic Functions, Local Search Algorithms and Optimization Problems, Local Search in Continuous Spaces.

UNIT III: KNOWLEDGE AND REASONING (09 Periods)
Logical Agents, Knowledge–Based Agents, The Wumpus World, Logic, Propositional Logic a Very Simple Logic, Reasoning Patterns in Propositional Logic, Effective Propositional Inference, Agents Based on Propositional Logic.

First-Order Logic:
Representation Revisited, Syntax and Semantic of First-Order Logic, Using First-Order Logic, Knowledge Engineering in First-Order Logic. Inference in First-Order Logic: Propositional vs. First-Order Inference, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution.

UNIT IV: KNOWLEDGE REPRESENTATION AND REASONING (09 Periods)
Ontological Engineering, Categories and Objects, Actions, Situations, and Events, Mental Events and Mental Objects, The Internet Shopping World, Reasoning Systems for Categories, Reasoning with Default Information, Truth Maintenance Systems. Uncertainty, Acting Under Uncertainty, Basic Probability Notation, The Axioms of Probability, Inference Using Full Joint Distributions, Independence, Bayes' Rule and its use.

UNIT V: LEARNING AND EVOLUTIONARY COMPUTATION CONCEPTS (09 Periods)
Learning from Observations, Forms of Learning, Inductive Learning, Learning Decision Trees, Ensemble Learning, Computational Learning Theory. History of Evolutionary Computation, Evolutionary Computation Overview, Genetic algorithms, Evolutionary Programming and strategies, Implementation issues, Genetic algorithm implementation, Particle Swarm Optimization Implementation.

Total Periods: 45

TEXT BOOKS:
1. Elaine Rich, Kevin Knight and Shivashankar B Nair, *Artificial Intelligence,* Tata McGraw Hill, 3rd Edition, 2007.
2. Stuart Russell and Peter Norvig, *Artificial Intelligence A Modern Approach*, Pearson Education, 2nd Edition, 2011.

REFERENCE BOOKS:
1. Russell C.Eberhart and Yuhui Shi, *Computational Intelligence: Concepts to Implementations,* Elsevier, 2007.

2. George F. Luther, *Artificial Intelligence: Structures and Strategies for Complex Problem Solving,* Pearson Education, 5th Edition, 2001.

III B. Tech. – I Semester

(16BT40501) COMPUTER GRAPHICS

(Interdisciplinary Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Matrices and Numerical Methods and Programming in C.

COURSE DESCRIPTION:

Introduction to Computer Graphics; Output Primitives; 2-D Geometric Transformations and Viewing; 3-D Geometric Transformations and Viewing; 3-D Object Representation; Visible Surface Detection Methods and Rendering Methods.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on
- Graphical interactive devices
- Viewing transformations
- 2-D & 3-D object representations and
- Surface detection methods

CO2. Analyze Transformations and Clipping algorithms for 2-D and 3-D objects.
CO3. Design algorithms to generate points, lines, and polygons for 2-D and 3-D objects.
CO4. Develop innovative methods and techniques for 2-D and 3-D modeling.
CO5. Apply appropriate techniques and tools for surface detection and rendering methods.
CO6. Use contextual knowledge to solve problems related to societal issues.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION AND OUTPUT PRIMITIVES (10 Periods)

Overview of Graphics Systems: Video display devices, Raster-scan systems, Random-scan systems, Graphics monitors and workstations, Input devices.

Output Primitives: Points and lines, Line-drawing algorithms, Midpoint circle algorithm, Midpoint ellipse algorithm.

UNIT II: FILLED AREA PRIMITIVES AND 2-D GEOMETRIC TRANSFORMATIONS (09 Periods)

Filled Area Primitives: Scan-line polygon fill algorithm, Boundary-fill algorithm and Flood-fill algorithm.

2-D Geometric Transformations: Transformations – translation, scaling, rotation, reflection and shear; Homogeneous coordinates, Composite transformations, Transformations between coordinate systems.

UNIT III: 2-D VIEWING AND 3-D OBJECT REPRESENTATIONS (09 Periods)

2-D Viewing: The viewing pipeline, Viewing coordinate reference frame, Window-to-viewport coordinate transformation, Viewing functions, Cohen-Sutherland line clipping algorithm, Sutherland-Hodgeman polygon clipping algorithm.

3-D Object Representations: Polygon surfaces, Quadric surfaces, Spline representations, Hermite curve, Bezier curves and surfaces, B-Spline curves and surfaces.

UNIT IV: 3-D GEOMETRIC TRANSFORMATIONS AND VIEWING (09 Periods)

3-D Transformations: Transformations – translation, rotation, scaling, reflection and shear.

3-D Viewing: Viewing pipeline, Viewing coordinates, Projections and Clipping.

UNIT V: VISIBLE-SURFACE DETECTION METHODS AND SURFACE-RENDERING METHODS (08 Periods)

Surface Detection Methods: Classification, Back-face detection, Depth-buffer, Scan-line, Depth-sorting, BSP-tree, Area-subdivision and Octree methods.

Surface-Rendering methods: Gouraud shading, Phong shading.

Total Periods: 45

TEXT BOOK:

1. Donald Hearn and M.Pauline Baker, Computer Graphics C version, Pearson Education, 2nd Edition, 2006.

REFERENCE BOOKS:

1. Steven Harrington, *Computer Graphics: A Programming Approach*, McGraw-Hill, 2nd Edition, 1987.
2. William M. Newman and Robert F. Sproull, *Principles of Interactive Computer Graphics*, McGraw-Hill, 2nd Edition, 2005.

III B. Tech. – I Semester

(16BT50531) **COMPUTER NETWORKS LAB**

(Common to CSE and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on Computer Networks

COURSE DESCRIPTION:

Hands on Practice on Data Link Layer Framing Methods; Routing Algorithms; Congestion Control Algorithms; Connection Management in Transport Layer;

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate Knowledge on:
- Framing methods for data link layer,
- Shortest path using Dijkstra’s routing algorithms

CO2. Identify suitable algorithm to find shortest path in a given network

CO3. Design and compute subnet masks and addresses for networking Requirements.

CO4. Solve problems related to Flow control, Error control, congestion control and Network Routing.

CO5. Apply Latest software tools and technologies for designing simple to complex applications in computer networks.

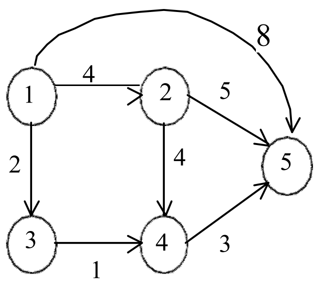
CO6. Assess the impact of wired and wireless Networks in the context of societal applications like VoIP, Multi-user Network Games, Internet of Things.

CO7. Work effectively as an individual to implement mini-project.

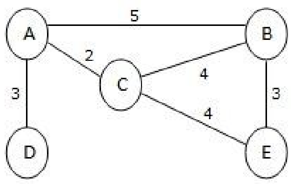
CO8. Demonstrate communication skills both oral and written for preparing and generating reports.

LIST OF EXCERCISES:

1. Implement the following data link layer framing methods.
   i. Character count. ii. Character stuffing. iii. Bit stuffing.
2. Implement the frame sorting technique used in buffers.
3. Design and develop a program to compute checksum for the given frame 1101011011 using CRC-12, CRC-16, and CRC-CCIP. Display the actual bit string transmitted. Suppose any bit is inverted during transmission. Show that this error is detected at the receivers end.
4. Implement Dijkstra‘s algorithm to compute the Shortest path for the given graph.



5. Develop a program to obtain routing table for each node using Distance Vector Routing Algorithm by considering the given subnet with weights indicating delay between Nodes.



6. Write a program to simulate flow based routing.
7. Write a program to simulate random early detection congestion control algorithm.
8. Using TCP/IP sockets, write a client-server program to open a file available in the server.
9. Write a program for congestion control using leaky bucket algorithm.
10. Write a program for the Mail Client
    i. POP Client: Gives the server name, user name and password retrieve the mails and allow manipulation of mail box using POP commands.
    ii. SMTP Client: Gives the server name, send e-mail to the recipient using SMTP commands
11. Write a program for HTTP server to implement the commands - GET, POST, HEAD and DELETE. The servermust handle multiple clients.

REFERENCE BOOK:

1. Andrew S. Tanenbaum and David J. Wetherall, *Computer Networks,* Pearson Education, 5th Edition, 2015.

III B. Tech. - I Semester

(16BT50451) MICROPROCESSORS AND INTERFACING LAB

(Common to ECE and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITE: Course on Microprocessors and interfacing.

COURSE DESCRIPTION:
Assembly language Programming for Intel 8086 & 8051; Programming of Interfacing standard peripherals - DAC, Stepper Motor, ADC, Logic Controller, Keyboard, Seven Segment Display.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1 Demonstrate knowledge on microcomputer & microcontroller based systems.
CO2. Analyze various programming alternatives, interfacing methods & usage of various on-chip resources like Displays, logic controllers ADC, DAC, Keyboard interfacing and Stepper Motor to build stand alone systems.
CO3. Design and develop microcomputer and microcontroller based system to suit market requirements.
CO4. Solve engineering problems by proposing potential solutions using microprocessors and microcontrollers.
CO5. Apply appropriate techniques, resources, and tools for modeling microcomputer and microcontroller based systems with understanding of limitations.
CO6. Work effectively as individual and as a team member in the area of microprocessors.
CO7. Communicate in oral and written form in the area of microprocessors.

LIST OF EXERCISES:
(Minimum of TWELVE experiments to be conducted)

I Programs using 8086

1. Introduction to MASM/TASM
2. Arithmetic operations
3. Logic operations
4. String operations
5. Modular program: using procedure & DOS/BIOS Programming

II Interfacing with 8086

1. Stepper motor
2. Logic controller
3. A/D converter
4. D/A Converter.
5. Seven segment display
6. Keyboard interfacing

III Programs using 8051

1. Arithmetic operations using internal and external memory.
2. Logical Operations and Bit-manipulation operations.
3. Programs using special instructions like SWAP, bit/byte, set/ reset etc.

III B. Tech. - I Semester
(16BT51531) **SYSTEMS SOFTWARE LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Courses on Programming in C and Operating Systems

COURSE DESCRIPTION: Hands on Implementation of copy of a file using standard I/O and system calls; emulate the UNIX commands; Access Permissions; Loops in Directory hierarchy; Displaying time of day for every 60 seconds; Print all error messages; Running two programs in pipeline.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate and interpret the working of commands available in UNIX.
CO2. Recognize different types of file supported by UNIX operating system.
CO3. Design and implement system-level applications for open-source operating systems.
CO4. Select and make use of the OS kernel functions and their APIs, standard programming Languages and utility tools.
CO5. Use different APIs for System Software design.

LIST OF EXPERIMENTS:

1. Write a C program that makes a copy of a file using standard I/O and system calls
2. Write a C program to emulate the UNIX ls –l command.
3. Write a program that prints the owner, file type, access permissions, and access times of files supplied as parameters. If a file (parameter) is a directory, the program should read the directory and print the above information for all files in the directory.
4. Write a program that visits every directory, starting with the current directory. How should it handle loops in the directory hierarchy?
5. Write a program that changes its root to a particular directory, and investigate the directory tree accessible to that program.
6. Write a C program that displays the real time of a day every 60 seconds.
7. Write a C program to print all error messages.
8. Write a C program to check all 12 permission bits of a file.
9. Write a C program to run two programs in a pipeline.

III B. Tech. - II Semester

(16BT3HS02) MANAGERIAL ECONOMICS AND PRINCIPLES OF ACCOUNTANCY

(Common to ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE- REQUISITE: —

COURSE DESCRIPTION: Managerial Economics; Demand and Elasticity of Demand; Production Functions; Markets and Pricing Policies; Formation of different types of Business Organizations; Basic concepts of Accounting (Journal, Ledger and Trial balance); Trading Account, Profit and Loss Account and Balance sheet with simple adjustments; Computerized Accounting.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Acquire Knowledge in
- a) Tools and concepts of Micro Economics.
- b) Basic Principles and concepts of Accountancy.
- c) Provides life skills for effective utilization of scarce resources.
- d) Financial Accounting.
- e) Significance of Economics and Accountancy

CO2. Develop skills in managerial decision making of an organization.

CO3. Apply the Economic theories i.e., Demand, Production, Cost, Markets and Price.

CO4. Develop effective communication in Business and Accounting transactions.

CO5. Ascertain the profitability and soundness of an organization.

CO6. Practice Financial Accounting

DETAILED SYLLABUS

UNIT I: INTRODUCTION TO MANAGERIAL ECONOMICS, DEMAND ANALYSIS (09 Periods)

Definition, Nature and Scope of Managerial Economics. **Demand:** Determinants of demand – Demand function - Law of demand, assumptions and exceptions - Elasticity of demand – Types of elasticity of demand - Demand forecasting and methods of demand forecasting.

UNIT II: THEORY OF PRODUCTION AND COST ANALYSIS (09 Periods)

Production Function: Isoquants and Isocosts – Input-output relationship - Law of returns. **Cost Concepts:** Total, Average and Marginal Cost **-** Fixed vs. Variable costs – Opportunity Costs Vs Outlay Costs– Separable Costs Vs Joint Costs, Urgent Costs Vs Postponable Costs- Avoidable Costs Vs Unavoidable Costs - **Break Even Analysis (BEA)** – Assumptions, Merits and demerits - Determination of Break Even Point (Simple problems).

UNIT III: MARKETS AND PRICING (09 Periods)

Market Structure: Types of Markets - Features of perfect competition - Monopoly and monopolistic competition - Price and Output determination in perfect competition, monopoly and monopolistic Markets.

Pricing : Objectives and policies of pricing – Sealed bid pricing - Marginal cost pricing - Cost plus pricing - Going rate pricing – penetration Pricing –skimming Pricing - Block pricing – Peak load pricing - Cross subsidization.

UNIT IV: INTRODUCTION TO PRINCIPLES OF ACCOUNTING & CAPITAL (09 Periods)

Accountancy: Introduction – Concepts – Conventions – Double Entry Book Keeping – Journal – Ledger - Trial Balance (Simple problems).

Capital : Significance - Types of capital – Sources of Capital.

UNIT V: FINAL ACCOUNTS - COMPUTERIZATION OF ACCOUNTING SYSTEM (09 Periods)

Introduction to Final Accounts - Trading account - Profit and Loss account and Balance Sheet with simple adjustments (Simple problems).**Computerization of Accounting System :** Manual Accounting *Vs* Computerized Accounting – Advantages and Disadvantages of Computerized Accounting.

Total Periods: 45

TEXT BOOKS:

1. A.R. Aryasri, *Managerial Economics and Financial Analysis,* Tata Mc- Graw Hill, New Delhi, 3rd Edition, 2007.
2. R.Cauvery, U.K. Sudhanayak, M. Girija and R. Meenakshi, *Managerial Economics, S. Chand and Company,* New Delhi, 2nd Edition, 2010.

REFERENCE BOOKS:

1. Varshaney and Maheswari*, Managerial Economics,* Sultan Chand and Sons, New Delhi, 19th Edition, 2005.

2. Ms. Samba Lalita, *Computer Accouting Lab Work*, 1st Edition, Kalyani Publishers, Ludhiana, 2009.
3. S.P. Jain and K.L. Narang, *Financial Accounting*, Kalyani Publishers, Ludhiana, 6th Edition, 2002.

III B. Tech. – II Semester

(16BT61501) DATA WAREHOUSING AND DATA MINING

(Common CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Database Management Systems.

COURSE DESCRIPTION: Data Mining Fundamentals; Data Preprocessing; Operational Database Systems and Data Warehouses; Mining Frequent Patterns; Classification and Prediction; Clustering; New Trends and Research Frontiers.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on Concepts of data warehousing and data mining.
CO2. Analyze using data mining techniques to find useful and potential Knowledge.
CO3. Design of Data Warehouse for OLAP applications and deployment.
CO4. Evaluate the usage of association mining techniques on complex data objects.
CO5. Select appropriate techniques to measure the interesting patterns from heterogeneous databases.
CO6. Apply appropriate evolutionary data mining algorithms to find solutions of Real time Applications.

DETAILED SYLLABUS:

UNIT I: DATA WAREHOUSING AND ONLINE ANALYTICAL PROCESSING (09 Periods)

Data Warehouse, Operational Database Systems versus Data Warehouses, A Multi tired Architecture, A Multidimensional Data Model, Stars, Snowflakes and Fact Constellations: Schemas, Role of Concept hierarchies, Measures, OLAP Operations, From online Analytical processing to Multidimensional Data Mining, Indexing OLAP Data.

UNIT II: DATA MINING AND DATA PREPROCESSING (08 Periods)

Introduction to Data Mining, kinds of data, kinds of patterns, major issues in Data Mining, Data Pre-processing**,** Data Cleaning, Data Integration , Data Reduction, Data Transformation and Discretization.

UNIT III: ASSOCIATIONS AND CLASSIFICATION (10 Periods)

Basic Concepts , Frequent itemset Mining Methods, pattern evaluation methods- From Association Mining to Correlation Analysis ,Classification, Decision Tree Introduction, Bayesian Classification Methods, Rule Based Classification, Prediction: Linear Regression.

UNIT IV: CLUSTER ANALYSIS (09 Periods)

Cluster Analysis: Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods -k-Means and K-Medoids , Hierarchical methods-Agglomerative and divisive method, Density-Based Method-DBSCAN, Grid-Based Method-STING, Outlier Analysis.

UNIT V: DATA MINING TRENDS (09 Periods)

Mining Complex Data Types: Mining sequence data, Mining other kinds of data: Spatial, Text, Multimedia and Web data, Data Mining Trends.

Total Periods: 45

TEXT BOOK:

1. Jiawei Han, Micheline Kamber and Jian Pei, *Data Mining: Concepts and Techniques,* Elsevier, 3rd Edition, 2013.

REFERENCE BOOKS:

1. K.P. Soman, Shyam Diwakar and V. Ajay, *Insight into Data mining Theory and Practice,* Easter Economy Edition, Prentice Hall of India, 2006.
2. G. K. Gupta, *Introduction to Data Mining with Case Studies,* Easter Economy Edition, Prentice Hall of India, 2006.
3. Tan P.N, Steinbach M.and Kumar V., *Introduction to Data mining*, Addison-Wesley, 2006.

III B. Tech. – II Semester
(16BT51203) **WEB TECHNOLOGIES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Java Programming.

COURSE DESCRIPTION: Hyper Text Markup Language (HTML); Features of HTML5; Cascading Style Sheets (CSS); JavaScript; JQuery; Bootstrap; Hypertext Preprocessor (PHP); MySQL.

COURSE OUTCOMES:
On successful completion of this course, students will be able to:
- CO1. Demonstrate knowledge on web page design elements, dynamic content and database interaction.
- CO2. Analyze user requirements to develop web applications.
- CO3. Design client-server applications using web technologies.
- CO4. Demonstrate problem solving skills to develop enterprise web applications.
- CO5. Use HTML, CSS, JavaScript, JQuery, Bootstrap and PHP technologies for device independent web application development.
- CO6. Apply Web Technologies to develop interactive, dynamic and scalable web applications for societal needs.

DETAILED SYLLABUS:

UNIT I: HTML (11 Periods)
Introduction: Fundamentals of HTML, Working with text, Organizing text in HTML, Working with links and URLs, Creating tables, Working with images, Canvas, Forms, Frames and Multimedia.
HTML5: Introduction, HTML5 document structure, Creating editable content, Checking spelling mistakes, Exploring custom data attributes, Client-Side storage, Drag and drop feature, Offline web applications, Web communications, Cross-Document messaging and desktop notifications.

UNIT II: CSS AND JAVASCRIPT (08 Periods)
CSS: Introduction, CSS selectors, Inserting CSS in an HTML document, Backgrounds, Fonts, and Text styles, Creating boxes, Displaying, Positioning and floating elements, Features of CSS3, Media queries.
Javascript: Overview of JavaScript, JavaScript functions, Events, Image maps and animations, JavaScript objects, Working with browser and document objects.

UNIT III: JQUERY AND BOOTSTRAP (09 Periods)
JQuery: Introduction, JQuery selectors, Events, Methods to access HTML elements and attributes, Introduction to AJAX.
Bootstrap: Getting started with Bootstrap, Creating responsive layouts using Bootstrap CSS - Basic HTML structure for Bootstrap, Responsive classes, Rendering images, the grid system, Constructing data entry forms.

UNIT IV: INTRODUCTION TO PHP (09 Periods)
Introduction, Data types, Variables, Constants, Expressions, String interpolation, Control structures, Functions, Arrays, Embedding PHP code in web pages, Object Oriented PHP.

UNIT V: PHP WEB FORMS AND MYSQL (08 Periods)
PHP Web forms: PHP and web forms, Sending form data to a server, Working with cookies and session handlers
PHP with MySQL: Interacting with the database, prepared statement, Database transactions.

Total Periods: 45

TEXT BOOKS:
1. Kogent Learning Solutions Inc, *HTML 5 Black Book: Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP and JQuery*, Dreamtech Press, 2nd Edition, 2016.
2. W. Jason Gilmore, *Beginning PHP and MySQL*, APress, 4th Edition, 2011.

REFERENCE BOOKS:
1. Snig Bahumik, *Bootstrap Essentials*, PACKT Publishing, 2015 (e-book).

2. Thomas A. Powell, *The Complete Reference: HTML and CSS,* Tata McGraw Hill, 5th Edition, 2010.
3. Andrea Tarr*, PHP and MySQL*, Wiley India, 2012.

III B. Tech. – II Semester

(16BT50341) **OPTIMIZATION TECHNIQUES**

(Common to CE, CSE and CSSE)
(Interdisciplinary Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Multi-variable calculus and differential equations

COURSE DESCRIPTION:

Introduction to optimization; classical optimization techniques; classification of optimization problems; linear programming; transportation and assignment problem; non-linear programming; un-constrained non-linear programming; constrained non-linear programming; dynamic programming.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on Optimization techniques for Linear, Non linear and Dynamic programming problems.
CO2. Analyze and quantify a system architecture or product design problem for selecting appropriate objective function, design variables, parameters and constraints.
CO3. Develop mathematical models for real time optimization problems.
CO4. Conduct investigations on complex problems and make recommendations based on solutions, analysis and limitations of models.
CO5. Use optimization techniques for solving complex problems of real time applications.
CO6. Optimize the resources in organizations for sustainable development.

DETAILED SYLLABUS:

UNIT I: CLASSICAL OPTIMIZATION TECHNIQUES (09 Periods)

Introduction, Engineering applications of optimization, Statement of an optimization problem, Design vector, Design constraints, Constraint surface, Objective function, Classification of optimization problems, Single variable optimization, Multi variable optimization without constraints, Multi variable optimization with equality constraints - Lagrange multipliers method; Multi variable optimization with inequality constraint - Kuhn Tucker conditions.

UNIT II: LINEAR PROGRAMMING (09 Periods)

Introduction, Formulation, Graphical solution, Simplex method, Big M-method, Two–phase method, Duality principle, Dual simplex method.

UNIT III: TRANSPORTATION AND ASSIGNMENT PROBLEM (09 Periods)

Transportation problems: Formulation, Initial basic feasible solution - North–West corner rule, Least cost method, and Vogel's approximation method; Optimal solution using Modified distribution method - Unbalanced transportation problem, Degeneracy.

Assignment problems: Formulation, Solution of assignment problem and its variants, Traveling salesman problem.

UNIT IV: NON-LINEAR PROGRAMMING (09 Periods)

One dimensional minimization methods, classification - Fibonacci method, quadratic interpolation method; classification of unconstrained minimization methods - Powell's method, steepest descent method (Cauchy's method); classification of constrained optimization techniques - interior and exterior penalty function methods.

UNIT V: DYNAMIC PROGRAMMING (09 Periods)

Multistage decision processes, Concept of sub optimization and Principle of optimality, Computational procedure in dynamic programming - calculus method, Tabular method; Linear Programming problem by dynamic programming approach, Applications - reliability problem, shortest path problem, and capital budgeting problem.

Total Periods: 45

TEXT BOOKS:

1. Singiresu S Rao, *Engineering Optimization: Theory and Practice*, New Age International, 3rd Edition, 2010.
2. A.Ravindran, K.M.Ragsdell, G.V.Reklaitis, *Engineering Optimization: Methods and applications,* Wiley India Pvt. Ltd., 2nd Edition2006.

REFERENCE BOOKS:

1. C Mohan and Kusum Deep, *Optimization Techniques*, New Age International Publishers, 1st Edition, 2010.
2. Hamdy A. Taha, *Introduction to Operations Research*, PHI, 9th Edition, 2013.

III B. Tech. - II Semester

(16BT60404) IMAGE PROCESSING

(Common to ECE and CSSE)

(Interdisciplinary Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —

COURSE DESCRIPTION:

Fundamentals of image processing; Image transforms; Image enhancement techniques in spatial and frequency domains; Restoration techniques; Image segmentation techniques; Image compression techniques.

COURSE OUTCOMES:

On successful completion of this course, students will be able to

CO1. Demonstarte knowledge in
- Image Fundamentals
- Image Enhancement & Restoration Techniques
- Image Segmentation & Compression Techniques
- Color image processing

CO2. Analyze different images using various processing techniques.

CO3. Design and Develop various image processing algorithms to process the images in various Real Time Applications.

CO4. Solve problems related to images for feasible and optimal solutions in the core area of Image Processing.

CO5. Apply appropriate techniques to complex engineering activities in the field of image processing.

CO6. Understand the impact of the image processing for societal needs.

DETAILED SYLLABUS:

UNIT I: IMAGE FUNDAMENTALS (10 Periods)

Fundamental steps in Image Processing, Image sampling & quantization, some basic relationships between pixels, Arithmetic operations, Logical operations, Spatial operations,

IMAGE TRANSFORMS: 2D-DFT and properties, Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Haar-Transform, Slant Transform, Hotelling Transform.

UNIT II: IMAGE ENHANCEMENT (11 Periods)

Basic Intensity transformation functions, Histogram processing, Fundamentals of Spatial Filtering, Smoothing spatial filters, Sharpening spatial filters, Combining spatial Enhancement methods.

Basics of filtering in frequency domain, Correspondence between filtering in the spatial and frequency domains, Image smoothing using frequency domain filters, Image sharpening using frequency domain filters, Homomorphic filtering.

UNIT III: IMAGE RESTORATION (07 Periods)

Image degradation/Restoration model, Noise models, Restoration in the presence of Noise only-spatial filtering - mean, order- statistic and adaptive filters. Estimating the degradation function, Inverse filtering, Weiner filtering, Constrained least squares filtering.

UNIT IV: IMAGE COMPRESSION (08 Periods)

Classification of redundancy in Images, Image Compression models, Run length coding, Arithmetic coding, Dictionary based compression, bit-plane coding, Transform based coding, Fidelity Criteria, Image compression standards.

UNIT V: IMAGE SEGMENTATION AND COLOR IMAGE PROCESSING (09 Periods)

Detection of discontinuities- Point, line and edge Detection. Thresholding- global thresholding, adaptive thresholding. Region based Segmentation. Color image fundamentals - RGB, HSI models, conversions, Pseudo Color Image Processing, Color transformations.

Total Periods: 45

TEXT BOOKS:

1. Rafael C. Gonzalez & Richard E. Woods, *Digital Image Processing*, Pearson Education, 3rd Edition, 2008
2. S.Sridhar*, Digital Image Processing*, Oxford University, 2nd Edition, 2016

REFERENCE BOOKS:

1. William K. Pratt, *Digital Image Processing,* John Wiley and Sons, 3rd Edition, 2002.
2. Anil K.Jain, *Fundamentals of Digital Image processing*, Prentice Hall, 2007

III B. Tech. – II Semester

(16BT61201) CLOUD COMPUTING

(Common to IT and CSSE)

(Interdisciplinary Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Computer Networks and Operating Systems.

COURSE DESCRIPTION: Virtualization, Virtualization Technologies; Cloud Computing Fundamentals, Deployment Models; Cloud Computing Architecture; Cloud Computing Mechanisms; Cloud Security, Cloud Disaster Recovery; Working with Clouds; and Case Studies.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on services, architecture, types of infrastructural models, disaster recovery and virtualization.

CO2. Analyze the issues in cloud computing Data, Network and Host security.

CO3. Apply API development skills in web applications for Cloud deployment.

CO4. Use research based knowledge to build cloud applications.

CO5. Use advanced programming languages to access cloud services.

CO6. Build cloud environment suitable for societal requirements.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION TO VIRTUALIZATION AND TECHNOLOGIES (09 Periods)

Introduction to Virtualization: Definition, Objectives, Characteristics, Benefits of virtualization, Taxonomy of virtualization technologies, Pros and cons of virtualization.

Virtualization Technologies: VMware, Hyper-V, Zen and virtual iron.

UNIT II: FUNDAMENTAL CLOUD COMPUTING AND MODELS (09 Periods)

Cloud Computing: Origin and influences, Basic concepts and terminology, Goals and benefits, Risks and challenges.

Cloud Models:Roles and boundaries, Cloud characteristics, Cloud delivery models, Cloud deployment models.

UNIT III: CLOUD COMPUTING MECHANISMS AND ARCHITECTURE (09 Periods)

Cloud-Enabling Technology: Broadband networks and internet architecture, Data center technology, Virtualization technology, Web technology, Multitenant technology, Service technology.

Cloud Architectures: Architecture - Workload distribution, Resource pooling, Dynamic scalability, Elastic resource capacity, Service load balancing, Cloud bursting, Elastic disk provisioning, Redundant storage.

UNIT IV: CLOUD SECURITY AND DISASTER RECOVERY (09 Periods)

Cloud Security: Data, Network and host security, Cloud security services and cloud security possible solutions.

Cloud Disaster Recovery: Disaster recovery planning, Disasters in the cloud, Disaster management, Capacity planning and cloud scale.

UNIT V: CLOUD CASE STUDIES (09 Periods)

Case Studies: Software-as-a-Service (SaaS) - Salesforce.com, Facebook; Platform–as-a-Service (PaaS) - Google App Engine, MS-Azure and IBM Bluemix; Infrastructure-as-a- Service (IaaS) - Amazon EC2, Amazon S3 and Netflix.

Total Periods: 45

TEXT BOOKS:

1. Thomas Erl and Ricardo Puttini, *Cloud Computing- Concepts, Technology and Architecture*, Pearson, 2013.
2. Ivanka Menken and Gerard Blokdijk, *Cloud Computing Virtualization Specialist Complete Certification Kit - Study Guide Book,* Lightning Source, 2009.

REFERENCE BOOKS:

1. Barrie Sosinsky, *Cloud Computing Bible*, Wiley India Pvt Ltd, 2011.
2. Rajkumar Buyya, James Broberg and Andrzej Goscinski, *Cloud Computing Principles and Paradigms,* John Wiley and Sons, 2011.

3. John W. Rittinghouse and James F. Ransome, *Cloud Computing Implementation, Management and Security,* CRC Press, Taylor & Francis Group, 2010.

III B. Tech. - II Semester

(16BT71204) MOBILE COMPUTING

(Common to CSE and CSSE)
(Interdisciplinary Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Computer Networks.

COURSE DESCRIPTION: Introduction to Mobile Computing, GSM; Medium Access Control, Wireless LAN; Mobile Network and Transport Layers; Data Dissemination; Mobile Ad-Hoc Networks (MANETs), Wireless Application Protocol (WAP).

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- GSM, GPRS, 3G, 4G, Wireless LAN, MANETs.
- Protocols in Data Link, Network, Transport and Application layer.

CO2. Analyze the issues related to database design and data retrieval in mobile applications.
CO3. Apply routing algorithms for finding shortest path in MANETs.
CO4. Use protocols of Wireless Technologies for security implementation in mobile computing.
CO5. Follow standards in the usage of mobile communications.

DETAILED SYLLABUS:

UNIT I: OVERVIEW OF MOBILE COMPUTING AND GSM (09 Periods)

Introduction: Introduction to mobile computing, Novel applications, Limitations, and Mobile computing architecture.

GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services, Introduction to 3G and 4G Communications Standards: WCDMA, LTE, WiMAX

UNIT II: MEDIUM ACCESS CONTROL AND WIRELESS LAN (09 Periods)

Medium Access Control: Motivation for a specialized MAC - Hidden and exposed terminals, Near and far terminals, SDMA, FDMA, TDMA, CDMA.

Wireless LAN: IEEE 802.11 - System architecture, Protocol architecture, Physical layer, Medium access control layer, MAC management; Bluetooth - User scenarios, Architecture, Radio layer, Baseband layer, Link manager protocol, L2CAP, Security.

UNIT III: MOBILE NETWORK AND TRANSPORT LAYER (09 Periods)

Mobile IP: Goals, Assumptions, Entities and terminology, IP packet delivery, Tunneling and encapsulation, Optimizations; IPv6; Dynamic Host Configuration Protocol (DHCP).

Mobile Transport Layer: Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/ fast recovery, Transmission/ time-out freezing, Selective retransmission, Transaction oriented TCP; TCP over 2.5G/3G wireless networks.

UNIT IV: DATABASE ISSUES AND DATA DISSEMINATION (09 Periods)

Database Issues: Hoarding techniques, Caching invalidation mechanisms, Client server computing with adaptation, Power-aware and context aware computing, Database transactional models, Query processing and recovery.

Data Dissemination: Communications asymmetry, Classification of data delivery mechanisms, Push-based mechanisms, Pull-based mechanisms, Hybrid mechanisms, Selective tuning (indexing) techniques.

UNIT V: MANETS AND WAP (09 Periods)

Mobile Ad Hoc Networks: Properties of a MANET, Spectrum of MANET, Applications, routing and routing algorithms, Security in MANETs.

Wireless Application Protocol: Architecture, Wireless datagram protocol, Wireless transport layer security, Wireless transaction protocol, Wireless session protocol, Wireless application environment.

Total Periods: 45

TEXT BOOKS:

1. Rajkamal, *Mobile Computing*, OXFORD University Press, 2nd Edition, 2012.
2. Jochen Schiller, *Mobile Communications*, Pearson Education, 2nd Edition, 2009.

REFERENCE BOOKS:

1. Gordon A. Gow and Richard K. Smith, *Mobile and Wireless Communication*, Mc Graw Hill, 2006.
2. Hansmann, Merk, Nicklous and Stober, *Principles of Mobile Computing*, Springer, 2nd Edition, 2003.

III B. Tech. - II Semester
(16BT70505) HUMAN COMPUTER INTERACTION

(Program Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —

COURSE DESCRIPTION:

Graphical User Interface; Design Process; Screen Designing; Windows; Components; Software Tools; Interaction Devices.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on principles, characteristics, tools and devices of Human Computer Interaction.
CO2. Analyze the user requirements, technological and physical characteristics of users for better interface design.
CO3. Design appropriate user interface for desktop and web applications.
C04. Conduct investigations on User requirements to provide an effective user interface.
CO5. Utilize user interface mockup tools and input, output and pointing devices for designing user interfaces.
CO6. Apply Contextual knowledge to develop interfaces for differently abled people.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION (09 Periods)

Importance of User Interface: Definition, Importance of good design, Benefits of good design, A brief history of screen design.

Characteristics of Graphical and Web User Interfaces: The graphical user interface - popularity of graphics, The concept of direct manipulation, Graphical systems, Characteristics; Web user Interface - Popularity, Characteristics; Principles of user interface design.

UNIT II: CONTROL DESIGN PROCESS (08 Periods)

Design Process: Human interaction with computers, Importance of human characteristics, human considerations in design, Human interaction speeds, and understanding business functions.

UNIT III: SCREEN DESIGN (10 Periods)

Design Goals: Screen meaning and purpose, Organizing screen elements, Ordering of screen data and content, Screen navigation and flow, Visually pleasing composition, Amount of information, Focus and emphasis, Presenting information simply and meaningfully, Information retrieval on web, Statistical graphics, Technological considerations in interface design.

UNIT IV: WINDOWS AND MULTIMEDIA (08 Periods)

Windows Menus and Navigation Schemes: Selection of window, Selection of device based and screen based controls.

Components: text and messages, Icons and images, Multimedia, Color uses, Problems with colors, choosing colors.

UNIT V: SOFTWARE TOOLS AND DEVICES (10 Periods)

Software Tools: Specification methods, Interface building tools, Interaction devices - Keyboards and keypads, Pointing devices, Speech and auditory interfaces; Image and video displays, drivers.

Total Periods: 45

TEXT BOOKS:

1. Wilbert O. Galitz, *The Essential Guide to User Interface Design*, Wiley India Education, 2nd Edition, 2008.
2. Ben Schneiderman and Catherine Plaisant, *Designing the User Interface*, Pearson Education, 4th Edition, 2009.

REFERENCE BOOKS:

1. A Dix, Janet Finlay, G. D. Abowd and R. Beale, *Human-Computer Interaction*, Pearson Publishers, 3rd Edition, 2008.

2. Jonathan Wolpaw and Elizabeth Winter Wolpaw, *Brain-Computer Interfaces: Principles and Practice,* Oxford Publishers, 2012.

III B. Tech. - II Semester

(16BT61502) NETWORK SECURITY

(Program Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Computer Networks

COURSE DESCRIPTION:
Foundations of Network Security; Security Technologies; Symmetric and Asymmetric key encryption algorithms; System Security with Firewalls; Intrusion Detection.

COURSE OUTCOMES:
On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on types of attacks, firewalls, Symmetric encryption, Cryptography, message authentication and confidentiality
CO2. Analyze the principles of symmetric and public key cryptographic algorithms
CO3. Design appropriate algorithms suiting the security needs of the network.
CO4. Apply security schemes in firewall design to protect the organization's internet/ network systems.
CO5. Use modern engineering techniques to identify Intrusion Detection, types of malicious software and apply suitable counter measures.
CO6. Apply ethical means to integrate network operations, administration and information assurance in a network.

DETAILED SYLLABUS:

UNIT I: NETWORK SECURITY FOUNDATIONS (10 Periods)
Network Security Overview: Benefits of good Security Practices, Security Methodology
Attacks: Define Access Attacks, Modification attacks, DoS attacks, Repudiation attacks, Hacking Techniques, Sniffing Switch Networks, IP spoofing

UNIT II: SECURITY TECHNOLOGIES (08 Periods)
Firewalls: Types of firewalls, Develop firewall configuration, design firewall rule set
Virtual Private Network: Define VPN, Deploy User, site VPNs, Standard VPN techniques, types of VPN systems

UNIT III: SYMMETRIC KEY ENCRYPTION AND MESSAGE CONFIDENTIALITY (09 Periods)
Symmetric key Encryption Principles, Symmetric Block Encryption Algorithms, Random and Pseudorandom numbers, Stream Ciphers and RC4, Cipher block mode of operations

UNIT IV: PUBLIC KEY CRYPTOGRAPHY AND MESSAGE AUTHENTICATION (09 Periods)
Secure Hash functions, Message Authentication codes, public key cryptography principles and algorithms, Digital Signatures

UNIT V: SYSTEM SECURITY (09 Periods)
Intruders: Intrusion Detection, Password Management, Types of IDS, Setup IDS, manage IDS, Intrusion prevention
Malicious Software: Types of malicious software, viruses, Virus Counter measures, Worms

TEXT BOOKS:
1. William Stallings, *Network Security Essentials: Applications and Standards*, Pearson, 4th Edition, 2011.
2. Eric Maiwald, *Fundamentals of Network Security*, McGraw Hill Education, 2010.

REFERENCE BOOK:
1. Roberta Bragg, Mark Rhodes-Ousley, *Network Security: The Complete Reference,* McGraw Hill Education, 2004.

III B. Tech. - II Semester
(16BT61503) SOFTWARE PROJECT MANAGEMENT

(Program Elective – 1)
(Common to IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Software Engineering.

COURSE DESCRIPTION:
Conventional Software Management; Evolution of Software Economics; Improving Software Economics; Lifecycle Phases; Artifacts of the Process; Workflow of the Process; Checkpoints of the Process; Software Economics; Iterative Process Planning; Project Organization and Responsibilities; Project Control and Project Instrumentation; Agile Overview.

COURSE OUTCOMES:
On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on software effort estimation techniques, Agile life cycle, project control and instrumentation.
CO2. Analyze the major and minor milestones, artifacts, metrics from management and technical perspectives.
CO3. Design and develop software products using conventional and modern principles of software project management.
CO4. Effectively implement project management through appropriate planning of Work flows and Work Breakdown Structures of the process.
CO5. Select appropriate techniques to evaluate progress of software project in terms of milestones and check points.
CO6. Apply appropriate ethical principles to be followed in management of software economics.

DETAILED SYLLABUS:

UNIT I: SOFTWARE MANAGEMENT (**09 Periods**)

Software management:
The Waterfall Model, Conventional Software Management Performance. Evolution of Software Economics**:** Software Economics, Pragmatic Software Cost Estimation.

Improving Software Economics:
Reducing Software Product Size, Improving Software Processes, Improving Team Effectiveness, Improving Automation, Achieving Required Quality.

UNIT II: LIFE CYCLE PHASES **(09 Periods)**

Conventional and Modern Software Management:
Principles of Modern Software Engineering, Principles of Modern Software Management, Transitioning to an Iterative Process.

Life Cycle Phases:
Engineering and Production Stages, Inception, Elaboration, Construction, Transition Phases.

UNIT III: ARTIFACTS, ARCHITECTURES AND WORKFLOWS **(09 Periods)**

Artifacts of The Process: The Artifact Sets, Management Artifacts, Engineering Artifacts.

Model Based Software Architectures: Architecture- Management Perspective, Technical Perspective.

Workflows of the Process: Software Process Workflows, Iteration Workflows.

UNIT IV: CHECKPOINTS, PROCESS PLANNING AND PROJECT ORGANIZATION **(09 Periods)**

Checkpoints of a process: Major Milestones, Minor Milestones, Periodic Status Assessments.

Iterative Process Planning: Work Breakdown Structures, Planning Guidelines, The Cost and Schedule Estimating Process

Project Organizations and Responsibilities: Line of Business Organizations, Project organizations, Evolution of Organizations.

UNIT V: PROJECT CONTROL AND AGILE MANAGEMENT **(09 Periods)**

Project control and process Instrumentation: The Seven Core Metrics, Management Indicators, Quality Indicators.

Agile Management: An Agile Overview, Role of a project manager, Benefits of Agile.

Total Periods: 45

TEXT BOOK:

1. Walker Royce, *Software Project Management*, Pearson Education, 3rd Edition, 1998.

REFERENCE BOOKS:

1. Michele Sliger and Stacia Broderick, *The Software Project Manager's Bridge to Agility*, Addison-Wesley, 2008.
2. Bob Hughes and Mike Cotterell, *Software Project Management*, Tata McGraw- Hill, 2006.

III B. Tech. - II Semester

(16BT61504) WINDOWS PROGRAMMING

(Program Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Operating Systems.

COURSE DESCRIPTION:
Windows File Processing; Advanced File and Exception Handling; Memory Management; Process Management; Inter-process Communication; Network programming with Windows Sockets.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Acquire knowledge on Windows File processing and Exception Handling.
CO2. Analyze and Interpret process management techniques used in System Software.
CO3. Design and Develop memory mapping techniques for sequential files and Dynamic Link Libraries
CO4. Use contextual knowledge for implementing Inter-Process Communication and Network Programming With Sockets.
CO5. Apply Win32 programming techniques for Heap memory management and Parallel pattern searching.
CO6. Exhibit professional ethics and responsibilities by understanding Windows Programming standards compared to open standards.

DETAILED SYLLABUS:
UNIT I: WINDOWS PROGRAMMING (08 Periods)
Windows Standards and Open Systems, Principles,32-bit and 64-bit Source Code Portability, The Windows File Systems, File Naming, Opening, Reading, Writing, and Closing File, Unicode and Generic Characters, Unicode Strategies, Error Processing.

UNIT II: ADVANCED FILE AND EXCEPION HANDLING (10 Periods)
The 64-Bit File System, File Pointers, Getting the File Size, Random Record Updates, File Attributes and Directory Processing, Listing File Attributes, Setting File Times, File Processing Strategies, File Locking, Exceptions and their Handlers, Floating-Point Exceptions, Errors and Exceptions, Termination Handlers, Console control Handlers, Vectored Exception Handling.

UNIT III: MEMORY MANAGEMENT (08 Periods)
Windows Memory Management Architecture, Heaps, Managing Heap Memory, Sorting Files with a Binary Search Tree, Memory-Mapped Files, Sequential File Processing with Mapped Files, Sorting a Memory-Mapped File, Dynamic Link Libraries, Explicitly Linking a File Conversion Function.

UNIT IV: PROCESS MANAGEMENT (09 Periods)
Windows Processes and Threads, Process Creation, Process Identities, Duplicating Handles,Exiting and Terminating a Process, Waiting for a Process to Terminate, Environment Blocks and Strings, Parallel Pattern Searching, Processes in a Multiprocessor Environment, Process Execution Times, Generating Console Control Events.

UNIT V: INTERPROCESS COMMUNICATION & NETWORK PROGRAMMING (10 Periods)
Anonymous Pipes, Named Pipes, Named Pipe Transaction Functions, Comments on the Client/Server Command Line Processor, Mailslots, Pipe and Mailslot Creation, Connection and Naming, Windows Sockets, Socket Server & Client Functions, Comparing Named Pipes and Sockets, In-Process Servers, Line-Oriented Messages, DLL Entry Points an TLS, Datagrams, Berkeley Sockets versus Windows Sockets.

Total Periods: 45

TEXT BOOK:
1. Johnson M. Hart, *Windows System Programming*, Pearson Education, 4th Edition, 2010.

REFERENCE BOOK:
1. Leland L.Beck, *System Software,* Pearson Education, 3rd Edition, 2001.

III B. Tech. - II Semester

(16BT61531) DATA WAREHOUSING AND DATA MINING LAB

(Common CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITE: A course on Data warehousing and Data Mining

COURSE DESCRIPTION: Hands on practical experience on Warehouse design; OLAP operation; Data pre-processing techniques; Association rule mining; classification of data; Naïve Bayes classifier; Decision tree; Clustering technique using WEKA-Open source machine learning tool.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on the creation and usage of data warehouses.
CO2. Analyze and interpret the results using data mining techniques.
CO3. Design and develop transformations such as filter, join and rank on data warehouses.
CO4. Use classification and clustering techniques to find interesting patterns in large databases.
CO5. Choose and deploy modern tools to handle large, missing and noisy data in datasets.
CO6. Use appropriate data mining algorithms to find solutions for real time societal applications.
CO7. Function effectively as an individual to perform operations on different databases using Informatica.
CO8. Communicate effectively using report generation tools on business data.

LIST OF PROGRAMMING EXCERSICES:

Experiments on Informatica

To create Employee datawarehouse using Employee database system using following tables.

For the given data tables,

Employee table **Dept table**

Name	**Data type**	**Size**	**Name**	**Data type**	**Size**
Eno	Number	20	Eno	Number	20
Ename	Varchar2	25	Ename	Varchar2	25
Deptno	Number	10	Deptno	Number	10
DepName	Varchar2	12	DepName	Varchar2	12
Salary	Number	20	Salary	Number	20
Job	Varchar2	20	Job	Varchar2	20

List of Experiments

A. Implement mapping of warehouse server on Employee table.
B. Display the list of employees whose salary is greater than 5000 by designing filter transformation.
C. Find the maximum and minimum salaried employee using aggregate transformation.
D. Join Employee and Dept table using joiner transformation.
E. Rank transformation on employee table.
F. Router transformation on employee and department table.

II. Experiments on Weka:

Credit Risk Assessment:

The business of banks is making loans. Assessing the credit worthiness of an applicant is of crucial importance. You have to develop a system to help a loan officer decide whether the credit of a customer is good, or bad. A bank's business rules regarding loans must consider two opposing factors. On the one hand, a bank wants to make as many loans as possible. Interest on these loans is the banks profit source. On the other hand, a bank cannot afford to make too many bad loans. Too many bad loans could lead to the collapse of the bank. The bank's loan policy must involve a compromise: not too strict, and not too lenient.

To do the assignment, you first and foremost need some knowledge about the world of credit. You can acquire such knowledge in a number of ways.
1. **Knowledge Engineering**. Find a loan officer who is willing to talk. Interview her and try to represent her knowledge in the form of production rules.
2**. Books**. Find some training manuals for loan officers or perhaps a suitable textbook on finance. Translate this knowledge from text form to production rule form.
3. **Common Sense.** Imagine yourself as a loan officer and make up reasonable rules which can be used to judge the credit worthiness of a loan applicant.
4. Case Histories. Find records of actual cases where competent loan officers correctly judged when, and when not to, approve a loan application.
The German Credit Data: Actual historical credit data is not always easy to come by because of confidentiality rules. Here is one such dataset, consisting of 1000 actual cases collected in Germany. credit dataset (original) Excel spreadsheet version of the German credit data (Down load from web).In spite of the fact that the data is German, you should probably make use of it for this assignment. (Unless you really can consult a real loan officer!)

A few notes on the German dataset:
" **DM** stands for Deutsche Mark, the unit of currency, worth about 90 cents Canadian (but looks and acts like a quarter).
Owns_telephone. German phone rates are much higher than in Canada so fewer people own telephones.
" **Foreign_worker**. There are millions of these in Germany (many from Turkey). It is very hard to get German citizenship if you were not born of German parents.
There are **20 attributes** used in judging a loan applicant. The goal is the classify the applicant into one of two categories, good or bad.

List of Experiments:

1. Preprocess the data in weka with a simple experiments
   a) Handling missing data(both nomial and numerical)
   b) All types normalization(min-max,z-score,decimal scaling)
   c) sampling
2. Implement Decision tree classification of German data set.
3. Implement Naïve Bayes classifier on German data set.
4. Implement K-means clustering technique for German data.
5. Implement Apriori algorithm, calculate all frequent itemsets(L's) for the following transactional data and display the 10 most significant rules you get using the default values of support and confidence.

Transactional Data:

TID	List of item_ids
T100	I1,I2,I5
T200	I2,I4
T300	I2,I3
T400	I1,I2,I4
T500	I1,I3
T600	I2,I3
T700	I1,I3
T800	I1,I2,I3,I5
T900	I1,I2,I3

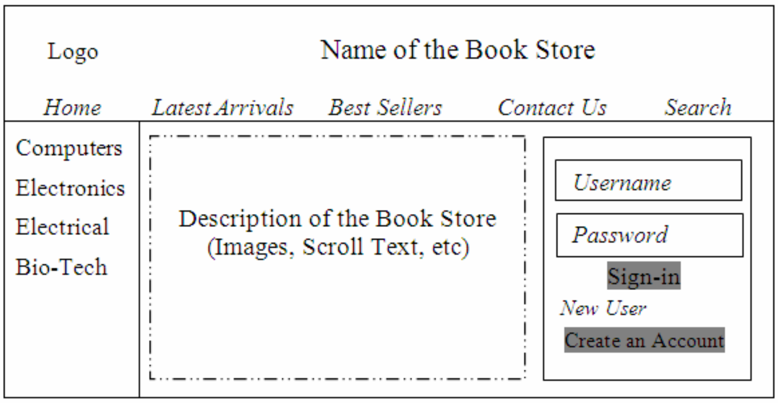
REFERENCE BOOKS:

1. Jiawei Han, Micheline Kamber and Jian Pei, *Data Mining: Concepts and Techniques*" Elsevier, 3rd Edition, 2013.
2. K.P. Soman, Shyam Diwakar and V. Ajay, *Insight into Data mining Theory and Practice*, Easter Economy Edition, Prentice Hall of India, 2006.
3. I.H Witten, E.Frank, *Data mining: Practical Machine learning Tools and Techniques with java Implemenatation,* Morgan Kaufmann Publishers,1999.

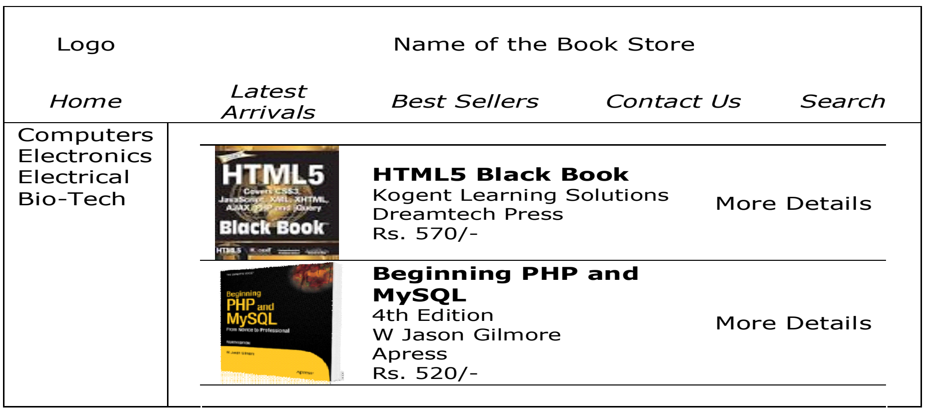
III B. Tech. – II Semester
(16BT51233) WEB TECHNOLOGIES LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITE: A course on Web Technologies.
COURSE DESCRIPTION: Hands-on experience on HTML5; CSS; JavaScript; JQuery; Bootstrap; PHP and MySQL.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on web page design elements, dynamic content and database Interaction.
CO2. Analyze user requirements to develop web applications.
CO3. Design client-server applications using web technologies.
CO4. Demonstrate problem solving skills to develop enterprise web applications.
CO5. Use HTML, CSS, JavaScript, JQuery, Bootstrap and PHP technologies for device independent web application development.
CO6. Apply web technologies to develop interactive, dynamic and scalable web applications for societal needs.
CO7. Work effectively as an individual and as a member in team for mini-project implementation.
CO8. Demonstrate communication skills, both oral and written for preparing and presenting reports.
LIST OF EXPERIMENTS:
1. Design the following static web pages of an online book store web application.
a. Home Page:



b. Catalogue Page:
The catalogue page should display the following details of available books.
i. Snap shot of cover page
ii. Title of the text book
iii. Author name
iv. Publisher
v. Price
vi. More details link.



c. Registration Page:
Design the Registration page with the following fields and navigate it with create an account link.

i. First Name	ii. Last Name	iii. Gender
iv. Date of Birth	v. Username	vi. Password
vii. Confirm Password	viii. Address	ix. Postal Code
x. Mobile No.	xi. Email-Id	

2. a. Design a web page to store username and password information using the local storage concept.
   b. Design a web page to store employee information including Name, Emp. Id, Department, Salary and Address on a client's machine using a real SQL database.
3. Apply the following styles to all web pages of online book store web application.
   a. Fonts and Styles: font-family, font-style, font-weight and font-size
   b. Backgrounds and colors: color, background-color, background-image and background-repeat
   c. Text: text-decoration, text-transformation, text-align and text-indentation, text-align
   d. Borders: border, border-width, border-color and border-style
   e. Styles for links: A: link, A: visited, A:active, A:hover
   f. Selectors, Classes, Layers and Positioning elements.
4. Write a JavaScript/JQuery code to validate the following fields of the Registration web page.
   a. First Name/Last Name - should contain only alphabets and the length should not be less than 8 characters.
   b. Username - It should contain combination of alphabets, numbers and underscore. It should not allow spaces and special symbols.
   c. Password - It should not less than 8 characters in length and it contains one uppercase letter and one special symbol.
   d. Date of Birth - It should allow only valid date; otherwise display a message stating that entered date is invalid. Ex. 29 Feb. 2009 is an invalid date.
   e. Postal Code: It must allow only 6 digit valid number.
   f. Mobile No. - It should allow only numbers and total number of digits should be equal to 10.
   g. e-mail id - It should allow the mail id with the following format: Ex. mailid@domainname.com
5. Design a web page with the following features using HTML5, JavaScript and JQuery
   a. Displaying of images with Custom animated effects
   b. Playing of selected video from the list of videos
   c. Showing the animated text in increasing and decreasing font size
   d. Changing the size of the area in a web page using DIV tag
   e. Hiding and Showing elements in a web page.
6. Design a web page with the following features using Bootstrap and Media Query.
   a. Components
   b. Responsive tables
   c. Responsive images and videos
7. a. Deploy and navigate web pages of online book store using WAMP/XAMPP web server.
   b. Write a PHP program to read user name and favorite color from the HTML form. Display the name of the user in green color and sets user favorite color as a background for the web page.
8. Write a PHP code to read the username and password entered in the Login form of the online book store and authenticate with the values available in cookies. If user enters a valid username and password, welcome the user by username otherwise display a message stating that, entered details are invalid.
9. Write a PHP code to read user details entered through the registration web page and store the same into MySQL database.
10. Write a PHP code for storing books details like Name of the book, author, publisher, Edition, price, etc into MySQL database. Embed a PHP code in catalogue page of the online book store to extract books details from the database.
11. Mini Project - 1: Design a web application for selling products online with the following features.

Mobile website option - The online store should be built on a responsive design template and its features need to be available to all users, at any time, from anywhere and in any device.
Image options - The photos should also be taken from different points of view to give you a clearer idea of the product. Image options should include viewing angles, zoom, multiple images, and more.
Detailed product description - The description should often include the important details, such as the expiration date, size dimensions, weight, manufacturers date, and practical uses must be included in a good product description.
Order Tracking - The customers should be able to track their ordered products by logging into an account created upon registration.
Payment Options - An online website should allow credit card/debit card/net banking for payment.
Mini Project – 2: Design a social website with the following features
Build Profile - Members allow to build their profiles.
Upload content - The Social Networking Sites allow members to upload text messages, photographs, audio and video files. All posts are arranged in descending order with the last post coming first.
Build conversations - Content posted by members can be browsed and commented upon by all members who form part of the community. Content can also be tagged from third party sites on subjects that interest the group.

REFERENCE BOOKS:

1. Kogent Learning Solutions Inc, *HTML 5 Black Book: Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP and JQuery,* Dreamtech Press, 2nd Edition, 2016.
2. W. Jason Gilmore*, Beginning PHP and MySQL*, APress, 4th Edition, 2011.

3. Snig Bahumik, *Bootstrap Essentials*, PACKT Publishing, 2015(e-book).

III B. Tech.– II Semester
(16BT61532) **SEMINAR**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
	100	100	-	-	-	2

PRE-REQUISITES: All the courses of the program up to III B. Tech. – I Semester.

COURSE DESCRIPTION:
Identification of the topic for the seminar; Literature survey; Performing critical study and analysis of the topic identified; Preparation of report and presentation.

COURSE OUTCOMES:
Completion of the seminar work enables a successful student to demonstrate:

CO1. Knowledge on the seminar topic.
CO2. Analytical ability exercised during the seminar work.
CO3. Ability to investigate and solve complex engineering problems faced during the seminar work.
CO4. Ability to apply techniques to complex engineering activities with an understanding of limitations as applied in the seminar work.
CO5. Ability to function effectively as an individual as experienced during the seminar work.
CO6. Ability to present views cogently and precisely on the seminar topic.
CO7. Ability to engage in life-long leaning as experience during the seminar work.

III B. Tech - II Semester

(16BT6HS01) BANKING AND INSURANCE

(Common to CE, ME, CSE, IT and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —

COURSE DESCRIPTION: Origin of Banking; Functions of Banking; Role & Functions of RBI; Bank-Customer Relationship; Deposit and Loan Services of Banks; Banking Procedures; Electronic Payment Mechanisms; Business Models; Concepts of Risk and Uncertainty; Fundamentals of Insurance; Principles of Insurance; Essentials of Insurance Contracts; Insurance players in India.

COURSE OUTCOMES:

On Successful completion of the course, students will be able to:

CO1. Demonstrate Knowledge in
- a) Tools and concepts of Banking and Insurance.
- b) Basic Principles and concepts of Insurance and Banking.
- c) e-fund transfers, e-payments and e-business models.

CO2. Develop skills in providing solutions for
- a) Online banking and e – payments...
- b) Risk Management through insurance benefits the society at large.
- c) Money management by leveraging on technology, banking and insurance services.

CO3. Exhibit conceptual soundness about banking and insurance, this would contribute to more employment opportunities.

CO4. Provide life skills for effective utilization of Banking and Insurance facilities.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION TO BANKING (09 Periods)

origin and growth of banking, meaning and functions of banking, importance of banking, Reserve Bank of India; functions, monetary policy, open market operations.

UNIT II: BANK-CUSTOMER RELATIONSHIP (09 Periods)

Debtor-creditor relationship, anti money laundering, deposit products or services, payment and collection of cheques. Accounts – Types of accounts, procedure for opening and closing an account. Loans and Advances- principles of lending, types of loans,

UNIT III: BUSINESS MODELS & ELECTRONIC PAYMENT SYSTEM (09 Periods)

Features, types of e-payment system, e-cash ,NEFT, RTGS, Credit cards, Electronic purses and Debit cards. Business models- B2B, B2C, C2C, and B2G.

UNIT IV: INTRODUCTION TO RISK AND INSURANCE (09 Periods)

Concept of risk, risk *Vs* uncertainty. Insurance definition, Insurance as risk mitigation mechanism, elements of insurance.

UNIT V: INSURANCE OVERVIEW (09 Periods)

Principles of insurance, insurance types, LIC & GIC insurance contract- nature, elements, functions, IRDA, Insurance Players in India.

TEXT BOOKS:

1. A.V. Ranganadha Chary, R.R. Paul, Banking and Financial *system*, Kalyani Publisher, New Delhi, 2nd Edition.
2. P.K.Gupta, *Insurance and Risk Management*, Himalaya Publishing House, New Delhi.

REFERENCE BOOKS:

1. Diwan, Praq and Sunil Sharma, *Electronic Commerce- A Manager's Guide to E-Business*, Vanity Books International, Delhi,2002.
2. Kalakota Ravi and Whinston Andrew B, *Frontiers of Electronic Commerce*, Pearson Education India, 1996.
3. Schneider, Grey P, *Electronic Commerce, Course Technology,* Cengage Learning, 8th Edition, 2008.

III B. Tech - II Semester

(16BT6HS02) BUSINESS COMMUNICATION AND CAREER SKILLS

(Common to CE, ME, CSE, IT and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Technical English or English at Diploma level

COURSE DESCRIPTION:
Nature and Scope of Communication; Corporate Communication; Writing Business documents; Careers and Resumes; Interviews.

COURSE OUTCOMES:
On successful completion of this course, students will be able to

CO1. Demonstrate knowledge in
- Corporate Communication
- Main Stages of Writing Messages
- Career Building

CO2. Analyze the possibilities and limitations of language in
- Communication Networks
- Crisis Management/Communication

CO3. Design and develop the functional skills for professional practice in Business Presentations & Speeches

CO4. Apply written and oral communication techniques in preparing and presenting various documents in technical writing.

CO5. Function effectively as an individual and as a member in diverse teams.

CO6. Communicate effectively with the engineering community and society in formal and informal situations.

DETAILED SYLLABUS:

UNIT I - NATURE AND SCOPE OF COMMUNICATION (09 Periods)
Introduction: Functions of Communication – Roles of a Manager – Communication Basics – Communication Networks – Informal Communication – Interpersonal Communication –Communication Barriers

UNIT II - CORPORATE COMMUNICATION (09 Periods)
Introduction: What is Corporate Communication? – Corporate Citizenship and Social Responsibility – Corporate Communication Strategy – Crisis Management/Communication – Cross-Cultural Communication.

UNIT III - WRITING BUSINESS DOCUMENTS (09 Periods)
Introduction: Importance of Written Business Communication, Types of Business Messages - Five Main Stages of Writing Business Messages – Business Letter Writing – Effective Business Correspondence – Common Components of Business Letters – Strategies for Writing the Body of a Letter

UNIT IV – CAREERS AND RESUMES (09 Periods)
Introduction – Career Building – Business Presentations and Speeches – Resume Formats – Traditional, Electronic and Video Resumes – Sending Resumes – Follow-up Letters – Online Recruitment Process

UNIT V – INTERVIEWS (09 Periods)
Introduction – Fundamental Principles of Interviewing – General Preparation for an Interview – Success in an Interview – Types of Interviewing Questions – Important Non-verbal Aspects – Types of Interviews – Styles of Interviewing

Total Periods: 45

TEXT BOOK:
1. Meenakshi Raman and Prakash Singh, Business Communication, Oxford University Press, New Delhi, 2nd Edition, 2012.

REFERENCE BOOKS:
1. Neera Jain and Sharma Mukherji, *Effective Business Communication*, Tata Mc Graw-Hill Education, Pvt. Ltd., New Delhi, 2012.
2. Courtland L.Bovee et al., *Business Communication Today*, Pearson, New Delhi, 2011.
3. Krizan*, Effective Business Communication*, Cengage Learning, New Delhi, 2010.
4. R.K. Madhukar, *Business Communication*, Vikas Publishing House Pvt. Ltd., New Delhi, 2005.

III B. Tech - II Semester

(16BT6HS03) COST ACCOUNTING AND FINANCIAL MANAGEMENT

(Common to CE, ME, CSE, IT and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —

COURSE DESCRIPTION: Scope, Objectives and Elements of cost Accounting; Cost Sheet and Tender quotations; Variance Analysis: Material variances, Labor variances; Meaning and Scope, Liquidity, Profitability Ratios: concept of Risk and Return on Investment.

COURSE OUTCOMES:

On successful completion of this course, students will be able to

CO1. Acquire Knowledge in
- a) Elements of Costing.
- b) Basic concepts of Financial Management.
- c) Risk and Return
- d) Significance of Cost Accountancy
- e) Behavioral Finance

CO2. Develop skills in
- a) Material, Labor, Overheads control.
- b) Excellence and ability to minimize the cost of the organization

C03: Develop effective Communication in Cost control and Financial Management.

CO4. Provide solutions for effective investment decisions.

DETAILED SYLLABUS:

UNIT I : INTRODUCTION TO COST & COST ACCOUNTING (09 Periods)

Cost and Cost Accounting, Scope, Objectives, Advantages and disadvantages – Cost Accounting *Vs* Management Accounting – Elements of Costing – Installation of costing system – Material Control, Labour Control, Overhead Control.

UNIT II: COST SHEET & PREPARATION OF COST SHEET (09 Periods)

Analysis of Cost – Preparation of cost sheet, estimate, tender and quotation (Simple problems) – Importance of Costing while pricing the products.

UNIT III: STANDARD COSTING & VARIANCE ANALYSIS (09 Periods)

Introduction to Standard Costing & Variances – Variance Analysis: Material variances, Labour variances (Simple Problems).

UNIT IV : INTRODUCTION TO FINANCIAL MANAGEMENT & RATIO ANALYSIS (09 Periods)

Financial Management-Meaning and Scope, Liquidity, Profitability, Financial Statement Analysis through ratios (Simple Problems).

UNIT V: INTRODUCTION TO INVESTMENT & BEHAVIORAL FINANCE (09 Periods)

Investment-Meaning and Definition- concept of risk and returns-Investment Alternatives- Introduction to Behavioral Finance – Anomalies –Key Concepts –Anchoring – Mental Anchoring-Confirmation and Hindsight Bias-Gambler's Fallacy-Herd Behavior-Over Confidence-Overreaction and Availability Bias-Prospect Theory.

TEXT BOOKS:

1. S.P. Jain and K.L. Narang, *Cost Accounting*, Kalyani Publishers, Ludhiana, 6th Edition, 2002
2. James C Van Horne*, Financial Management and Policy,* Prentice-Hall of India/Pearson, 12th Edition, 2001.

REFERENCE BOOKS:

1. The Institute of Company Secretaries of India, *Cost and Management Study Material*, New Delhi.
2. I.M. Pandey, *Financial Management*, Vikas Publishing House Pvt. Ltd., 10th Edition, 2010.

III B. Tech - II Semester

(16BT6HS04) ENTREPRENEURSHIP FOR MICRO, SMALL AND MEDIUM ENTERPRISES

(Common to CE, ME, CSE, IT and CSSE) (Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —

COURSE DESCRIPTION: Introduction to Entrepreneur Development; Idea generation and formation of Business Plan; Micro and Small Enterprises; Institutional Finance and Support to Entrepreneur; Woman Entrepreneurship.

COURSE OUTCOMES:

On successful completion of this course, students will be able to

C01: Acquire Knowledge in

a) Schemes and institutions encouraging entrepreneurship.

b) Basic Principles and concepts of Accountancy.

c) Significance of entrepreneurship.

CO2. Develop skills in providing solutions for

a) Personal excellence through financial and professional freedom.

b) Women entrepreneurship serving as contrivance in societal development

CO3. Develop Critical thinking and evaluation ability.

CO4. Widens knowledge and build up attitude towards trouble shooting.

CO5. Demonstrate business acumen

DETAILED SYLLABUS:

UNIT I : INTRODUCTION TO ENTREPRENEURSHIP DEVELOPMENT (09 Periods)

Concept of Entrepreneurship – Growth of Entrepreneurship in India **-** Factors affecting entrepreneurship growth - Characteristics of an Entrepreneur – Functions of Entrepreneur – Need for an Entrepreneur – Entrepreneurial Decision Process – Types of Entrepreneurs – Distinction between an Entrepreneur and a manager.

UNIT II : IDEA GENERATION AND FORMULATION OF BUSINESS PLANS (09 Periods)

Sources of Ideas – Methods of idea generation – Steps in Setting up of a Small Business Enterprise – Formulation of Business Plan – Contents of Business Plan – Significance – Common Errors in Business Plan Formulation, The role of incubation centers for promoting Entrepreneurship, Start-up – New Guidelines.

UNIT III : MICRO AND SMALL ENTERPRISE (09 Periods)

Meaning and Definition – Micro and Macro units – Essentials – Features – Characteristics – Scope of Micro and Small Enterprises – Objectives of Micro Enterprises – relationship between Micro and Macro Enterprises - Problems of Micro and Small Enterprises

UNIT IV : INSTITUTIONAL FINANCE (09 Periods)

Institutional Finance **–** Need-Scope-Services - Various Institutions offering Institutional support: – Small Industries Development of Bank of India (SIDBI), State Industrial Development Corporations (SIDCs)– Small Industries Development Organisation (SIDO) – Small Industries Service Institutes (SISIs) – District Industries Centres (DICs) – National Institute of Entrepreneurship and Small Business Development (NIESBUD) – Technical Consultancy Organizations (TCOS). Micro Units Development and Refinance Agency Bank (MUDRA).

UNIT V : WOMEN & RURAL ENTREPRENEURSHIP (09 Periods)

Concept of Women entrepreneur - Functions of Women entrepreneurs - Growth of women entrepreneurship in India - Challenges of Women entrepreneurs- Programmes supporting women entrepreneurship – Rural Entrepreneurship – Meaning, Need for Rural entrepreneurship, Problems of rural entrepreneurship, Role of NGOs, Role of Bharatiya Mahila Bank for encouraging Women Entrepreneurs.

TEXT BOOKS:

1. Dr.S.S.Khanka, *Entrepreneurial Development*, S. Chand and Company Ltd, Revised Edition, 2012.
2. Madhurima Lall & Shikha Sahai, *Entrepreneurship,* Excel Books India, 2nd Edition 2008.

REFERENCE BOOKS:

1. Nandan, H.*, Fundamentals of Entrepreneurship*, PHI Learning Pvt. Ltd., 2013, New Delhi, 3rd Edition 2013.
2. Vasanth Desai, *The Dynamics of Entrepreneurial Development and Management*, Himalaya Publishing House, 4th Edition 2009.

3. Bholanath Dutta, *Entrepreneurship Management – Text and Cases, Excel Books, 1st Edition 2009.*

III B. Tech - II Semester
(16BT6HS05) FRENCH LANGUAGE
(La Langue Francais)

(Common to CE, ME, CSE, IT and CSSE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE:—

COURSE DESCRIPTION: Oral communications; Basic grammar; Advanced grammar; basic writing; Business French (La Francais Commercial).

COURSE OUTCOMES:
On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge in
- Process of communication
- Modes of listening
- Paralinguistic features
- Skimming and Scanning
- Elements of style in writing

CO2. Analyze the possibilities and limitations of language, understanding
- Barriers to Communication
- Barriers to Effective Listening
- Barriers to Speaking
- Formal and metaphorical language

CO3. Design and develop language skills for professional practice.
CO4. Apply basic writing skills in writing Emails and understanding wide range of technical terminologies.
CO5. Understand French culture and civilization.
CO6. Communicate effectively with the native French in day to day situation**.**

DETAILED SYLLABUS:

UNIT I: ORAL COMMUNICATION (09 Periods)
Introduction - Language as a Tool of Communication, French alphabets, Phonetics and pronunciation, making contacts, giving information, Arranging things, Expression of feelings.

UNIT II: BASIC GRAMMAR (09 Periods)
Introduction –Articles, -Er ending Verbs, Nouns, Numbers, Gender, Pronouns, Sentence structure – Case study.

UNIT III: ADVANCED GRAMMAR (09 Periods)
Introduction -Adjectives, Prepositions, Introduction to tenses – Present tense, past tense and future tense, Active and Passive voice.

UNIT IV: BASIC WRITING (09 Periods)
Introduction -Introduction to written communication, Pre-writing, Creating context for writing and Data collection, fill in forms, Write greeting cards, Invitations and Short personal announcements, Short text to describe photos and pictures.

UNIT V: BUSINESS FRENCH (La Francais Commercial) (09 Periods)
Introduction - E-mail writing, Letter writing, Learning technical vocabulary and its application.
Case study of influential French companies, Learning computer/desktop/new age- media vocabulary, Introduction to how to present a topic, Fixing an Appointment

Total Periods: 45

TEXT BOOK:
1. Annie Berther, *Alter Ego*, Hachette Publications, 2012.

REFERENCE BOOKS:
1. RegineMerieux, *Yves Loiseau, Connexions,* Goyall Publishers, 2011.

2. DelphineRipaud, Saison, *French and European* Inc., 2015.

III B. Tech - II Semester

(16BT6HS06) GERMAN LANGUAGE (Deutsch alsFremdsprache)

(Common to CE, ME, CSE, IT and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE:—

COURSE DESCRIPTION: Oral communication;Basic grammar; Advanced grammar; Basic writing; Berufsdeutcsch (Business German)

COURSE OUTCOMES:

On successful completion of this course, students will be able to

CO1. Demonstrate knowledge in
- Process of communication
- Modes of listening
- Paralinguistic features
- Skimming and Scanning
- Elements of style in writing

CO2. Analyze the possibilities and limitations of language, understanding
- Barriers to Communication
- Barriers to Effective Listening
- Barriers to Speaking
- Formal and metaphorical language

CO3. Design and develop language skills for professional practice.

CO4. Apply basic writing skills in writing Emails and understanding wide range of technical terminologies.

CO5. Understand German culture and civilization.

CO6. Communicate effectively with the native German in day to day situation**.**

DETAILED SYLLABUS:

UNIT I: ORAL COMMUNICATION (09 Periods)

Introduction - Language as a Tool of Communication, German alphabets, Phonetics and pronunciation, making contacts, giving information, Arranging things, Expression of feelings.

UNIT II: BASIC GRAMMAR (09 Periods)

Introduction –Articles, Verbs, Nouns, Numbers, Gender, Pronouns, Sentence structure – Case study.

UNIT III: ADVANCED GRAMMAR (09 Periods)

Introduction - Adjectives, Prepositions, Introduction to tenses – Present tense, past tense and future tense, Active and Passive voice, Introduction to Case- Akkusativ, Nominativ, Dativ&Genetiv Case.

UNIT IV: BASIC WRITING (09 Periods)

Introduction -Introduction to written communication, Pre-writing, Creating context for writing and Data collection, fill in forms, Write greeting cards, Invitations and Short personal announcements, Short text to describe photos and pictures.

UNIT V: BERUFSDEUTCSCH (BUSINESS GERMAN) (09 Periods)

Introduction - E-mail writing, Letter writing, Learning technical vocabulary and its application.
Case studies of influential German companies, Learning computer/desktop/new age- media vocabulary, Introduction to how to present a topic, Fixing an Appointment.

Total Periods: 45

TEXT BOOK:

1. Heuber, Tangram, *Aktuelleins*, HeuberVerlag Publications, 2011.

REFERENCE BOOKS:

1. Anta Kursisa, Gerhard Newner, Sara vicenta, *Fir fuer Deutsch 1 und Deutsch 2*" , Heuber Verlag Publications, 2005.
2. Herman Funk, Studio D A1, Cornelsen *GOYAL SAAB* Publication, 2011.

III B. Tech - II Semester

(16BT6HS07) INDIAN CONSTITUTION

(Common to CE, ME, CSE, IT and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —-

COURSE DESCRIPTION: Elements, functions and functionaries according to Indian Constitution, understanding for better professional practice and good citizenry

COURSE OUTCOMES:

On successful completion of this course, students will be able to

CO1. Gain knowledge in
- Parliamentary proceedings, laws, legislature, administration and its philosophy federal system and judiciary of India
- Socials problems and public services like central civil services and state civil services
- Indian and international political aspects and dynamics

CO2. Develop etiquette and professional behavior in line with the constitution of India for becoming a responsible citizen

DETAILED SYLLABUS :

UNIT- I: PREAMBLE AND ITS PHILOSOPHY (08 Periods)

Introduction and Evolution of Indian Constitution, preamble and its Philosophy.

UNIT- II: UNION GOVERNMENT (08 Periods)

Powers, Functions and Position of President, Vice-President and Council of Ministers, Composition of parliament, Constitution Amendment Procedure, Financial Legislation in Parliament.

UNIT III: FEDERAL SYSTEM (14 Periods)

Centre-State relations, Directive Principles of State Policy, Fundamental Rights and Duties, Centre-State Relations, Features of Federal System, Administrative Relationship between Union and States, Powers, Functions and Position of Governors, Function of Chief Ministers, Council of Ministers, Composition and powers of the State Legislature.

UNIT IV: JUDICIARY AND PUBLIC SERVICES (10 Periods)

The Union Judiciary - Supreme Court and High Court, All India Services, Central Civil Services, State Services, Local Services and Training of Civil Services.

UNIT V: INTERNATIONAL POLITICS (05 Periods)

Foreign Policy of India, International Institutions like UNO, WTO, SAARC and Environmentalism.

Total Periods: 45

TEXT BOOK:

1. Briji Kishore Sharma*, Introduction to the Constitution of India*, Prentice Hall of India, 2005.

REFERENCE BOOKS:

1. Mahendra Pal Singh,V. N. Shukla’s, Constitution of India, Eastern Book Company, 2011.
2. Pandey J. N., *Constitutional Law of India* - Central Law Agency, 1998

III B. Tech - II Semester

(16BT6HS08) **INDIAN ECONOMY**

(Common to CE, ME, CSE, IT and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —

COURSE DESCRIPTION:
Introduction; Time Value of Money; Elementary Economic Analysis; Value Analysis; Value Engineering; Economic Planning.

COURSE OUTCOMES:
On successful completion of this course the students will be able to:

CO1. Acquire the knowledge in
- Micro and Macro Economics.
- Traditional and Modern methods of Capital Budgeting.
- Five year plans and NITI Aayog.

CO2. Analyze
- Capital Budgeting.
- Value Analysis and Value Engineering.
- Economic analysis
- Law of supply and demand

CO3. Understand the nuances of project management and finance

DETAILED SYLLABUS:

UNIT I: INTRODUCTION (09 Periods)
Economics- Flow in an Economy, Law of Supply and Demand; Micro and Macro Economics; Relationship between Science, Engineering, Technology, and Economic Development; Concept of Engineering Economics-Types of Efficiency, Definition and Scope of Engineering Economics.

UNIT II: TIME VALUE OF MONEY (12 Periods)
Concepts and Application; Capital Budgeting-Traditional and Modern Methods; Simple and Compound Interest, Cash Flow Diagram, Principle of Economic Equivalence; Evaluation of Engineering Projects – Present Worth Method, Future Worth Method, Annual Worth Method, Internal Rate of Return Method, Cost-benefit Analysis in Public Projects; Depreciation Policy-Depreciation of Capital Assets, Causes of Depreciation, Straight Line Method and Declining Balance Method.

UNIT III: ELEMENTARY ECONOMIC ANALYSIS (09 Periods)
Economic Analysis – Meaning, Significance, Simple Economic Analysis; Material Selection for a Product, Substitution of Raw Material; Design Selection for a Product;Material Selection-Process Planning, Process Modification.

UNIT IV: VALUE ENGINEERING (06 Periods)
Introduction- Value Analysis, Value Engineering, Functions, Aims; Value Analysis vs. Value Engineering; Value Engineering Procedure- Advantages, Application Areas.

UNIT V: ECONOMIC PLANNING (09 Periods)
Introduction- Need For Planning in India, Five year plans(1951-2012), NITI Aayog(from 2014 onwards); Inclusive Growth-Meaning, Significance, Need for inclusive growth in India, Strategy for more inclusive growth, Challenges and Prospects; Employment and Inclusive Growth in India, Role of engineers in sustaining inclusive growth. **Total Periods: 45**

TEXT BOOKS
1. Panneerselvam R., *Engineering Economics*, PHI Learning Private Limited, Delhi, 2nd Edition, 2013.
2. Jain T.R., V. K.Ohri, O. P. Khanna*., Economics for Engineers*, VK Publication, 2015.

REFERENCE BOOKS
1. DuttRudar & Sundhram K. P. M., *Indian Economy*, S. Chand, New Delhi, 62nd revised Edition 2010.

2. Misra, S.K. & V. K. Puri, *Indian Economy: Its Development Experience*, Himalaya Publishing House, Mumbai, 32nd Edition, 2010.

III B. Tech - II Semester

(16BT6HS09) INDIAN HERITAGE AND CULTURE

(Common to CE, ME, CSE, IT and CSSE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —

COURSE DESCRIPTION: Basic traits of Indian Culture; Humanistic Reforms under Jainism and Buddhism; Culture in the medieval period; Socio Religious reforms in Indian Culture; Reform movements for harmonious relations.

COURSE OUTCOMES:
On successful completion of this course, students will be able to:

CO1. Acquaint knowledge in
- (a) human aspirations and values in Vedic culture.
- (b) cultural aspects of Buddhism and Jainism
- (c) unification of our country under Mourya's and Gupta's administrations
- (d) socio Religious aspects of Indian culture
- (e) reform movements and harmonious relations.

CO2**.** Apply ethical principles and reforms as models for the upliftment of the societal status in the present cultural contexts

DETAILED SYLLABUS:

UNIT I: BASIC TRAITS OF INDIAN CULTURE (09 Periods)
Meaning and definition and various interpretations of culture . Culture and its features. The Vedic and Upanishadic culture and society. Human aspirations and values in these societies. Chaturvidha purushardhas, Chaturashrma and Chaturvarna theory.

UNIT II: HUMANISTIC REFORMS UNDER JAINISM AND BUDDHISM (09 Periods)
Salient features of Jainism - contributions of Jainism to Indian culture. Contributions of Aachaarya and Mahaapragya. Buddhism as a humanistic culture. The four noble truths of Buddhism. Contributions of Buddhism to Indian culture.

UNIT- III: CULTURE IN THE MEDIEVAL PERIOD (09 Periods)
Unifications of India under Mouryas and Guptas and their cultural achievements. Cultural conditions under satavahanas. Contributions to pallavas and cholas to art and cultural achievements of vijayanagara rulers.

UNIT- IV: SOCIO RELIGIOUS REFORMS IN INDIAN CULTURE (09 Periods)
Western impact on India, Introductin of western education, social and cultural awakening and social reform movements of Rajaramohan Roy - Dayanandha Saraswathi- Anne Besant. (theosophical society)

UNIT- V: REFORM MOVEMENTS FOR HARMONIOUS RELATIONS (09 Periods)
Vivekananda, Eswarchandra vidyasagar and Veeresalingam- emancipation of women and struggle against caste. Rise of Indian nationalism. Mahatma Gandhi- Non violence and satyagraha and eradication of untouchability.

Total Periods: *45*

TEXT BOOK:
1. Valluru Prabhakaraiah, *Indian Heritage and Culture*, Neelkamal Publications Pvt. Ltd. Delhi, reprint 2015.

REFERENCE BOOKS:
1. L. P. Sharma, *History of Ancient India*, Konark Publishers, Pvt. Ltd. New Delhi, 2010.
2. L. P. Sharma, *History of Medieval India*, Konark Publishers, Pvt. Ltd. New Delhi, 2010.
3. L. P. Sharma, *History of Modern India,* Konark Publishers, Pvt. Ltd. New Delhi, 2010.

4. The Cultural Heritage of India Vol-I, II, III, IV, V, *The Ramakrishna Mission Institute of Culture*, Calcutta.

III B. Tech - II Semester

(16BT6HS10) INDIAN HISTORY

(Common to CE, ME, CSE, IT and CSSE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —-

COURSE DESCRIPTION:
Introduction; Ancient India; Classical and Medieval era; Modern India; India after independence.

COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Gain knowledge on evolution and history of India as a nation.
CO2. Analyze social and political situations of past and current Periods.
CO3. Practice in career or at other social institutions morally and ethically.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION (08 Periods)
Elements of Indian History; History Sources: Archaeology, Numismatics, Epigraphy & Archival research; Methods used in History; History & historiography; sociological concepts-structure, system, organization, social institutions, Culture and social stratification (caste, class, gender, power), State& Civil Society.

UNIT II: ANCIENT INDIA (09 Periods)
Mohenjo-Daro civilization; Harappa civilization; Mauryan Empire.

UNIT -III: CLASSICAL & MEDIEVAL ERA (12 Periods)
Classic Era (200 BC - 1200 AD); Hindu - Islamic Era (1200 - 1800 AD).

UNIT IV: MODERN INDIA (06 Periods)
Age of Colonialism (17th - 19th centuries); First war of Indian Independence;
Freedom Struggle (1857-1947).

UNIT V:INDIA AFTER INDEPENDENCE (1947 -) (10 Periods)
The Evolution of the Constitution and Main Provisions; Consolidation of India as a Nation; Politics in the States; Indian economy; Modernization and globalization, Secularism and communalism, Nature of development, Processes of social exclusion and inclusion, Changing Nature of work and organization.

Total Periods: 45

TEXT BOOK:
1. K. Krishna Reddy, *Indian History*, Tata McGraw-Hill, 21st reprint,2017.

REFERENCE BOOK:
1. Guha, Ramachandra, *India after Gandhi*, Pan Macmillan, 2007.
2. Thapar, Romila, Early India, Penguin, 2002.

III B. Tech - II Semester

(16BT6HS11) PERSONALITY DEVELOPMENT

(Common to CE, ME, CSE, IT and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	0	3

PRE-REQUISITE: Soft Skills Lab

COURSE DESCRIPTION:
Self-esteem & Self-Management; Developing Positive Attitudes; Self-Motivation & Self-Management; Getting Along with the Supervisor; Workplace Success.

COURSE OUTCOMES:
On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge in
- Self-Management
- Planning Career

CO2. Analyze the situations based on
- Attitudes
- Thinking strategies

CO3. Design and develop the functional skills for professional practice in

CO4. Function effectively as an individual and as a member in diverse teams.

CO5. Communicate effectively in public speaking in formal and informal situations.

DETAILED SYLLABUS:

UNIT I: SELF-ESTEEM & SELF-IMPROVEMENT (09 Periods)
Know Yourself – Accept Yourself; Self-Improvement: Plan to Improve - Actively Working to Improve Yourself.
Case study: 1

UNIT II: DEVELOPING POSITIVE ATTITUDES (09 Periods)
How Attitudes Develop – Attitudes are Catching – Improve Your Attitudes.
Case study: 2

UNIT III: SELF-MOTIVATION & SELF-MANAGEMENT (09 Periods)
Show Initiative – Be Responsible Self-Management; Efficient Work Habits – Stress Management – Employers Want People Who can Think – Thinking Strategies.
Case study: 3

UNIT IV: GETTING ALONG WITH THE SUPERVISOR (09 Periods)
Know your Supervisor – Communicating with Your Supervisor – Special Communications With Your Supervisor – What Should You Expect of Your Supervisor? – What Your Supervisor Expects of You - Moving Ahead Getting Along with Your Supervisor.
Case study: 4

UNIT V: WORKPLACE SUCCESS (09 Periods)
First Day on the Job – Keeping Your Job – Planning Your Career – Moving ahead.
Case study: 5

Total Periods: 45

TEXT BOOK:
1. Harold R. Wallace and L. Ann Masters, Personality Development, Cengage Learning, Delhi, 6th Indian Reprint 2011.

REFERENCE BOOKS:

1. Barun K. Mitra, Personality Development and Soft Skills, Oxford University Press, New Delhi, 2011.
2. Stephen R. Covey, The 7 Habits of Highly Effective People, Free Press, New York, 1989
3. K. Alex, Soft Skills, S. Chand & Company Ltd, New Delhi, 2nd Revised Edition 2011.

4. Stephen P. Robbins and Timothy A. Judge, Organizational Behaviour, Prentice Hall, Delhi, 16th Edition 2014.

III B. Tech - II Semester

(16BT6HS12) PHILOSOPHY OF EDUCATION

(Common to CE, ME, CSE, IT and CSSE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —-

COURSE DESCRIPTION: Introduction to Philosophy and Engineering Education; Philosophical methods and their implications in engineering; Philosophical education in India; Values and Engineering education; Outcome based education.

COURSE OUTCOMES:
On successful completion of this course the students will be able to

CO1. Acquire knowledge in
- Philosophy of Engineering education.
- Philosophical Methods.
- Knowledge acquiring methods.
- Engineering education and responsibilities.

CO2. Understand the impact of Outcome Based Education for effective educational outcomes

CO3. Apply reasoning to assess societal issues with the contextual knowledge of engineering education and responsibilities.

DETAILED SYLLABUS

UNIT I: INTRODUCTION TO PHILOSOPHY AND ENGINNERING EDUCATION (09 Periods)
Concept , Significance, and Scope of Philosophy in Engineering – Aims of Engineering Education – relationship between philosophy and engineering education – speculative, normative and critical approaches of philosophy in engineering.

UNIT II: PHILOSOPHICAL METHODS AND THEIR IMPLICATIONS IN ENGINEERING (09 Periods)
Introduction to Philosophical approaches: Idealism, Naturalism, Pragmatism, Realism and Existentialism; Significance and Scope in Engineering Education.

UNIT III: PHILOSOPHICAL EDUCATION IN INDIA (09 Periods)
Different branches of philosophy- meaning, Epistemology: nature and scope; Knowledge acquiring methods;Kinds and instruments of knowledge; Re-shapingof educational thoughts by Indian thinkers: Rabindranath Tagore, Sri Aurobindo Gosh, Mahatma Gandhi,Jiddu Krishnamurthy and Swamy Vivekananda.

UNIT IV: VALUES AND ENGINEERING EDUCATION (09 Periods)
Introduction; Engineering education and responsibilities: health, social, moral, ethics aesthetic; Value: crisis and strategies for inculcation;
Case study: Engineering Solutions given by Mokshagundam Visvesvaraya

UNIT V: OUTCOME- BASED EDUCATION (09 Periods)
Institutional visioning ;educational objectives ; programme outcomes , curriculum, stakeholders, infrastructure and learning resources ; governance and management, quality in education.

Total Periods: 45

TEXT BOOKS :
1. Ganta Ramesh, *Philosophical Foundations of Education*, Neelkamal Publications, 2013
2. CarlMicham, *Thinking through technology(The Paths between Engineering and Philosophy*). University of Chicago Press, 1994.
3. Louis L Bucciarelli, *Engineering Philosophy*, Delft University Press, 2003.
4. NBA/ABET Manuals.

REFERENCE BOOKS :
1. Louis L Bucciarelli, *Philosophy of Technology and Engineering Sciences*, North Holland, 2009(e-book).

2. Samuel Florman, *Existential pleasures of education*, Martins's Griffin S.T. publication, 1992.

III B. Tech. - II Semester

(16BT6HS13) PUBLIC ADMINISTRATION

(Common to CE, ME, CSE, IT and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —

COURSE DESCRIPTION:

Introduction; Public Policy; Good Governance; E-Governance; Development Administration.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Acquire knowledge in
- Public Policy.
- Good Governance.
- E-governance.
- Development Administration.

CO2. Analyze the possibilities and limitations of existing policies through Good Governance perspective.

CO3. Design and develop solutions in e-governance models to find and provide opportunities in e-governance.

CO4. Adopt principles ofe-governance in addressing the existing issues and challenges in e-governance sector.

CO5. Understand the significance of Administrative Development in finding professional engineering solutions by probing
- Bureaucracy.
- Role of civil society.

DETAILED SYLLABUS :

UNIT I: INTRODUCTION **(09 Periods)**

Public and Private Administration- Differences and Similarities, Meaning, Scope; Importance of Public Administration in Modern Era; Public Administration and its implications in the field of Engineering.

Case Study: Unique Identification Authority of India (UIDAI): Aadhaar Project: Challenges Ahead

UNIT II: PUBLIC POLICY **(09 Periods)**

Meaning and Scope; Policy Formulation in India; Policy making process; Policy Implementation Engineering and Public Policy**,** Social, ethical, Monetary and fiscal policies; policy implications of engineering; The engineer's role in Public Policy.

Case Study: NITI Aayog: Demonetization and Aftermath of Demonetization – Cashless transactions.

UNIT III: GOOD GOVERNANCE **(09 Periods)**

Significance; Objectives; Concepts; Reforms; Organization and its basic problems Administrative and Governance reforms in India; Sustainable and Inclusive growth in India; Engineering and Sustainable Environment-Role of Engineers; Right to information Act

Case Study: Strategies in Good Governance: A Case Study of Karnataka, Kerala and Orissa.

UNIT IV: E-GOVERNANCE **(09 Periods)**

Meaning, Significance, Issues in E-governance; E-governance Models, Problems and Opportunities; Application of DataWarehousing and Data Mining in Governance; Engineers role in re-engineering E-governance.

Case Study: e-Housing System for Bhavana Nirman Dhanasahayam Online disbursement of housing assistance in Kerala.

UNIT V: DEVELOPMENT ADMINISTRATION **(09 Periods)**

Introduction;Development Administration-Administrative Development- Sustainable Development - Significance- Objectives; Bureaucracy - Personnel administration and human resources development; Role of civil society-Citizens and administration; Development and Engineering: Issues Challenges and Opportunities.

Case Study: Neeru-Chettu (Water-Tree) of Andhra Pradesh.

Case Study: TPDDL of Delhi and Odisha. **Total Periods: 45**

TEXT BOOKS

1. M.P. Sharma, B.L. Sadana, Harpreet Kaur*, Public Administration in Theory and Practice*, Kitab Mahal, Mumbai, 2014.
2. CSR Prabhu, *E. Governance – concepts and case studies*, PHI, New Delhi, 2nd Edition 2012.

REFERENCE BOOKS

1. SurendraMunshi, Bijupaul *Abraham, Good Governance, Democratic societies and Globalization,* Sage publications, New Delhi, 2004.
2. R.K.Sapru, *Public Policy*, Sterling Publishers Pvt Ltd., New Delhi, 2001.

III B. Tech. – II Semester
(16BT60112) BUILDING MAINTENANCE AND REPAIR
(Common to CE, ME, CSE, IT and CSSE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —

COURSE DESCRIPTION: Durability of buildings, Failure and repair of buildings, Material Techniques for repair, Maintenance of buildings, Conservation and recycling.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Acquire basic knowledge on durability and serviceability, failures, repair and rehabilitation of buildings.
CO2. Analyze failures, repair and rehabilitation techniques.
CO3. Solve complex building maintenance problems through proper investigations and interpretation.
CO4. Use modern tools and techniques for various repairs and rehabilitation of structures.
CO5. Provide solutions for building maintenance and repair problems considering health and safety.
CO6. Consider environmental sustainability in building maintenance and repair.
CO7. Maintain ethical standards for quality in repairs and rehabilitation of structures.
CO8. Evaluate specifications and perform cost analysis of building components while repair and rehabilitation.

DETAILED SYLLABUS:

UNIT I: DURABILITY AND SERVICEABILITY OF BUILDINGS (10 Periods)

Life expectancy of different types of buildings; Effect of environmental elements such as heat, dampness, frost and precipitation on buildings; Effect of chemical agents on building materials, Effect of pollution on buildings, Effect of fire on building; Damage by biological agents like plants, trees, algae, fungus, moss, insects, etc.; Preventive measures on various aspects, Inspection, Assessment procedure for evaluating for damaged structures, Causes of deterioration, Testing techniques.

UNIT II*:* FAILURE AND REPAIR OF BUILDINGS (10 Periods)

Building failure – Types, Methodology for investigation; Diagnostic testing methods and equipment, Repair of cracks in concrete and masonry, Materials for Repair, Methods of repair, Repair and strengthening of concrete buildings, Foundation repair and strengthening, Underpinning, Leakage of roofs and repair methods.

UNIT III: TECHNIQUES FOR REPAIR (08 Periods)

Rust eliminators and polymers coating for rebars during repair, Foamed concrete, Mortar and dry pack, Vacuum concrete, Gunite and shotcrete, Epoxy injection, Mortar repairs for cracks, Shoring and underpinning.

UNIT IV: MAINTENANCE OF BUILDINGS (09 Periods)

Reliability principles and its applications in selection of systems for building, Routine maintenance of building, Maintenance cost, Specifications for maintenance works, Dampness - Damp proof courses, Construction details for prevention of dampness; Termite proofing, Fire protection, Corrosion protection.

UNIT V: CONSERVATION AND RECYCLING (08 Periods)

Performance of construction materials and components in service, Rehabilitation of constructed facilities, Conservation movement, Materials and methods for conservation work, Recycling of old buildings and its advantages, Examples. **Total Periods: *45***

TEXT BOOKS:

1. Dennison Campbell, Allen and Harold Roper, *Concrete Structures – Materials, Maintenance and Repair,* Longman Scientific and Technical, UK, 1991.
2. Allen, R. T. L., Edwards, S. C. and J. D. N. Shaw, *The Repair of Concrete Structures,* Blackie Academic & Professional, UK, 1993.

REFERENCE BOOKS:

1. Peter H. Emmons, *Concrete Repair and Maintenance*, John Wiley and Sons Publications, 2002.
2. "*Building Construction under Seismic Conditions in the Balkan Region*, UNDP/UNIDO Project Rer/79/015, Volume 5, Repair and Strengthening of Reinforced Concrete, Stone and Brick Masonry Buildings, United Nations Industrial Development Organisation, Vienna.
3. Shetty, M. S., *Concrete Technology*, S. Chand and Company.
4. Smith, P. and Julian, W*., Building Services*, Applied Science Publications, London, 1976.
5. SP: 25, BIS; *Causes and Prevention of Cracks in Buildings*.
6. Champion, S., *Failure and Repair of Concrete Structures*, John Wiley and Sons Publications, 1961.
7. Perkins, P. H., Repair, *Protection and Water Proofing of Concrete Structures*, E& FN Spon, UK, 3rd Edition, 1997.

III B. Tech. – II Semester

(16BT60113) **CONTRACT LAWS AND REGULATIONS**

(Common to CE, ME, CSE, IT and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: -

COURSE DESCRIPTION: Construction contracts; Tenders; Arbitration; Legal requirements; Labour regulations.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate basic Knowledge on construction contracts, tenders, arbitration, legal requirements and labour regulations.
CO2. Analyze contracts and tenders.
CO3. Address the legal issues in contracts and tenders.
CO4. Follow laws and regulations in the preparation of contracts and tenders.
CO5. Prepare contract and tender documents as per the standards.
CO6. Consider project schedule, cost, quality and risk in the preparation of contracts and tenders.

DETAILED SYLLABUS:

UNIT I: CONSTRUCTION CONTRACTS (09 Periods)

Indian contracts act, Elements of contracts, Types of contracts, Features, Suitability, Design of contract documents, International contract document and laws, Standard contract document, Law of torts.

UNIT II: TENDERS (09 Periods)

Prequalification, Bidding, Accepting; Evaluation of tender from technical, contractual and financial points of view; Two cover system, Preparation of the documentation, Contract formation and interpretation, Potential contractual problems, Price variation clause, Comparison of actions and laws, Subject matter, Violations.

UNIT III: ARBITRATION (09 Periods)

Arbitration, Comparison of actions and laws, Agreements, Appointment of arbitrators, Conditions of arbitration, Powers and duties of arbitrator, Rules of evidence, Enforcement of award, Arbitration disputes, Dispute review board.

UNIT IV: LEGAL REQUIREMENTS (09 Periods)

Legal requirements for planning, Property law, Agency law, Tax laws – Income tax, Sales tax, Excise and custom duties, Local government approval, Statutory regulations, Insurance and bonding, Laws governing purchase and sale, Use of urban and rural land, Land revenue codes, EMD, Security deposits, Liquidated damages.

UNIT V: LABOUR REGULATIONS (09 Periods)

Social security, Welfare legislation; Laws relating to wages, bonus and industrial disputes; Labour administration, Insurance and safety regulations, Workmen's compensation act, Maternity benefit act, Child labour act, Other labour laws.

Total Periods: 45

TEXT BOOKS

1. Subba Rao, G. C. V., *Law of Contracts I & II*, S. Gogia & Co., 11th Edition, 2011.
2. Jimmie Hinze*, Construction Contracts,* McGraw Hill, 3nd Edition, 2011.

REFERENCE BOOKS

1. Kishore Gajaria, GT Gajaria's*, Law Relating to Building and Engineering Contracts in India*, Lexis Nexis Butterworths India, 4th Edition, 2000.
2. Patil, B. S., *Civil Engineering Contracts and Estimates*, University Press (India) Private Ltd., 4th Edition, 2015.
3. Joseph T. Bockrath, *Contracts and the Legal Environment for Engineers and Architects*, McGraw Hill Education, 7th Edition, 2010.
4. Akhileshwar Pathak, *Contract Law*, Oxford University Press, 2011.

III B. Tech. - II Semester

(16BT60114) DISASTER MITIGATION AND MANAGEMENT

(Common to CE, ME, CSE, IT and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —

COURSE DESCRIPTION: Disasters; Earthquakes; Floods; Cyclones; Droughts; Landslides; Disaster management.

COURSE OUTCOMES:

On successful completion of course, the students will be able to:

CO1. Demonstrate knowledge on disasters, their vulnerability and mitigation measures.
CO2. Analyze disasters and their vulnerability.
CO3. Design strategies for effective disaster mitigation.
CO4. Address pre and post disaster issues for better preparedness and mitigation measures, through proper analysis and interpretation.
CO5. Use appropriate methods in disaster mitigation and management.
CO6. Use historical data of disasters to inform the people over preparedness and mitigation measures.
CO7. Solve disaster related issues considering environment.
CO8. Consider economical issues in disaster management.

DETAILED SYLLABUS:

UNIT I: DISASTERS (09 Periods)

Types of disasters - Natural disasters; Impact of disasters on environment, infrastructure and development; Concepts of hazards and vulnerability analysis, Hazard Assessment, Guidelines for hazard assessment and vulnerability analysis, Basic principles and elements of disaster mitigation.

UNIT II: EARTHQUAKES (09 Periods)

Introduction to earthquake, Intensity scale (MSK–64), Seismic activity in India, Seismic zones of India, Earthquakes in A.P., Action plan for earthquake disaster preparedness, Elements at risk, Recovery and rehabilitation after earthquake, Earthquake resistant design and construction of buildings; Tsunami – Onset, Types and causes, Warning, Elements at risk, Typical effects, Specific preparedness and mitigation strategies.

UNIT III: FLOODS, CYCLONES AND DROUGHTS (11 Periods)

Floods and Cyclones: Onset, Types, Warnings; Elements at risk, Typical effects, Indian floods and cyclones, Hazard zones, Potential for reducing hazards, Mitigation strategies and community based mitigation.

Droughts: Onset, Types and warning; Causes, Impact, Early warning and response mechanisms, Mitigation strategies, Droughts in India.

UNIT IV: LANDSLIDES (08 Periods)

Onset, Types and warning; Causes, Elements at risk, Indian landslides, Hazards zones, Typical effects, Mitigation strategies and community based mitigation.

UNIT V: DISASTER MANAGEMENT (08 Periods)

Disaster management organization and methodology, Disaster management cycle, Disaster management in India – Typical cases; Cost–benefit analysis with respect to various disaster management programs implemented by NGOs and Government of India.

Total Periods: 45

TEXT BOOKS:

1. V. K. Sharma, *Disaster Management,* Medtech Publishing, 2nd Edition, 2013.
2. Anand S. Arya, Anup Karanth, and Ankush Agarwal, *Hazards, Disasters and Your Community: A Primer for Parliamentarians, GOI–UNDP Disaster Risk Management Programme, Government of India, National Disaster Management Division,* Ministry of Home Affairs, New Delhi, Version 1.0, 2005.

REFERENCE BOOKS:

1. Donald Hyndman and David Hyndman, *Natural Hazards and Disasters*, Cengage Learning, 3rd Edition, 2011.
2. *Disaster Management in India, A Status Report, Ministry of Home Affairs, Govt. of India*, May 2011.
3. Rajendra Kumar Bhandari, *Disaster Education and Management: A Joyride for Students, Teachers, and Disaster Managers*, Springer India, 2014.

4. R. B. Singh, *Natural Hazards and Disaster Management*, Rawat Publications, 2009.

III B.Tech - II Semester

(16BT60115) ENVIRONMENTAL POLLUTION AND CONTROL

(Common to CE, ME, CSE, IT and CSSE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —

COURSE DESCRIPTION: Fundamentals of air pollution; Dispersion of pollutants; Effects and control of air pollution; Water pollution; Soil pollution and control; Municipal solid waste management.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on air, water, soil pollution and their control and solid waste management.
CO2. Analyze causes and effects of air, water and soil pollution and their remedial measures.
CO3. Recommend suitable solutions to complex environmental pollution problems.
CO4. Use appropriate remedial technique to solve environmental pollution problems.
CO5. Understand the effects of environmental pollutionon human health and vegetation.
CO6. Encourage sustainable development through implementation of pollution control measures.
CO7. Maintain IS Codes for environmental quality control.

DETAILED SYLLABUS:

UNIT I: AIR AND NOISE POLLUTION (08 Periods)

Air Pollution: Scope, Significance, Classification, Sources – Line, Area, Stationary, Mobile; Effects of air pollutants on man, material and vegetation; Global effects of air pollution; Air pollution meteorology - Lapse rate, Inversion, Plume pattern; Dispersion of air pollutants - Dispersion models and applications; Ambient air quality standards.

Noise Pollution: Sound pressure, Power and intensity, Impacts of noise, permissible limits of noise pollution, measurement of noise.

UNIT II: AIR AND NOISE POLLUTION CONTROL (10 Periods)

Self cleansing properties of the environment, Dilution method, Control at source, Process changes and equipment modifications, Control of particulates – Types of equipment, Design and operation - Settling chambers, Centrifugal separators, Bag house filters, Wet scrubbers, Electrostatic precipitators; Control of gaseous pollutants – Adsorption, Absorption, Condensation, Combustion; Control of air pollution from automobiles, Control of noise pollution.

UNIT III: WATER POLLUTION AND CONTROL (10 Periods)

Water pollution – Sources, Causes, Effects; Surface and groundwater quality – Physical, Chemical, Biological; Drinking water quality standards, Water purification – Processes, Engineered systems – Aeration, Solids separation, Settling operations, Coagulation, Softening, Filtration, Disinfection; Wastewater – Sources, Causes, Effects, Treatment and disposal – Primary, Secondary, Tertiary; Case studies.

UNIT IV: SOIL POLLUTION AND CONTROL (08 Periods)

Soil pollutants, Sources of soil pollution, Causes, Effects and control of soil pollution, Diseases caused by soil pollution, Methods to minimize soil pollution, Effective measures to control soil pollution, Case studies.

UNIT V: MUNICIPAL SOLID WASTE MANAGEMENT (09 Periods)

Types of solid waste, Composition of solid waste, Collection and transportation of solid waste, Methods of disposal – Open dumping, Sanitary landfill, Composting, Incineration, Utilization - Recovery and recycling, Energy Recovery.

Total Periods: 45

TEXT BOOKS:

1. eavy, H. S, Rowe, D. R., and Tchobanoglous, G. *Environmental Engineering*, McGraw Hill Inc., 1985.
2. C. S. Rao, *Environmental Pollution Control Engineering*, New Age International Pvt. Ltd., 2nd Edition, 2007.
3. Ibrahim A. Mirsa, *Soil Pollution: Origin, Monitoring & Remediation*, Springer, UK, 2nd Edition, 2008.

REFERENCE BOOKS:

1. M. N. Rao and H. V. N. Rao, *Air Pollution,* Tata McGraw–Hill Education Pvt. Ltd., 19th Edition, 2010.
2. Daniel Vallero, Fundamentals of *Air Pollution, Academic Press (Elsevier)*, 5th Edition, 2014.
3. S. M. Khopkar, *Environmental Pollution Monitoring and Control*, New Age International Pvt. Ltd., 2nd Edition, 2007.

4. V. M. Domkundwar, *Environmental Engineering*, Dhanpat Rai & Co. Pvt. Ltd., New Delhi, 2014.

III B.Tech - II Semester

(16BT60116) PLANNING FOR SUSTAINABLE DEVELOPMENT

(Common to CE, ME, CSE, IT and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE:—

COURSE DESCRIPTION: Sustainable development; Environmental impact; Sustainable Policies; Governance; Theories and strategies; Media and education for sustainability.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on sustainable development, environmental impact, sustainable policies, governance, systems and strategies, media and education for sustainability.

CO2. Analyze theories, environmental impact, policies, systems and strategies for sustainable development.

CO3. Develop suitable methods and systems for sustainable development.

CO4. Use appropriate techniques in solving issues related to sustainable development.

CO5. Provide solutions to problems associated with sustainable development considering society.

CO6. Consider environment while planning sustainable development.

CO7. Communicate effectively on sustainable development issues through media and education.

CO8. Consider economical issues while planning for sustainable development.

DETAILED SYLLABUS:

UNIT I: SUSTAINABLE DEVELOPMENT (09 Periods)

Definition and concepts of sustainable development, Capitalization of sustainability - National and global context; Millennium development goals, Emergence and evolution of sustainability and sustainable development, Theories of sustainability, Case studies.

UNIT II: ENVIRONMENTAL IMPACT (09 Periods)

Climate change – Science, Knowledge and sustainability; Unforeseen environmental impacts on development, Challenges of sustainable development, Centrality of resources in sustainable development, Case studies.

UNIT III: SUSTAINABLE POLICIES AND GOVERNANCE (09 Periods)

Governance - Democracy and Eco–welfare; Global civil society and world civil politics, Civic environmentalism, Policy responses to sustainable development, Economics of sustainability, Social responsibility in sustainability, National action, ISO 14001: Environmental management system.

UNIT IV: SUSTAINABLE SYSTEMS AND STRATAGIES (09 Periods)

Need for system innovation, Transition and co–evolution, Theories and methods for sustainable development, Strategies for eco–innovation, Ecological foot print analysis, Socio ecological indicators – Eco labels; Policy programmes for system innovation, Case studies.

UNIT V: MEDIA AND EDUCATION FOR SUSTAINABILITY (09 Periods)

Role of emerging media, Remarkable design and communication art, Activism and the public interest, Education for sustainability, Participation in decision making, Critical thinking and reflection, Case studies.

Total Periods: 45

TEXT BOOKS:

1. John Blewitt, *Understanding Sustainable Development*, Earth Scan Publications Ltd., 2nd Edition, 2008.
2. Jennifer A. Elliot, *An Introduction to Sustainable Development*, Earth Scan Publications Ltd., 4th Edition, 2006.

REFERENCE BOOKS:

1. Peter Rogers, Kazi F Jalal and John A Boyd, *An Introduction to Sustainable Development*, Earth Scan Publications Ltd., 2006.
2. Simon Dresner, *The Principles of Sustainability*, Earth Scan Publications Ltd., 2nd Edition, 2008.
3. Peter Bartelmus, Environment Growth and Development: *The Concepts and Strategies of Sustainability*, Routledge, 3rd Edition, 2003.
4. Gabriel Moser, Enric Pol, Yvonne Bernard, Mirilia Bonnes, Jose Antonio Corraliza and Maria Vittoria Giuliani, *People places and Sustainability*, Hogrefe & Huber Publishers, 2nd Edition, 2003.”

III B. Tech. – II Semester

(16BT60117) PROFESSIONAL ETHICS

(Common to CE, ME, CSE, IT and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: -

COURSE DESCRIPTION: Engineering ethics; Professional ideals and virtues; Engineering as social experimentation; Responsibilities and rights; Global issues.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate the principles of ethics, importance of professional values and social responsibility.
CO2. Analyze the problems in the implementation of moral autonomy and use ethical theories in resolving moral dilemmas.
CO3. Develop suitable strategies to resolve problems arise in practicing professional ethics.
CO4. Provide solutions to complex problems associated with professional ethics by proper analysis and interpretation.
CO5. Use appropriate theories in resolving issues pertain to professional ethics.
CO6. Understand the impact of professional ethics on society and address the limitations of codes of ethics.
CO7. Practice engineering with professionalism, accountability and ethics.
CO8. Function as a member, consultant, manager, advisor and leader in multi-disciplinary teams.
CO9. Write reports without bias and give instructions to follow ethics.

DETAILED SYLLABUS:

UNIT I: ENGINEERING ETHICS (09 Periods)

Scope and aim of engineering ethics, Senses of engineering ethics, Variety of moral issues, Types of inquiry, Moral dilemmas, Moral autonomy-Kohlberg's theory, Gilligan's theory, Consensus and controversy.

UNIT II: PROFESSIONAL IDEALS AND VIRTUES (08 Periods)

Theories about virtues, Professions, Professionalism, Characteristics, Expectations, Professional responsibility, Integrity, Self-respect, Sense of responsibility, Self-interest, Customs and religion, Self-interest and ethical egoism, Customs and ethical relativism, Religion and divine command ethics, Use of ethical theories, Resolving moral dilemmas and moral leadership.

UNIT III: ENGINEERING AS SOCIAL EXPERIMENTATION (10 Periods)

Engineering as experimentation, Similarities to standard experiments, Learning from the past and knowledge gained, Engineers as responsible experimenters, Conscientiousness, Moral autonomy and accountability, The challenger case, Codes of ethics and limitations, Industrial standards, Problems with the law of engineering.

UNIT IV: RESPONSIBILITIES AND RIGHTS (09 Periods)

Collegiality and loyalty, Respect for authority, Collective bargaining, Confidentiality, Conflict of interests, Occupational crime, Rights of engineers, Professional rights, Whistle-blowing, The BART case, Employee rights and discrimination.

UNIT V: GLOBAL ISSUES (09 Periods)

Multinational corporations, Professional ethics, Environmental ethics, Computer ethics, Engineers as consultants, Witnesses, Advisors and Leaders, Engineers as Managers, Managerial ethics applied to Engineering Profession, moral leadership.

Total Periods: 45

TEXT BOOKS:

1. Mike W. Martin and Roland Schinzinger, *Ethics in Engineering*, Tata McGraw-Hill, 3rd Edition, 2007.
2. Govindarajan, M., Nata Govindarajan, M., Natarajan, S. and Senthilkumar, V. S., *Engineering Ethics*, Prentice Hall of India, 2004.

REFERENCE BOOKS:

1. S. Kannan and K. Srilakshmi, *Human Values and Professional Ethics*, Taxmann Allied Services Pvt Ltd., 2009.
2. Edmund G. Seebauer and Robert L. Barry, *Fundamental of Ethics for Scientists and Engineers*, Oxford University Press, 2001.
3. Charles F. Fledderman, *Engineering Ethics,* Pearson Education, 2nd Edition, 2004.
4. R. Subramanaian, Professional Ethics, Oxford Higher Education, 2013.

III B. Tech. - II Semester

(16BT60118) RURAL TECHNOLOGY

(Common to CE, ME, CSE, IT and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: -

COURSE DESCRIPTION: Rural technology; Non conventional energy; Community development; IT in rural development.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on technologies for rural development.

CO2. Analyze various technologies available which are appropriate for rural development.

CO3. Carryout feasibility study on the public and private partnership for rural development.

CO4. Develop and use latest technologies for rural development.

CO5. Address health and safety issues while choosing technologies for rural development.

CO6. Educate the rural populace on the positive impacts of bio-fertilizers and usage of agro-machinery in agriculture.

DETAILED SYLLABUS:

UNIT I: RURAL TECHNOLOGY (09 Periods)

India - Technology and rural development, Pre and post independence period, Rural India Life, Indian farmer, Role of science and technology in rural development, Rural technology and poverty eradication, Rural business hubs, Technology in improving rural infrastructure, Various organizations related to innovation, Issues of technology transfer - CAPART, NABARD, CSIR, NIF.

UNIT II: NON CONVENTIONAL ENERGY (09 Periods)

Definition of energy, Types of alternative sources of energy, Sources of non conventional energy – Solar energy: Solar cooker, Solar heater; Biogas, Recycling and management, Wastes conservation, Assessment and production of biomass products and their utilization.

UNIT III: TECHNOLOGIES FOR RURAL DEVELOPMENT (09 Periods)

Food and agro based technologies, Tissue culture, Nursery, Building and construction technologies, Cultivation and processing of economic plants, Cottage and social industries.

UNIT IV: COMMUNITY DEVELOPMENT (09 Periods)

Water conservation, Rain water Harvesting, Drinking water, Environment and Sanitation, Bio fertilizers, Medical and aromatic plants, Employment generating technologies – Apiculture, Pisciculture, Aquaculture.

UNIT V: IT IN RURAL DEVELOPMENT (09 Periods)

Role of information technology (IT) in rural areas, Impact of IT in rural development, Need and necessity of technology, Corporate social responsibilities, Private sector participation (Activities in different spheres: Employment, Education, Health, Agriculture and service sectors) and Saansad Adarsh Gram Yojana (SAGY), Village adoption schemes.

TEXT BOOKS

1. M. S. Virdi, Sustainable Rural Technologies, Daya Publishing House, 2009.
2. S. V. Prabhath and P. Ch. Sita Devi, Technology and Rural India, Serials Publications, 2012.

REFERENCE BOOKS

1. R. Chakravarthy and P. R. S. Murthy, "Information Technology and Rural Development", Pacific Book International, 2012.
2. Shivakanth Singh, "Rural Development Policies and Programmes", Northern Book Centre, 2002.
3. L. M. Prasad, Principles and Practice of Management, S. Chand & Sons, 8th Edition, 2014.

4. Venkata Reddy, K., *Agriculture and Rural Development*- Gandhian Perspective, Himalaya Publishing House, 2001.

III B.Tech - II Semester

(16BT60308) GLOBAL STRATEGY AND TECHNOLOGY

(Open Elective)

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —

COURSE DESCRIPTION: Introduction to strategic management; Strategic management process; Principles of good strategy; Globalization strategies; Research and Development strategies; Technology Management and Transfer; Elements of Transfer Process; Corporate Governance in the Indian scenario.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1: Demonstrate the knowledge on Strategic management, Research & development strategies, Technology management and transfer, Globalization and Corporate governance.

CO2: Indentify and analyze crucial problems in strategic management to improve performance of the organizations.

CO3: Develop the products and production process by using research and development strategies.

CO4: Conduct investigations on the impact of globalization in current scenario in the context of corporate governance.

CO5: Appraise the resources and capabilities of the firm in terms of their ability to confer sustainable development.

CO6: Apply ethics in strategic decision making.

DETAILED SYLLABUS:

UNIT I: STRATEGIC MANAGEMENT (09 Periods)

Introduction, Classes of decisions, Levels of strategy, Core competence, Strategic intent and stretch, Approaches to strategy making, Roles of different strategists, Strategic management- Process, Benefits, Limitations; Ethics in strategic decision making, Principles of good strategy, Strategic Management in India.

UNIT II: RESEARCH & DEVELOPMENT STRATEGIES (09 Periods)

Concept, Evolution of R&D Management, R&D as a business, R&D as competitive advantage, Elements of R & D strategies, Integration of R & D, Selection and implementation of R & D strategies, R & D trends.

UNIT III: TECHNOLOGY MANAGEMENT AND TRANSFER (09 Periods)

Technology Management: Introduction, Technology - Definition, Components, Classification Features; Technology Management- Concept, Nature; Drivers of Management of Technology- Significance, Scope, Responding to technology challenges.

Technology Transfer: Introduction, Definition, Classification, Significance, Elements of process, Types of Technology Transfer, Package, Modes of Transfer, Routes, Channels and Effectiveness of Technology Transfer.

UNIT IV: GLOBALISATION (09 Periods)

Definition, Stages, Essential conditions for globalization, Globalization strategies, Competitive advantage of Nations, Factors affecting Globalization, Globalization of Indian business.

UNIT V: CORPORATE GOVERNANCE: THE INDIAN SCENARIO (09 Periods)

Emergence of corporate governance in India- Landmarks, Models, Codes and status in India, Role and Responsibilities of Regulators, The Board of Directors; Corporate Governance- Specific issues in India, Family owned Business, Corporate Governance and the Indian ethos.

Total Periods: 45

TEXT BOOKS:

1. Francis Cherunilam, *Strategic Management*, Himalaya Publishing House, 3rd Edition, 2002.
2. C.S.G.Krishnamacharyulu and Lalitha Ramakrishnan, Management of Technology, Himalaya Publishing House, 2nd Edition, 2012.

REFERENCE BOOKS:

1. White and Bruton, *The Management of Technology and Innovation*: A Strategic Approach, Cengage Learning, 1st Edition, 2007.

2. S.K.Mandak, *Ethics in Business and Corporate Governance*, TMH, 2nd Edition, 2012.

III B.Tech - II Semester

(16BT60309) INTELLECTUAL PROPERTY RIGHTS AND MANAGEMENT

(Open Elective)

(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —

COURSE DESCRIPTION: Protection of ideas; innovation and artistic endeavors; Acts and procedure related to patents, trademarks, copy right, design registration, trade secrets and cyber laws; Infringement; Commercialization of intellectual property rights; Case studies in each.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1: Demonstrate knowledge on intellectual property rights, patents, trademarks, copyrights, trade secrets and commercialization of intellectual property.

CO2: Analyse the commercial significance of discoveries and developments and to assist in bringing these into public use.

CO3: Investigate and ensure smooth transition from concept to final product by following National & International Laws of Intellectual Property.

CO4: Utilize the various policies and procedures related to patents, trademarks and copyrights relating to IPR.

CO5: Safeguard, review and manage the intellectual property so that it may receive adequate and appropriate legal protection against unauthorized use.

CO6: Follow ethical standards in capacity building and work as a platform for development, promotion, protection, compliance, and enforcement of intellectual property and knowledge.

CO7: Prepare documents and fill applications needed for filing a patent, design, copyright and trade mark.

DETAILED SYLLABUS

UNIT I: OVERVIEW OF INTELLECTUAL PROPERTY RIGHTS (09 Periods)

Introduction, Intellectual Property vs Conventional Property, and importance of intellectual property rights (IPRs), types of intellectual property, International Treaties for protection of IPR-Paris Convention, World Intellectual Property Organization (WIPO), World Trade Organization (WTO), Trade Related Aspects of Intellectual Property Rights (TRIP) Agreement, General Agreement on Tariffs and Trade(GATT).

UNIT II: TRADEMARKS (09 Periods)

Introduction, Functions and kinds of trademarks, Trade Mark Registration Process, Post registration procedures, Trade Mark maintenance, Transfer of rights, Inter parties Proceedings, Infringement and Dilution of Ownership of Trade Mark, Trade Mark claims, International Trade Mark Law.

UNIT III: PATENTS (09 Periods)

Introduction, Rights under Patent Law, Patent Application Process, Terms and Maintenance of Patents Requirements, Patent Ownership and Transfer, Licensing of Patent Rights, Sole and Joint Inventors, Disputes over Inventorship, Patent Infringement, International Patent Law, Patent Cooperation Treaty (PCT), Patent Law Treaty (PLT), Substantive Patent Law Treaty (SPLT).

UNIT IV: COPY RIGHTS, TRADE SECRETS, CYBER LAWS (09 Periods)

Copy Rights: Introduction, nature and scope, subject matter, Rights afforded by copyright law, Copyrights ownership, transfers and duration, Copyright registration process.

Trade Secrets: Introduction, Determination of Trade Secret Status, Emploer-Employee Relationships, Protection of submissions.

Cyber laws: E-commerce and cyber laws, cyber crime and legislation- need, objective and scope; IT Act 2000, Information Technology and Information Security.

UNIT V: INDUSTRIAL DESIGN AND COMMERCIALIZATION OF INTELLECTUAL PROPERTY RIGHTS (09 Periods)

Industrial Design: Introduction, Indian Law related to registration of Industrial Designs, Essential requirements for registration of a design in India, International Agreements – Hague System; Conflicts related to registration of design.

Commercialization of Intellectual Property Rights: Competition and Confidentiality Issues, Antitrust Laws, Assignment of Intellectual Property Rights, Technology, Transfer Agreements, Intellectual Property Issues in the Sale of Business, Legal Auditing of Intellectual Property, Due Diligence of Intellectual Property Rights in a Corporate Transaction. **Total Periods: 45**

TEXT BOOKS:

1. Deborah E. Bouchoux, *Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets*, Cengage Learning, 4th Edition, 2016.
2. Kompal Bansal and Parikshit Bansal, *Fundamentals of Intellectual Property for Engineers, B*S Publications, 1st Edition, 2013.

REFERENCE BOOKS:

1. Prabuddha Ganguli, *Intellectual Property Rights-Unleashing the Knowledge Economy*, McGraw Hill Education, 6th reprint, 2015.
2. P. Narayanan, *Intellectual Property Law, Eastern Book Company,* 3rd Edition, 2013.

3. R. Radha Krishnan, S. Balasubramanian, *Intellectual Property Rights: Text and Cases, Excel Books,* 1st Edition, 2008.

III B. Tech – II Semester

(16BT60310) MANAGING INNOVATION AND ENTREPRENEURSHIP

(Common to CE, ME, CSE, IT and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —

COURSE DESCRIPTION: Evolution of entrepreneurship from economic theory Managerial and entrepreneurial competencies; Concepts of Shifting Composition of the Economy Purposeful Innovation & Sources of Innovative Opportunity; The Innovation Process; Innovative Strategies; Entrepreneurial Motivation; Entrepreneurs versus inventors; Ethics and International Entrepreneurship; Strategic Issues in International Entrepreneurship; Problem solving Innovation and Diversification.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1: Demonstrate the principles of business innovation and entrepreneurship for establishing industrial ventures.

CO2: Analyze business plans for potential investors and stakeholders and effectively answer probabilistic questions on the substance of plan.

CO3: Develop a comprehensive and well planned business structure for a new venture.

CO4: Conduct investigation on complex problems, towards the development of Project.

CO5: Apply modern statistical and mathematical tools to design projects and subsequent work procedures.

CO6: Apply ethics in constructive innovation framework.

CO7: Exhibit professionalism by employing modern project management and financial tools.

DETAILED SYLLABUS:

UNIT I: CREATIVITY AND INNOVATION (07 Periods)

Introduction, Levels of innovation, Purposeful innovation and the sources of innovative opportunity, The innovation process, Innovative strategies, Strategies that aim at introducing and innovation, Dynamics of ideation and creativity – Inbound, Outbound; Context and process of new product development, Theories of outsourcing.

UNIT II: PARADIGMS OF INNOVATION (11Periods)

Systems approach to innovation, Innovation in the context of developed economies and Emerging economies, Examining reverse innovation and its application, Performance gap, Infrastructure gap, Sustainability gap, Regulatory gap, Preference gap, organizational factors effecting innovation at firm level.

UNIT III: SOURCES OF FINANCE AND VENTURE CAPITAL (07 Periods)

Importance of finance, Comparison of venture capital with conventional development capital, Strategies of venture funding, Investment phases, Investment process, Advantages and disadvantages of venture capital, Venture capital developments in India.

UNIT IV: INTELLECTUAL PROPERTY INNOVATION AND ENTREPRENEURSHIP (11 Periods)

Introduction to Entrepreneurship, Evolution of entrepreneurship from economic theory, Managerial and entrepreneurial competencies, Entrepreneurial growth and development, Concepts, Ethics and Nature of International Entrepreneurship, Intellectual property – forms of IP, Patents, Trademarks, Design registration, Copy rights, Geographical indications, Patent process in India.

UNIT V: OPEN INNOVATION FRAMEWORK & PROBLEM SOLVING (09 Periods)

Concept of open innovation approach, Difference between open innovations and Cloud innovation approaches, Limitations and Opportunities of open innovation framework, Global context of strategic alliance, Role of strategic alliance, Problem Identification and Problem Solving, Innovation and Diversification.

Total Periods: 45

TEXT BOOKS:

1. Vinnie Jauhari, Sudhanshu Bhushan*, Innovation Management*, Oxford University Press, 1st Edition, 2014.
2. Drucker, P. F., *Innovation and Entrepreneurship*, Taylor & Francis, 2nd Edition, 2007.

REFERENCE BOOKS:

1. Robert D Hisrich, Claudine Kearney, *Managing Innovation and Entrepreneurship*, Sage Publications, 1st Edition, 2014.
2. V.K.Narayanan, *Managing Technology and Innovation for Competitive Advantage,* Pearson India, 1st Edition, 2002.

III B. Tech – II Semester

(16BT60311) MATERIALS SCIENCE

(Common to CE, ME, CSE, IT and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Engineering Chemistry and Engineering Physics

COURSE DESCRIPTION: Structure and Bonding in metals; Steels, Cast Irons and Non Ferrous alloys; Material Selection for conductors, Insulators and semi conductors; Strengthening mechanisms of metals; Plastics and Ceramics as Insulators; AC and DC properties of Insulators; Semiconductors and Magnetic materials; Composite materials in Electrical and Electronics engineering; Material Selection and manufacturing of Optical fibers.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on concepts of fundamental science and engineering principles relevant to materials.

CO2. Analyze the structures of various types of Ferrous, Non ferrous alloys influencing various engineering applications.

CO3. Conduct investigations to select suitable materials with desired properties for engineering applications.

CO4. Use phase diagrams to interpret the data regarding microstructure of materials.

CO5. Consider health and safety issues while providing materials to real time applications.

CO6. Use composite materials that reduce material waste in design and manufacturing for sustainability.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION TO MATERIALS SCIENCE (07 Periods)

Structure of metals: Bonds in Solids, Crystallization of metals, Grain and grain boundaries, Effect of grain boundaries on the properties of metals/alloys, Determination of grain size measurement.

Constitution of alloys: Necessity of alloying, Types of solid solutions, Hume rothery rules, Intermediate alloy phases.

UNIT II: CAST IRONS, STEELS & NON-FERROUS METALS (12 Periods)

Structure and properties of Grey cast iron, Spheroidal cast iron, White Cast iron, Malleable Cast iron, Alloy cast irons, Classification of steels, structure and properties of plain carbon steels, Structure and properties of Copper and its alloys, Aluminum and its alloys.

UNIT III: ELECTRIC CONDUCTORS & INSULATORS (12 Periods)

Type of materials selected for conductors, Insulators and semi conductors, Introduction to ceramics - Bonding and microstructure, DC properties of ceramic materials, AC properties of ceramic materials, mechanical properties, Ceramics as Conductors, Insulators and capacitors; Introduction to Plastics - DC properties, AC properties, Mechanical properties.

UNIT IV: SEMICONDUCTORS AND MAGNETIC MATERIALS (09 Periods)

Fabrication of Semiconductors, Producing a silicon wafer-Lithography and Deposition packaging of semiconductors materials; Types of magnetic materials, Measuring magnetic properties, Application of soft magnetic materials in Electromagnets and relays, AC transformers, Generators and motors.

UNIT V: ADVANCED MATERIALS AND APPLICATIONS (05 Periods)

Composites - Fiber reinforced metal matrix, Ceramic matrix, Polymer matrix, Properties and applications of composites; Ceramics - Alumina, Zirconia, Silicon Carbide, SiAlONs, Reaction Bonded Silicon Nitride (RBSN); Glasses- properties and applications, manufacturing of optical fibers.

Total Periods: 45

TEXT BOOKS:

1. Kodgire V D, *Material Science and Metallurgy*, Everest Publishing House, Pune, 31st Edition, 2011.
2. Ian. P.Jones, *Material Science for Electrical and Electronic Engineers,* Oxford University Press, 1st Edition, 2000

REFERENCE BOOKS:

1. V. Raghavan, *Physical Metallurgy: Principles and Practices*, PHI, New Delhi, 2nd Edition, 2006.
2. William. D. Callister, *Materials Science & Engineering-An Introduction*, John Wiley and Sons, New Delhi, 6th Edition, 2002.

III B.Tech - II Semester
(16BT70412) **GREEN TECHNOLOGIES**
(Common to CE, ME, CSE, IT and CSSE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —
COURSE DESCRIPTION:
Principles of green engineering; Green communications; Green energy; Green computing; Green construction; Green manufacturing.
COURSE OUTCOMES:
On successful completion of this course, students will be able to
CO1. Deploy conceptual knowledge in green technologies pertaining to engineering practice.
CO2. Analyze various green technologies for engineering practice.
CO3. Provide green solutions to engineering problems.
CO4. Apply various green techniques in the engineering practice.
CO5. Consider health and safety issues while providing green solutions to the society.
CO6. Understand issues related to environment sustainability.
CO7. Apply ethical standards for environmental sustainability in the engineering practice.
DETAILED SYLLABUS:
UNIT I: PRINCIPLES OF GREEN ENGINEERING AND GREEN COMMUNICATIONS (11 Periods)
Principles of Green Engineering:
Introduction, Definition of green engineering, Principles of green engineering.
Green Communications:
Introduction, Origin of Green Communications, Energy Efficiency in Telecommunication systems, Telecommunication system model and energy Efficiency, Energy saving concepts, Quantifying energy efficiency in ICT, Energy efficiency metrics of green wireless networks, Embodied energy of communication devices- Introduction, The extended energy model, Embodied/Operating Energy of a BS in Cellular network- A Case study; Energy efficient standards for wire-line communications.
UNIT II: GREEN ENERGY (09 Periods)
Introduction, adverse impacts of carbon emission, control of carbon emission– methods, greenhouse gas reduction – methods, Energy sources and their availability, Green energy for sustainable development. Green energy sources – Solar energy, Wind energy, Fuel cells, Bio-fuels, Wave and Geothermal energy (Principle of generation only).
UNIT III: GREEN IT (09 Periods)
The importance of Green Information technologies, Strategizing Green Initiatives, Implementation of Green IT, Information Assurance, Communication and Social Media, Regulating Green IT- Laws, Standards and Protocols; RoHS, REACh, WEEE, Legislating for GHG Emissions and Energy Use of IT Equipment, Non-regulatory Government Initiatives, Industry Associations and Standard Bodies, Green Building Standards, Green Data Centres, Social Movements and Greenpeace, Conclusions.
UNIT IV: GREEN CONSTRUCTION (09 Periods)
Green Building: Definition, Typical features, Benefits, Requisites for green building construction, Sustainability, Concept of REDUCE, REUSE, RECYCLE, RETHINK, REPLENISH AND REFUSE (6 R's), Sustainable construction focus point – Site selection, Planning, Water, Energy, Material, Indoor air quality, Construction procedures.
Indian Green Building Council: Introduction to IGBC green homes, Benefits of IGBC, IGBC green home rating system, Introduction to USGBC, LEED rating system, Procedure to get IGBC certification, GRIHA Rating.
UNIT V: GREEN MANUFACTURING (09 Periods)
Introduction, background, definition, motivation and barriers to green manufacturing, Impact of manufacturing in environmental ecology, Need for green manufacturing, Advantages and Limitations, green manufacturing strategies, Green manufacturing and sustainability, Sustainability tools; Waste stream mapping and application, Green manufacturing through clean energy supply, green lean manufacturing, green packaging and supply chain. **Total Periods: 47**
TEXT BOOKS:
1. Konstantinos Samdanis, Peter Rost, Andreas Maeder, Michela Meo, Christos Verikoukis, *Green Communications: Principles, Concepts and Practice*, John Wiley & Sons, 2015.
2. Soli J. Arceivala, *Green Technologies for a better future,* McGraw Hill Education (India) Pvt Ltd, 2014.
3. San Murugesan, G.R. Gangadharan, *Harnessing Green IT – Principles and Practices,* John Wiley & Sons Ltd., 2008.
4. Tom Woolley, Sam Kimmins, Paul Harrison and Rob Harrison, *Green Building Handbook,* Volume 1, E & FN Spon, an imprint of Thomson Science & Professional.
5. IGBC Green Homes Rating System Version 1.0 – A bridged reference guide.
6. J Paulo Davim, Green Manufacturing: Processes and Systems, Springer, 2012
7. David A Dornfeld, Green Manufacturing: Fundamentals and Applications, Springer, 2013
REFERENCE BOOKS:
1. Athanasios V Alavanidis, Thomais Vlachogianni, *Green Chemistry and Green Engineering,* Synchrona Themata, 2012.

2. G.D. Rai, *Non-conventional Energy Sources*, Khanna Publishers, Delhi, 5th Edition, 2011.
3. Marty Poniatowski, *Foundation of Green Information Technology*, Prentice Hall, 2009.
4. R. K. Gautham, *Green Homes*, BS publications, 2009.

III B. Tech. – II Semester

(16BT70413) INTRODUCTION TO NANOSCIENCE AND NANOTECHNOLOGY

(Common to CE, ME, CSE, IT and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —

COURSE DESCRIPTION:

Introduction to the concept of nano; Description of nanomaterial; Nanostructure characterization tools; Classification of nanomaterials; Fabrication of nanomaterial; Different applications of nanostructures and nanomaterials.

COURSE OUTCOMES:

On successful completion of this course, students will be able to

CO1. Demonstrate knowledge in
- Nanoscale technology.
- Difference between micro and nanotechnology
- Classification of Nanostructure and Nanomaterial
- Fabrication of various nanomaterials and nanostructures.

CO2. Analyze numerical and analytical problems in Nanomaterial size by using Scanning Electron Microscope and X-Ray diffraction

CO3. Design and fabricate devices based on nanostructures like
- Nano solar cell
- Nano cantilever
- Nano bio-sensor

CO4. Synthesize nano particle of different materials to solve the problems related to fabrication of nanostructures.

CO5. Select appropriate technique for fabrication of nanostructures and nanocomposites.

CO6. Apply ethical standards and legal issues while using chemical substances in fabrication of new nanostructures.

DETAILED SYLLABUS:

UNIT I: FUNDAMENTALS OF NANOTECHNOLOGY (08 Periods)

Introduction – Scientific revolutions, Time and length scale in structures, Definition of a nanosystem; Dimensionality and size dependent phenomena - Surface to volume ratio Fraction of surface atoms, Surface energy and surface stress, surface defects, Properties at nanoscale (optical, mechanical, electronic, and magnetic).

UNIT II: IDENTIFICATION AND CHARACTERIZATION TOOLS FOR NANOMATERIALS AND NANOSTRUCTURE (10 Periods)

Field Emission Scanning Electron Microscopy (FESEM), Environmental Scanning Electron Microscopy (ESEM) High Resolution, Transmission Electron Microscope (HRTEM), Scanning Tunneling Microscope(STM), Surface enhanced Raman spectroscopy (SERS), Secondary Ion Mass Spectroscopy, Focused Ion Beam Photoelectron Spectroscopy, X-ray Photoelectron Spectroscopy (XPS), Auger electron spectroscopy (AES), Rutherford backscattering spectroscopy (RBS), X-Ray Diffraction, Intensities in X-Ray Scattering Particle Size Effect.

UNIT III: CLASSIFICATION OF NANOMATERIALS (10 Periods)

Classification based on dimensionality, Quantum Dots, Wells and Wires-III-V Nanoparticles, Electronic Structure of Nanosemiconductor, Carbon based nanomaterials (buckyballs, nanotubes, graphene), Metal based nano materials (nanogold, nanosilver and metal oxides), Nanocomposites, Nanopolymers, Nanoglasses, Nano ceramics, Biological nanomaterials, Fulrene-discovery and early years,.

UNIT IV: SOME FABRICATION TECHNIQUES OF NANOMATERIALS AND NANOSTRUCTURES (09 Periods)

Chemical Methods: Metal Nanocrystals by Reduction, Solvothermal Synthesis, Photochemical Synthesis, Sonochemical Routes, Chemical Vapor Deposition (CVD), Metal Oxide Chemical Vapor Deposition (MOCVD), Plasma Enhanced Chemical Vapour Deposition Technique (PECVD), Hydrothermal Method, Sol-Gel.

Physical Methods: Ball Milling, Electrodeposition, Spray Pyrolysis, Flame Pyrolysis, DC/RF Magnetron Sputtering, Molecular Beam Epitaxy (MBE) Thermal Evaporation Method.

UNIT V: APPLICATIONS (08 Periods)

Solar energy harvesting, Catalysis, Molecular electronics and printed electronics Nanoelectronics, Polymers with a special architecture, Liquid crystalline systems, Linear and nonlinear optical and electro-optical properties, Applications in displays and other devices, Nanomaterials for data storage, Photonics, Plasmonics, Chemical and biosensors, Nanomedicine and Nanobiotechnology, MESFET.

Total Periods: 45

TEXT BOOKS:

1. Pradeep T., *A Textbook of Nanoscience and Nanotechnology,* Tata McGraw Hill Education Pvt.Ltd., 2012.
2. Hari Singh Nalwa*, Nano-structured Materials and Nanotechnology,* Academic Press, 2002.

REFERENCE BOOKS:

1. Nabok A., *Organic and Inorganic Nanostructures*, Artech House, 2005.

2. Dupas C., Houdy P., Lahmani M., *Nanoscience:Nanotechnologies and Nanophysics*, Springer - Verlag Berlin Heidelberg, 2007.
3. S.M. Sze, *Physics of Semiconductor Devices*, 2nd Edition, 2001.

III B. Tech. – II Semester

(16BT60505) ENGINEERING SYSTEM ANALYSIS AND DESIGN

(Common to CE, ME, CSE, IT and CSSE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —

COURSE DESCRIPTION:
Systems Process; Technologies for Systems; System Development Life Cycle; System Analysis and Modeling; Levels of Management; Project Management; Systems Implementation and Importance of UML Prototyping; Maintaining and Managing the Systems Output Process.

COURSE OUTCOMES:
On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge in
- Systems Process and System Design
- Systems Analysis and Modeling
- System Development Life Cycle
- Design Management and Maintenance Tools.

CO2. Analyze System Process and estimate the given models by using case tools.
CO3. Design and Develop a model to the organizational systems.
CO4. Solve complex problems related to engineering systems and produce accurate results.
CO5. Apply object oriented techniques for modeling dynamic systems.
CO6. Contribute towards societal issues and responsibilities in designing, modeling and developing of organizational systems.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION (09 Periods)
Systems, Types of systems, Integrating technologies for systems, Need for system analysis and design, Role of the systems analyst, System development life cycle, CASE tools for analysis and design.

UNIT II: ANALYSIS AND MODELING ORGANIZATIONAL SYSTEM (09 Periods)
Organization as system, System analysis, Depicting systems graphically, Use case modeling, Levels of management, Organizational culture.

UNIT III: PROJECT MANAGEMENT (10 Periods)
Project initiation, Problem in organization, Determining feasibilities, Ascertaining hardware and software needs, Identifying, Forecasting, Comparing costs and benefits, Activity planning and control, Managing the project.

UNIT IV: OBJECT ORIENTED ANALYSIS AND DESIGN USING UML (08 Periods)
Introduction, Object modeling, Dynamic modeling, functional modeling, packages and other UML artifacts, the importance of using UML for modeling.

UNIT V: DESIGNING EFFECTIVE OUTPUT (09 Periods)
Output design objectives, Relating output content to output method, Realizing how output bias affects users, Designing output for display, Case studies-Designing a web site management, Online exam management, Online portal design.

Total Periods: 45

TEXT BOOK:
1. Kenneth E. Kendall and Julie E. Kendall, *System Analysis and Design,* Pearson Education, 9th Edition, 2011.

REFERENCE BOOKS:
1. Dennis, Wixom and Roth, *Systems Analysis and Design*, John Wiley, 5th Edition, 2012.
2. Shelly and Rosenblatt, *Systems Analysis and Design*, Cengage Learning, 9th Edition, 2012.

III B. Tech. – II Semester

(16BT71011) MICRO-ELECTRO-MECHANICAL SYSTEMS

(Common to CE, ME, CSE, IT and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Engineering Physics.

COURSE DESCRIPTION: Overview of Micro Electro Mechanical Systems (MEMS); scaling laws; working principles of microsensors and microactuators; materials; microfabrication processes; packaging of Microsystems.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on MEMS devices, scaling laws, microsensors and microactuators

CO2. Analyze the properties of materials and identify its suitability for MEMS devices.

CO3. Design MEMS devices that meet desired specifications and requirements.

CO4. Analyze and synthesize the information to provide effective solution to engineering problems with MEMS devices.

CO5. Use modern techniques in micro manufacturing process.

CO6. Develop efficient and cost effective MEMS based products for society.

DETAILED SYLLABUS:

UNIT I: OVERVIEW OF MEMS AND SCALING LAWS (09 Periods)

MEMS and Microsystems, Microsystems and microelectronics, miniaturization, applications of MEMS in the automotive industry and in other industries.

Scaling laws of miniaturization: Introduction to scaling, scaling in: geometry, rigid- body dynamics, electrostatic forces, electromagnetic forces, Electricity, Fluid mechanics, Heat transfer.

UNIT II: WORKING PRINCIPLES OF MICROSYSTEMS (09 Periods)

Microsensors, acoustic wave sensors, biomedical and biosensors, chemical sensors, pressure sensors, thermal sensors. Microactuation: actuation using thermal forces, shape-memory alloys, piezoelectric crystals, electrostatic forces. MEMS with microactuators, microgrippers, micromotors, microvalves, micropumps. Micro-accelerometers, microfludics.

UNIT III: MATERIALS FOR MEMS AND MICROSYSTEMS (09 Periods)

Substrate and wafers, silicon as a substrate material, silicon compounds, silicon piezoresistors, gallium arsenide, quartz, piezoelectric crystals, polymers, carbon nano tube (CNT), development of CNTs, application of CNTs.

UNIT IV: MEMS FABRICATION PROCESS AND MICROMANUFACTURING (09 Periods)

Photolithography, ion implantation, diffusion, oxidation, chemical vapor deposition, physical vapor deposition, deposition by epitaxy, etching, bulk micro-manufacturing, surface micro-manufacturing, LIGA process.

UNIT V: MEMS PACKAGING (09 Periods)

Introduction to microsystem packaging, objectives and general considerations in packaging design, three levels of microsystem packaging, interfaces in microsystem packaging, packaging technologies, three-dimensional packaging, selection of packaging materials, signal mapping and transduction, Design case: Pressure sensor packaging.

Total Periods: 45

TEXT BOOK:

1. Tai-Ran Hsu, MEMS & Microsystems*, Design and Manufacture*, McGraw Hill Education (India), Pvt. Ltd., 2002.

REFERENCES BOOKS:

1. G.K.Ananthasuresh, K.J.Vinoy, *Micro and Smart Systems*, Wiley India, 2010.
2. Nitaigour Premchand Mahalik, *MEMS*, McGraw Hill Education (India) Pvt. Ltd., 2007.

III B. Tech. – II Semester

(16BT61205) **CYBER SECURITY AND LAWS**

(Common to CE, ME, CSE, IT and CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —

COURSE DESCRIPTION: Cyber Crimes and Indian IT Act; Cyber Offenses; Tools and Methods used in Cyber Crime; Phishing ad Identity Theft; Indian and Global Perspective on Cyber Crimes and Cyber Security; Organizational Implications on Cyber Security; IPR Issues; Cyber Crime and Terrorism; Cyber Crime Illustrations.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge in Cyber security, Cyber crimes and its related laws in Indian and Global Act.

CO2. Analyze the legal perspectives and laws related to cyber crimes in Indian context.

CO3. Apply security and privacy methods in development of modern applications and in organizations to protect people and to prevent cyber crimes.

CO4. Solve Cyber security issues using privacy policies.

CO5. Use antivirus tools to minimize the impact of cyber threats.

CO6. Follow security standards for the implementation of Cyber Security and laws.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION TO CYBER CRIMES AND OFFENSES (09 Periods)

Cyber Crimes: Introduction, Definition, Origin, Cyber crime and information security, Cyber criminals, Classifications of cyber crimes, The legal perspectives and Indian perspective, Cyber crime and Indian ITA 2000, Global perspective on cyber crimes.

Cyber Offenses: Introduction, Criminals planning on attacks, Social engineering, Cyber stalking, Cyber cafe and crimes, Botnets.

UNIT II: TOOLS AND METHODS USED IN CYBER CRIME & PHISHING AND IDENTITY THEFT (09 Periods)

Introduction, Proxy servers and Anonymizers, Phishing, Password cracking, Key loggers and Spywares, Virus, Worms and Ransomware, Trojan horses and Backdoors, Steganography, DoS and DDoS attacks.

Phishing and Identity Theft: Introduction, Phishing, Identity Theft (ID Theft).

UNIT III: CYBER CRIMES AND CYBER SECURITY-LEGAL PERSPECTIVES (08 Periods)

Introduction, Cyber laws in Indian context, The Indian IT act, Challenges to Indian law and Cyber crime scenario in India, Consequences of not addressing the weakness in IT act, Digital signatures and the Indian IT Act, Cyber Crime and Punishment, Cyberlaw, Technology and Students in India scenario.

UNIT IV: CYBER SECURITY-ORGANIZATIONAL IMPLICATIONS (10 Periods)

Introduction, Web threats for organizations – evils and perils, Security and privacy implications from cloud computing, Social Media Marketing-Security risks and Perils for organizations, Social computing and associated challenges for organizations, Protecting people's privacy in organization, Organizational guidelines for internet usage, Safe computing and Usage policy, Incident handling and Best practices.

UNIT V: CYBER CRIME & TERRORISM AND ILLUSTRATIONS (09 Periods)

Cyber Crime & Terrorism: Introduction, Intellectual property in the cyber space, The ethical dimension of cyber crimes, The psychology, Mindset and skills of hackers and cyber criminals, Sociology of cyber criminals, Information warfare.

Cyber Crime Illustrations: Indian banks lose millions of rupees, Justice vs. Justice, Parliament attack, The Indian case of online gambling, Bank and credit card related frauds, Purchasing goods and services scam, Nigerian 419 scam.

Total Periods: 45

TEXT BOOK:

1. Nina Gobole and Sunit Belapure, *Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives*, Wiley India, 2011.

REFERENCE BOOK:

1. Prashant Mali, *Cyber Law and Cyber Crimes*, Snow White Publications Pvt. Ltd., 2013.

III B. Tech. – II Semester
(16BT61505) BIOINFORMATICS
(Open Elective)
(Common to CE, ME, CSE, IT and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —

COURSE DESCRIPTION:
Introduction to Bioinformatics; Biology and Information; Sequence alignment and dynamic programming; Biological Database; Homology Modeling; Structure Prediction; Molecular Dynamics

COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on concepts of biological databases, Genome and proteome.
CO2. Analyze biological sequences for Homology Modeling.
CO3. Apply clustering methods for Phylogenetic trees.
CO4. Solve bio sequencing problems using dynamic programming.
CO5. Select and apply appropriate techniques and tools to structure Prediction

DETAILED SYLLABUS:
UNIT I: NUCLEIC ACIDS, PROTEINS AND AMINO ACIDS (08 Periods)
Bioinformatics-Definition, Nucleic acid structure, Protein structure, the central dogma, Physico-chemical properties of the amino acids and their importance in protein folding, Polymerase chain reaction (PCR)

UNIT II: INFORMATION RESOURCES FOR GENES AND PROTEIN (10 Periods)
Database file formats, Nucleic acid sequence databases, Protein sequence databases
Sequence Alignment Algorithm
Pair wise sequence alignment – The problem, Pair wise sequence alignment – Dynamic programming methods, The effect of scoring parameters on the alignment, Multiple sequence alignment

UNIT III: PREDICTION OF THE THREE-DIMENSIONAL STRUCTURE OF A PROTEIN AND HOMOLOGY MODELING (09 Periods)
Secondary Structure Prediction, Basic Principles, The Steps of Comparative Modeling, Accuracy of Homology Models, Manual versus Automatic Models, SNPs, Motifs.

UNIT IV: PHYLOGENETIC METHODS (10 Periods)
Phylogenetic trees, choosing sequences, Distance matrices and clustering methods, Calculation of distances in the neighbor-joining method, Bootstrapping, Tree optimization criteria and tree search methods, The maximum-likelihood criterion, Calculating the likelihood of the data on a given tree, The parsimony criterion.

UNIT V: NEW FOLD MODELING (08 Periods)
Estimating the Energy of a Protein Conformation, Energy Minimization, Molecular Dynamics,
The "Omics" Universe-Transcriptomics, Proteomics, Interactomics, Structural Genomics, Pharmacogenomics.

Total Periods: 45

TEXT BOOKS:
1. Paul G. Higgs and Teresa K. Attwood, *Bioinformatics and Molecular Evolution*" Blackwell Publishing 2005.
2. Anna Tramontano, *Introduction to Bioinformatics*, Chapman and Hall/CRC, 2006.

REFERENCE BOOKS:
1. Hooman H. Rashidi and Lukas K. Buehler, *Bioinformatics Basics, Applications in Biological Science and Medicine*, CRC Press, Taylor & Francis Group, 2nd Edition, 2005.
2. Rastogi S. C., NamitaMendiratta and Parag Rastogi, *Bioinformatics: Methods and Applications: Genomics, Proteomics and Drug Discovery*, PHI Learning Pvt. Ltd., 3rd Edition, 2011.

IV B. Tech. - I Semester

(16BT71501) SYSTEM MODELING AND SIMULATION

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Programming in C and Probability Distributions and Statistical Methods.

COURSE DESCRIPTION:
Discrete event simulation; R Studio Operations; Useful statistical models; Queueing systems; Properties of random numbers, Test for random numbers; Data collection, Types of simulations with respect to output analysis.

COURSE OUTCOMES:
On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on functional modeling of system design.
CO2. Analyze the performance of Queueing systems in real world applications.
CO3. Design dynamic system operations using simulation results using R.
CO4. Apply mathematical foundations and computer science theory in the modeling and design of experiments for real time systems.
CO5. Select suitable tools and simulation software for simulating computer based systems.
CO6**.** Relate appropriate professional principles of engineering practice for designing simulation models.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION TO DISCRETE EVENT SIMULATION (08 Periods)
Simulation-Advantages and Disadvantages, Areas of application, Steps in a simulation study, Basics of spreadsheet simulation, Queueing simulation in a spread sheet, Concepts in discrete-event simulation, List processing, Selection of simulation software, Simulation environments.

UNIT II: THE R ENVIRONMENT (10 Periods)
Command line interface, R Studio, Basic Math, Variables, Data Types, Vectors, Calling Functions, Missing Data, Reading data into R, ggplot2, Function arguments, Return values, Control statements, Loops, Correlation and covariance, T-Tests, ANOVA, Autoregressive moving average, VAR.

UNIT III: STATISTICAL MODELS (07 Periods)
Terminology and concepts, Useful statistical models, Discrete distributions, Continuous distributions, Poisson process, Empirical distributions.

UNIT IV: QUEUEING MODELS AND RANDOM NUMBERS (09 Periods)
Characteristics of queuing systems, Queueing notation, Long-run measures of performance of queueing systems. Properties of random numbers, Generation of pseudo-random numbers, Techniques for generating random numbers, Tests for random numbers, Inverse-transform technique, Acceptance-rejection technique.

UNIT V: ANALYSIS OF SIMULATION DATA (11 Periods)
Input Modeling-Data Collection, Identifying the distribution with data, Parameter estimation, Multivariate and time series input models. Validation of Simulation Models -Model building verification and validation, Verification of simulation models. Estimation of absolute performance - Types of simulations with respect to output analysis, stochastic nature of output data, Absolute measures of performance and their estimation, Output analysis of terminating Simulations.

Total Periods: 45

TEXT BOOKS:

1. Jerry Banks, John S. Carson II, Barry L.Nelson and David M.Nicol, *Discrete-Event System Simulation,* Pearson India,5th Edition, 2013.
2. Jared P. Lander, *R for Everyone*, Pearson India, 2014.

REFERENCE BOOKS:

1. Narsingh Deo, System *Simulation with Digital Computer*, Prentice Hall India 2009.

2. Averill M. Law, *Simulation Modeling and Analysis*, McGraw Hill Education (India) Private Limited, 4th Edition, 2007.

IV B. Tech. I Semester

(16BT70402) EMBEDDED SYSTEMS

(Common to EEE, ECE and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Digital Logic Design and Microprocessors and Interfacing

COURSE DESCRIPTION:

Embedded system design approaches; MSP430 Architecture; Instruction Set; On-Chip Resources; Programming; Communication with peripherals; Internet of Things related Issues.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Apply knowledge in
- MSP430 Architecture, Pin out, Instruction set
- High level programming
- Usage of On-chip resources like ADC, DAC, Timers
- Internet of Things related issues

CO2. Analyze various design issues regarding
- Usage of on chip resources
- Low power modes
- Communication support

CO3. Design embedded systems using MSP430 series microcontrollers to suit market requirements.

CO4. Solve engineering problems and arrive at solutions in designing embedded systems to support interconnectivity.

C05. Apply techniques, program skills, On-Chip resources to design networked embedded systems with an understanding of limitations.

CO6. Reason out and practice professional engineering to deliver efficient and cost effective embedded based products to society.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION TO EMBEDDED SYSTEMS (09 Periods)

Embedded Systems - Definition, Approaches, Applications, Anatomy of microcontroller, Memory, Software; MSP430 Introduction- Pin out, Functional Block diagram, Memory, CPU, Memory mapped input and output, Clock generator; Exceptions- Interrupts and Resets.

UNIT II: ARCHITECTURE OF MSP430 (09 Periods)

CPU, Addressing Modes, Constant Generator and Emulated Instructions, Instruction Set, Example programs, Reflections on CPU and Instruction set, Resets, Clock System.

UNIT III: FUNDAMENTALS FOR PROGRAMMING (09 Periods)

Development Environment, C Programming Language, Assembly Language, Programming and Debugging, Sample programs- Light LEDs in C, Read input from a switch; Automatic Control-Flashing light by delay, use of subroutines, using Timer_A; Header files and issues, Functions, Interrupts and Low power modes.

UNIT IV: TIMERS, MIXED SIGNAL SYSTEMS AND COMMUNICATION (09 Periods)

Timers - Watchdog Timer, RTC, Measurement in capture mode; Mixed-Signal Systems- Comparator_A, ADC10 Architecture & operation, ADC12, Sigma-Delta ADC Architecture & operation, DAC; Communication- Communication Peripherals in MSP430, SPI, Inter-integrated Circuit Bus, Asynchronous communication with the USCI_A.

UNIT V: HARDWARE SOFTWARE CO-DESIGN AND INTERNET OF THINGS (09 Periods)

CO- Design Issues: Co-design Models, Architectures, Languages, a Generic Co-design Methodology

IOT: Introduction, Origins, Drivers and Applications, IOT Communication Models - Device to Device, Device to Cloud, Device to Gateway, Back end Data Sharing Model; IPV6 and IOTs', IOT Issues, Security Issues-challenges; Privacy Considerations, Interoperability/Standards.

Total Periods: 45

TEXT BOOKS:

1. John H. Davies, *MSP430 Microcontroller Basics*, Newnes Publications, 2008.
2. Karen Rose, Scott Eldridge, Lyman Chapin, T*he Internet of Things: An Overview: Understanding the Issues and Challenges of a More Connected World*, Internet Society, Oct. 2015.
3. Jorgen Staunstrup, Wayne Wolf, *Hardware / software co- design Principles and Practice*, Springer, 2009.

REFERENCE BOOK:

1. Chris Nagy, *Embedded Systems Design using the TI MSP30* Series, Newnes Publications, 2003.

IV B. Tech. - I Semester

(16BT71502) SYSTEMS ENGINEERING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Software Engineering.

COURSE DESCRIPTION: Foundations of System Engineering; Complex Systems structure; System Engineering Management and Development.

COURSE OUTCOMES:

On the Successful Completion of this Course, students will be able to:

CO1. Demonstrate Knowledge on:
- System Engineering foundation
- Structure of Complex Systems
- System Engineering management and Development

CO2. Analyze the requirements for the development of structures of a system.

CO3. Design system engineering management plan for complex integrated systems and evaluate them in operational environment.

CO4. Use appropriate system engineering methods in iterative system development process

C05. Use appropriate methods to support the phases of Production, operation and maintenance in system development.

CO6. Apply ethical principles of System engineering for addressing the issues in modeling, simulation and trade-off analysis for complex systems development**.**

DETAILED SYLLABUS:

UNIT I: FOUNDATIONS OF SYSTEMS ENGINEERING (09 Periods)

Systems Engineering and the World of Modern Systems - Origins of Systems Engineering - Examples of Systems Requiring Systems Engineering - Systems Engineering Viewpoint - Systems Engineering as a Profession - The Power of Systems Engineering

System Engineering Landscape-System Engineering Viewpoint–Perspective of System Engineering–Systems Domain-System Engineering Field–System Engineering Approaches – System Engineering Activities and Products

UNIT II: STRUCTURE OF COMPLEX SYSTEMS (09 Periods)

System Building Blocks and Interfaces - Hierarchy of Complex Systems - System Building Blocks - The System Environment - Interfaces and Interactions

The System Development Process-Systems Engineering Through the System Life Cycle - Evolutionary Characteristics of the Development Process - The Systems Engineering Method - Testing Throughout System Development

UNIT III: CONCEPT DEVELOPMENT STAGE (10 Periods)

Needs Analysis- Originating a New System -Operations Analysis - Functional Analysis - Feasibility Definition - Needs Validation - System Operational Requirements

Concept Exploration- Developing the System Requirements - Operational Requirements Analysis - Performance Requirements Formulation

Concept Definition- Selecting the System Concept - Performance Requirements Analysis - Functional Analysis and Formulation - Concept Selection - Concept Validation - System Development Planning - System Functional Specifications

UNIT IV: ENGINEERING DEVELOPMENT STAGE (09 Periods)

Advanced Development -Reducing Program Risks - Requirements Analysis - Functional Analysis and Design - Prototype Development - Development Testing - Risk Reduction -**Engineering Design**-Implementing the System Building Blocks - Requirements Analysis - Functional Analysis and Design - Component Design - Design Validation - Configuration Management

UNIT V: POST DEVELOPMENT STAGE AND MANAGEMENT (08 Periods)

Production-Systems Engineering in the factory-Engineering for production-Transition from development to production-Production Operations

Operations and Support-Installing, Maintaining, and upgrading the system-Installation and test- In-Service support, Major System Upgrades: Modernization

Managing System Development and Risks - Work Breakdown Structure (WBS) - Systems Engineering Management Plan (SEMP) - Risk Management - Organization of Systems Engineering

Total Periods: 45

TEXT BOOK:

1. Alexander Kossiakoff , William N. Sweet, *Systems Engineering: Principles and Practice,*John Wiley & Sons, Inc*.,* Hoboken, New Jersey, 2nd Edition, 2016.

REFERENCE BOOK:

1. B. Blanchard and W. Fabrycky, *Systems Engineering and Analysis,* Prentice Hall, 4th Edition, 2006.

IV B. Tech. - I Semester

(16BT71503) DATA ANALYTICS

(Program Elective – 2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Data Warehousing and Data Mining

COURSE DESCRIPTION: Introduction to Data Analytics; Analytic Processes and Tools; Cluster Analysis; Big Data; Hadoop;

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on concepts of Data Analytics Characteristics, Hadoop Framework ecosystem components and Cluster Analysis.

CO2. Identify appropriate solutions through analysis for problems of Big data and Hadoop.

CO3. Design and model an effective sustainable Database system for better performance using Data Analytic techniques.

CO4. Appropriately use database models for storing, accessing and analyzing large data sets.

CO5. Apply Hadoop Framework for data processing.

CO6. Recognize the need for using Hadoop environment for solving complex engineering problems.

DETAILED SYLLABUS:

UNIT- I: WHOLENESS OF DATA ANALYTICS (09 Periods)

Data Analytics, Business Intelligence, Pattern Recognition, Data Processing chain, Terminology and careers.

Data Mining: Data Mining, Gathering and selecting Data, Data cleansing and preparation, outputs of Data mining, Evaluating Data Mining results, Data Mining Techniques.

Data Visualization: Data Visualization, Excellence in visualization, Types of charts, Visualization example, Tips for Data Visualization.

UNIT II: DATA ANALYSIS (08 Periods)

Decision Trees: Decision Tree problem, Decision Tree construction, Lessons from constructing trees, Decision tree algorithms.

Regression: Regression, correlations and relationships, visual look at relationships, Non linear regression, logistic regression, Advantages and Disadvantages of regression models.

Artificial Neural Networks: ANN, Business applications of ANN, Design principles of ANN, Representation of a Neural Network, Developing an ANN, Advantages and Disadvantages of using ANN's.

UNIT III: CLUSTER ANALYSIS (11 Periods)

Applications of Cluster Analysis, Representing Clusters, Clustering Techniques, K-means algorithm for clustering, selecting the number of clusters, Advantages and Disadvantages of K-means algorithm.

Association Rule Mining: Association Rule Mining, Business applications of Association Rules, Representing Association Rules, Algorithm for Association Rule, Apriori Algorithm, Association Rules, Creating Association Rules.

Naïve-Bayes Analysis: Naïve-Bayes Model, Simple classification Example, Text Classification Example, Advantages and Disadvantages of Naïve-Bayes.

Social Network Analysis: Social Network Analysis, Techniques and Algorithms, Page Rank, Practical considerations.

UNIT IV: BIG DATA (09 Periods)

Big Data, Defining Big Data, Big Data Landscape, Business implications of Big Data, Technology implications of Big Data, Big Data technologies, Management of Big Data.

Data Modeling Primer: Evolution of Data Management Systems

Statistics Primer: Statistics Primer, Descriptive Statistics, Normal Distribution and Bell Curve, Inferential Statistics, Predictive Statistics.

UNIT V: HADOOP (08 Periods)

Hadoop, RDBMS versus Hadoop, Distributed Computing Challenges, History of Hadoop, Hadoop Overview, Use Case of Hadoop, Hadoop Distributors, HDFS, Processing Data with Hadoop, Hadoop YARN, Hadoop Ecosystem.

MongoDB: Introduction to MongoDB, Terms used in RDBMS and MongoDB, Datatypes in MongoDB, MongoDB query Language.

Total Periods: 45

TEXT BOOKS:

1. Anil Maheswari, *Data Analytics*, McGraw Hill Education, 2017.
2. Seema Acharya and Subhashini C*, Big Data and Analytics*, Wiley India, 2015

REFERENCE BOOKS:

1. Bart Baesens, *Analytics in a Big Data World: The Essential Guide to Data Science and Its Applications*, Wiley Publications, 2014.
2. Michael Berthold, David J. Hand, *Intelligent Data Analysis*, Springer, 2014.

IV B. Tech. - I Semester

(16BT71504) PERFORMANCE EVALUATION OF COMPUTER SYSTEMS

(Program Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Probability Distributions and Statistical Methods.

COURSE DESCRIPTION: Performance Evaluation Systems; Workload characterization; Hardware and software monitors; Summarization of data, Linear regression models; Experimental Design.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on Performance Metrics, workload selection and Monitors.

CO2. Analyze and interpret the data using summarization techniques.

CO3. Design and develop Factorial Experimental models for evaluating the performance of a computer based systems.

CO4. Use statistical methods for interpretation of data in simulation based systems.

CO5. Select appropriate techniques for prediction of variability and index of dispersion.

CO6. Apply contextual knowledge to asses experimental errors in Factorial designs.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION TO PERFORMANCE EVALUATION (09 Periods)

The art of performance evaluation, Performance projects, Common mistakes, Systematic approach, Selecting an evaluation technique, Performance metrics- selection, Usage, Classification, Setting performance requirements.

UNIT II: WORKLOADS (09 Periods)

Types of workloads: Addition Instruction, Instruction Mixes, Kernels, Synthetic Programs, Application Benchmarks, Popular Benchmarks.

Workload selection and Characterization Techniques: Services Exercised, Level Of Detail, Representativeness, Timeliness, Terminology, Averaging, Specifying Dispersion, Single-Parameter Histograms, Multi parameter Histograms, Principal-Component Analysis, Markov Models, Clustering.

UNIT III: MONITORS (08 Periods)

Monitor terminology, classification, Software, Hardware monitors, Software versus Hardware monitors, Firmware and Hybrid monitors, Distributed system monitors, Program execution monitors, Techniques for improving program performance, Accounting logs, Analysis and inter presentation of accounting log data.

UNIT IV: SUMMARIZING DATA AND LINEAR REGRESSION MODELS (09 Periods)

Summarizing Data: Probability and statistics concepts, Summarizing data by a single number, Selecting among the mean, Median, and Mode, Common misuses of means, Geometric, mean, Harmonic mean, Mean of a ratio, Summarizing variability, Selecting the index of dispersion, Determining distribution of data.

Linear Regression Models: Definition of a good model, Estimation of model parameters, Confidence intervals for regression parameters, Confidence intervals for predictions.

UNIT V: EXPERIMENTAL DESIGN AND ANALYSIS (10 Periods)

Experimental design: Terminology, Common mistakes in Experimentation, Types of Experimental Designs, 2^2 Factorial Designs, Computation of effects, Sign table method for calculating effects, Allocation of variation.

General 2^k Factorial Designs: 2^2r Factorial Designs, Computation of effects, Estimation of Experimental errors, Allocation of variation, Confidence intervals for effects, Confidence intervals for predicted responses, General 2^kr Factorial design **Total Periods: 45**

TEXT BOOK:

1. Raj Jain, *The Art of Computer Systems Performance Analysis: Techniques for Experimental Design,Measurement, Simulation, and Modeling*, Wiley-India, Reprint Edition 2014.

REFERENCE BOOKS:

1. Kishore S.Trivedi, *Probability & Statistics with reliability, queuing, and computer science applications*, PHI, 8th Edition, 2011.

2. Paul J. Fortier and Howard E. Michel, *Computer Systems Performance Evaluation and Prediction*, Elsevier, 2003.

IV B. Tech. - I Semester

(16BT71505) NETWORK PROGRAMMING

(Common to IT and CSSE)

(Program Elective – 2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Computer Networks

COURSE DESCRIPTION:

OSI model, Unix standards; Normal startup, terminate and signal handling server process termination; lost datagram, summary of UDP example, Lack of flow control with UDP; Function and IPV6 support, uname function ,IPv4 Client- IPv6 Server ;FIFO's, streams and messages, RPC.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on concepts of sockets, inter process communication and remote login.

CO2. Identify appropriate TCP Echo server functions and Socket options used in Network based systems.

CO3. Analyze networking protocols such as TCP and UDP for connection establishment between client and server.

CO4. Design appropriate solutions for network applications based on UNIX.

CO5. Apply modern tools to create cooperating processes in network based Systems.

CO6. Relate suitable ethical principles to design and develop applications related to Network Traffic Monitoring.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION TO NETWORK PROGRAMMING AND SOCKETS (09 Periods)

OSI model, Unix standards, TCP and UDP & TCP connection establishment and Format, Buffer sizes and limitation, standard internet services, Protocol usage by common internet application, Address structures, Value Result Arguments, Byte ordering and manipulation function and related functions,

Elementary TCP sockets: Socket, connect, bind, listen, accept, fork and exec function, concurrent servers, Close function.

UNIT II: TCP CLIENT SERVER AND SOCKET OPTIONS (09 Periods)

TCP Echo server functions, Normal startup, terminate and signal handling, Server process termination, Crashing and Rebooting of server host, Shutdown of server host.

Socket Options:I/O Models, select function, Batch input, shutdown function, poll function, getsockopt and setsockopt functions, Socket states, Generic socket option, IPV6 socket options.

UNIT III: ELEMENTARY UDP SOCKET (08 Periods)

Introduction, UDP Echo server functions, UDP Echo client functions, lost datagram, summary of UDP example, Lack of flow control with UDP, Determining outgoing interface with UDP.

UNIT IV: DOMAIN NAME SERVER & IPv4 AND IPv6 INTEROPERABILITY (09 PERIODS)

DNS, gethostbyName function, gethostbyAddr Function, Resolver option, Function and IPv6 support, uname function and other networking Information.

IPv4 and IPv6 Interoperability: Introduction, IPv4 Client- IPv6 Server, IPv6 Client-IPv4 Server, IPv6 Address-Testing Macros, Source Code Portability.

UNIT V: INTERPROCESS COMMUNICATION AND REMOTE LOGIN (11 Periods)

Introduction, Pipes, popen and pclose functions, FIFO's, streams and messages, System V IPC: IPC_Perm Structure, IPC Permissions, Creating and Opening IPC Channels, Message queues (msgget, msgsnd, msgrcv, msgctl Functions), Shared Memory (shmget, shmat, shmdt, shmctlFunctions).

Remote Login: rlogin Overview, RPC.

TEXT BOOKS:

1. W.Richard Stevens, *UNIX Network Programming*, Vol. I, Sockets API, PHI, 3rd Edition, 2010.
2. W.Richard Stevens, *UNIX Network Programming IPC*, Vol. II, Pearson Education India, 2nd Edition, 2015.

REFERENCE BOOKS:

1. T Chan, *UNIX Systems Programming Using C++,* PHI, 3rd Edition, 2012
2. Graham Glass, King Ables, *UNIX for programmers and Users*, Pearson Education, 3rd Edition, 2003.

IV B. Tech. - I Semester

(16BT71506) SOFTWARE ARCHITECTURE AND DESIGN PATTERNS

(Program Elective – 2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Software Engineering.

COURSE DESCRIPTION: Architecture Business Cycle; Documenting Architecture; Layered Systems; Heterogeneous Architectures; Architectural Structures For Shared Information Systems; Formalizing Architectural Design Space; Selection and Usage Patterns;

COURSE OUTCOMES

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge in software architecture, styles, patterns and frameworks.
CO2. Analyze and select appropriate architectural patterns for software design
CO3. Design appropriate software architectures for software Project implementation.
CO4. Apply Skills for designing Architectural solutions using Formal Models and Specification.
CO5. Select appropriate techniques for designing and evaluating a system's architecture.

DETAILED SYLLABUS

UNIT I: INTRODUCTION TO SOFTWARE ARCHITECTURE (09 Periods)

Software Architecture, Software as Engineering Discipline, the Status of Software Architecture, Designing the Architecture, Documenting Architecture, Reconstructing Software Architecture. Software Architecture Guidelines, Baseline architecture, Good software architecture.

UNIT II: ARCHITECTURAL STYLES (09 Periods)

Pipes And Filters, Data Abstraction And Object Oriented Organization, Event-Based Implicit Invocation, Layered Systems, Repositories, Interpreters, Process Control, Familiar Architectures, Heterogeneous Architectures.

UNIT III: ARCHITECTURE DESIGN GUIDANCE AND FORMAL MODELS SPECIFICATION (08 Periods)

Database Integration, Batch Sequential, Simple Repository, Virtual Repository, Hierarchical Repository, Integration in Software Development Environments, Guidance for User Interfacing Architecture, Formalizing the Architecture of a Specific System, Formalizing an Architectural Style, Formalizing Architectural Design Space.

UNIT IV: DESIGN PATTERNS AND CREATIONAL PATTERNS (09 Periods)

Design Pattern, Smalltalk MVC, Catalogs, Role in Solving Design Problems, Selecting Design Pattern, Using Design Pattern. Creational Patterns: Abstract Factory, Prototype.

UNIT V: STRUCTURAL PATTERNS AND BEHAVIORAL PATTERNS (10 Periods)

Structural Patterns: Adapter, Bridge, Composite. Behavioral Patterns**:** Proxy, Interpreter, Iterator.

Total Periods: 45

TEXT BOOKS:

1. Mary Shaw, David Garlan, *Software Architecture Perspective: on an Emerging Discipline,* PHI, 2014.
2 Erich Gamma*, Design Patterns,* Pearson Education, 2006.

REFERENCE BOOKS:

1. Len Bass, Paul Elements, Rick Kazman, *Software Architecture in Practice*, SEI Series, 2012
2. Buschmann, *Pattern Oriented Software Architecture*, Wiley, 1996.
3. Gamma, Shaw, *An Introduction to Software Architecture*, World Scientific, 1995.

IV B. Tech. - I Semester

(16BT71507) BUSINESS ANALYTICS

(Program Elective – 3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Database Management Systems

COURSE DESCRIPTION:
Analytics on Spreadsheets; Visualizing and Exploring Data; Descriptive Statistical Measures; Predictive Modeling and Analysis; Regression Analysis; Linear Optimization; Applications of Linear Optimization; Decision Analysis.

COURSE OUTCOMES:
On Successful Completion of this course, students will be able to:

CO1. Demonstrate knowledge on techniques involved in business analytics.
CO2. Analyze the techniques involved in classifying massive and opportunistic data.
CO3. Design solutions by evaluating business problems and determine suitable analytical methods.
CO4. Plan, organize and evaluate methods to prepare raw data for different analytical techniques.
CO5. Collect, manage, and interpret data to identify issues in the workplace and develop measures for solving them.
CO6. Apply ethical principles and commit to business decisions by using data analytic techniques.

DETAILED SYLLABUS:

UNIT I: FUNDAMENTALS OF BUSINESS ANALYTICS (11 Periods)

Introduction to Business Analytics: Evolution of Business Analytics, Scope of Business Analytics, Data for Business Analytics, Decision Models, Problem Solving and Decision Making.

Analytics on Spreadsheets: Basic Excel Skills, Excel Functions, Spreadsheet Modeling and Spreadsheet Engineering.

UNIT II: DESCRIPTIVE ANALYTICS (09 Periods)

Visualizing and Exploring Data: Data Visualization, Data Queries Using Sorting and Filtering, Statistical Methods for Summarizing Data.

Descriptive Statistical Measures: Populations and Samples, Measures of Location, Measures of Dispersion, Measures of Shape, Measures of Association, Statistical Thinking in Business Decisions, Details of Data Modeling.

UNIT III: PREDICTIVE ANALYTICS (09 Periods)

Predictive Modeling and Analysis: Logic-Driven Modeling, Data-Driven Modeling, Analyzing Uncertainty and Model Assumptions, Model Analysis Using Risk Solver Platform

Regression Analysis: Simple Linear Regression, Residual analysis and regression assumptions, multiple linear regression, Building good regression models, Regression with categorical independent variables, Regression model with nonlinear Terms

UNIT IV: PRESCRIPTIVE ANALYTICS (08 Periods)

Linear Optimization: Building Linear Optimization Models, Implementing Linear Optimization Models on Spreadsheets, Solving Linear Optimization Models, Graphical Interpretation of Linear Optimization, Using Optimization Models for Prediction and Insight.

Applications of Linear Optimization: Types of Constraints in Optimization Models, Process Selection Models, Blending Models, Portfolio Investment Models, Transportation Models, Multiperiod Production Planning Models, Models with Bounded Variables, A Production / Marketing Allocation Model.

UNIT V: NONLINEAR, NON-SMOOTH OPTIMIZATION AND MAKING DECISIONS (08 Periods)

Nonlinear And Non-Smooth Optimization: Modeling and Solving Nonlinear Optimization Problems, Quadratic Optimization, Evolutionary Solver for Non-Smooth Optimization

Decision Analysis: Making Decisions with Uncertain Information, Decision Trees, The Value of Information, Utility and Decision Making, Case Study

Total Periods: 45

TEXT BOOK:

1. James R. Evans, *Business Analytics*, Pearson, 2016.

REFERENCE BOOKS:

1. R. N. Prasad, Seema Acharya, *Fundamentals of Business Analytics*, Wiley, 2014.

2. Evan Stubbs, *Delivering Business Analytics: Practical Guidelines for Best Practice*, Wiley, 2013.

IV B. Tech. – I Semester

(16BT71202) **MOBILE APPLICATION DEVELOPMENT**

(Common to IT and CSSE)
(Program Elective – 3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Java Programming and Web Technologies.

COURSE DESCRIPTION: Mobile platforms; Mobile User Interface and tools; Introduction to Android; Activities; Views; Menus; Database Storage; SMS; e-mail; Displaying Maps; Building a Location Tracker Web Services Using HTTP; Sockets Programming; Communication between a Service and an Activity; Introduction to iOS.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Mobile platforms and Mobile User Interface
- Android Activities and Intents
- Messaging, Networking, Location based Services, Android Services
- Basics of iOS

CO2. Analyze the context of complex problems and identify user interface design requirements.
CO3. Design and develop solutions for real world problems with android mobile applications.
CO4. Demonstrate problem solving skills to create applications for mobile devices.
CO5. Apply Android studio and iOS tools to develop mobile applications.
CO6. Create mobile applications as per societal needs.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION AND MOBILE USER INTERFACE DESIGN (08 Periods)

Mobile web presence, Mobile applications, Marketing, App as a mobile web app; User interface design - Effective use of screen real estate, Mobile application users, Mobile information design, Mobile platforms, Tools of mobile interface design.

Android versions, Features and architecture, required tools, Android application launching.

UNIT II: ACTIVITIES, INTENTS AND ANDROID USER INTERFACE (09 Periods)

Activities, Linking activities using intents, Displaying notifications, Components of a screen, Adapting to display orientation, Managing changes to screen orientation, Utilizing the action bar, Listening for UI notifications.

UNIT III: ADVANCED USER INTERFACE AND DATA PERSISTENCE (10 Periods)

Basic views, Picker views, List view, Image view, Menus with views, Web view, Saving and loading user preferences, Persisting data to files, Creating and using databases.

UNIT IV: MESSAGING, LOCATION-BASED SERVICES, AND NETWORKING (09 Periods)

SMS messaging, Sending e-mail, Displaying maps, Getting location data, Monitoring a location, Consuming web services using HTTP.

UNIT V: ANDROID SERVICES AND IOS (09 Periods)

Services, Communication between a service and an activity, Binding activities to services, Threading. iOS tools, iOS project, Debugging iOS apps, Objective-C basics, Hello world app, Building the derby app in iOS.

Total Periods: 45

TEXT BOOKS:

1. J. F. DiMarzio, *Beginning Android Programming with Android Studio,* Wiley India, 4th Edition, 2017.
2. Jeff McWherter and Scott Gowell, *Professional Mobile Application Development,* Wiley India, 2012.

REFERENCE BOOKS:

1. Neils Smyth, *Android Stduio Development Essentials,* Creative Space Independent publishing platform, 7th Edition 2016.
2. Paul Deital and Harvey Deital, *Android How to Program,* Detial associates publishers, 2013.

IV B. Tech. - I Semester

(16BT60502) SOFT COMPUTING

(Common to CSE and IT)
(Program Elective – 3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —

COURSE DESCRIPTION:
Concepts on Soft Computing Techniques; Artificial Neural Networks; Supervised Learning; Unsupervised Learning; Fuzzy logic; Genetic Algorithms.

COURSE OUTCOMES:
On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge in
- Artificial Neural Networks
- Supervised Learning Networks
- Unsupervised Learning Networks
- Fuzzy sets, relations and measures
- Genetic Operators

CO2. Analyze neural network architectures, Fuzzy systems and Genetic algorithms.
CO3. Design soft computing solutions for real life computational problems.
CO4. Use soft computing techniques to solve complex computational problems.
CO5. Create algorithms using soft computing techniques.
CO6. Apply contextual knowledge to solve problems related to societal issues like Business Intelligence, Forecasting.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION TO SOFT COMPUTING & ARTIFICIAL NEURAL NETWORKS (08 Periods)

Soft Computing: Neural networks, Application scope of neural networks, Hybrid systems, Soft computing, Applications of soft computing.
Artificial Neural Networks: Fundamentals, Evolution, Basic Models, Terminologies, Hebb network.

UNIT II: SUPERVISED LEARNING NETWORKS (10 Periods)

Perceptron Networks: Theory, Perceptron learning rule, Architecture, Flowchart for training process, Perceptron training algorithm for single and multiple output classes, Perceptron network testing algorithm.
Back-Propagation Networks: Theory, Architecture, Flow chart for training process, Training algorithm, Learning factors of back-propagation networks, Testing algorithm for back-propagation networks.

UNIT III: UNSUPERVISED LEARNING NETWORKS (09 Periods)

Unsupervised Learning Networks: Fixed weight competitive nets, Kohonen self-organizing feature maps, Learning vector quantization, Counter-propagation networks, Adaptive response theory network.

UNIT IV: FUZZY LOGIC (10 Periods)

Classical Sets and Fuzzy Sets: Classical sets- Operations, Properties, Function mapping; Fuzzy sets- Operations, Properties.
Classical Relations and Fuzzy Relations: Cartesian product of relation, Classical relations, Fuzzy relations, Tolerance and equivalence relations, Non-interactive fuzzy sets.

UNIT V: FUZZY SYSTEMS AND GENETIC ALGORITHMS (08 Periods)

Fuzzy Arithmetic and Fuzzy Measures: Fuzzy arithmetic, Extension principle, Fuzzy measures, Measures of fuzziness.
Genetic Algorithms: Genetic operators, Working principle, Fitness function, reproduction.

Total Periods: 45

TEXT BOOK:
1. S. N. Sivanandan and S. N. Deepa, *Principles of Soft Computing*, Wiley India, 2nd Edition, 2011.

REFERENCE BOOKS:

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun and Eiji Mizutani, *Neuro-Fuzzy and Soft Computing,* Prentice-Hall India, 2003.

2. S. Rajasekaran and G. A. Vijayalakshmi Pai, *Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and Applications, PHI* Learning Private Ltd, 2011.

IV B. Tech. – I Semester

(16BT60501) **SOFTWARE TESTING**

(Common to IT and CSSE)
(Program Elective – 3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Software Engineering.

COURSE DESCRIPTION:

Software Testing Basics: Goals, Defects, Terminology, Methodology, STLC in SDLC, Verification & Validation; Software Testing Techniques: White box testing, Black Box Testing, Regression testing; Test Management: Test Planning, Design & Specifications; Test Automation: Tool selection & Guidelines.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on
- Software Testing Life Cycle.
- Testing Techniques.
- Test Management & Metrics.
- Regression Testing
- Test Automation

CO2. Analyze testing circumstances and their resultants in software development.

CO3. Design and develop the appropriate test cases in accordance to the software development model.

CO4. Use problem solving skills to control and monitor the testing process

CO5. Apply testing tools for testing the software quality.

CO6. Apply contextual knowledge to perform testing on software related to societal applications

DETAILED SYLLABUS:

UNIT I: INTRODUCTION TO SOFTWARE TESTING (09 Periods)

Evolution of Software Testing, Software Testing—Myths and Facts, Goals of Software Testing, Psychology for Software Testing, Software Testing Definitions, Model for Software Testing, Effective Software Testing vs. Exhaustive Software Testing. Effective Testing is Hard, Software Testing as a Process.

Terminology & Methodology: Software Testing Terminology, Software Testing Life Cycle (STLC), Software Testing Methodology.

UNIT II: WHITE BOX TESTING (09 Periods)

Need of White-Box Testing, Logic Coverage Criteria, Basis Path Testing, Graph Matrices, Loop Testing, Data Flow Testing, Mutation Testing.

UNIT III: BLACK BOX TESTING (08 Periods)

Boundary Value Analysis (BVA), Equivalence Class Testing, State Table-Based Testing, Decision Table-Based Testing, Cause-Effect Graphing Based Testing, Error Guessing.

UNIT IV: SOFTWARE TEST MANAGEMENT & METRICS (10 Periods)

Test Management: Test Organization, Structure of Testing Group, Test Planning, Detailed Test Design, Test Specifications.

Software Metrics: Definition of Software Metrics, Classification of Software Metrics, Size Metrics.

UNIT V: REGRESSION AND AUTOMATION (09 Periods)

Regression Testing: Progressive vs. Regressive Testing, Regression Testing Produces Quality Software, Regression Testability, Objectives of Regression Testing, Regression Testing Types, Defining Regression Test Problem, Regression Testing Techniques.

Automation and Testing Tools: Need for Automation, Categorization of Testing Tools, Selection of Testing Tools, Costs Incurred in Testing Tools, Guidelines for Automated Testing, Overview of Some Commercial Testing Tools.

Total Periods: 45

TEXT BOOK

1. Naresh Chauhan, *Software Testing: Principles and Practices,* Oxford University Press, 2nd Edition, 2016.

REFERENCE BOOKS:

1. Boris Beizer, *Software Testing Techniques*, Dream Tech Press, 2nd Edition, 2004.

2. Dr. K. V. K. K. Prasad, *Software Testing Tools*, Dreamtech, 2004.

IV B. Tech. – I Semester

(16BT71210) HIGH PERFORMANCE COMPUTING

(Common to IT and CSSE)

(Program Elective - 4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Computer Organization.

COURSE DESCRIPTION: Cache-based Microprocessor Architecture; Memory Hierarchies; Multithreaded Processors; Common Sense Optimizations; The Role of Compilers; Data Access Optimization; Shared-memory Computers; Parallel Scalability; Introduction to OpenMP; Parallel Jacobi Algorithm; Introduction to MPI; MPI Performance Tools; MPI Parallelization of Jacobi Solver.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Modern Processors and code Optimization.
- Parallel computing paradigms.

CO2. Analyze computation problems and identify the suitable parallel processing approaches to achieve optimum computation.

CO3. Design Parallel processing algorithms for achieving high performance computing.

CO4. Solve shared memory problems using Parallel Programming.

CO5. Use OpenMP and MPI tools in Parallel Programming.

DETAILED SYLLABUS:

UNIT I: MODERN PROCESSORS (08 Periods)

Stored-program computer architecture, General-purpose cache-based microprocessor architecture, Memory hierarchies, Multicore processors, Multi-threaded processors, Vector processors.

UNIT II: BASIC OPTIMIZATION TECHNIQUES FOR SERIAL CODE (10 Periods)

Scalar profiling, Common sense optimizations, Simple measures, Large impact, The role of compilers, C++ optimizations, Data access optimization-balance analysis and light speed estimates, Storage order.

Case study: The Jacobi algorithm and Dense matrix transpose.

UNIT III: PARALLEL COMPUTERS (09 Periods)

Taxonomy of parallel computing paradigms, Shared-memory computers, Distributed-memory computers, Hierarchical systems, Networks. Basics of parallelization, Data Parallelism, Function parallelism, Parallel scalability.

UNIT IV: PARALLEL PROGRAMMING WITH OpenMP (09 Periods)

Introduction to OpenMP – Parallel execution, Data scoping, OpenMP work sharing for loops, Synchronization, Reductions, Loop scheduling and tasking.

Case study: OpenMP-parallel Jacobi algorithm, Efficient OpenMP programming-profiling OpenMP programs, Performance pitfalls.

Case study: Parallel sparse matrix-vector multiply.

UNIT V: DISTRIBUTED-MEMORY PARALLEL PROGRAMMING WITH MPI (09 Periods)

Message passing, Introduction to MPI, Examples - MPI parallelization of Jacobi solver; Efficient MPI Programming - MPI performance tools, communication parameters, Synchronization, Serialization, Contention, Reducing communication overheads, Understanding intranode point-to-point communication.

Total Periods: 45

TEXT BOOK:

1. Georg Hager and Gerhard Wellein, *Introduction to High Performance Computing for Scientists and Engineers*, Chapman & Hall / CRC Computational Science Series, 2012.

REFERNCE BOOKS:

1. Charles Severance and Kevin Dowd, *High Performance Computing*, O'Reilly Media, 2nd Edition, 1998.

2. Kai Hwang and Faye Alaye Briggs, *Computer Architecture and Parallel Processing*, McGraw Hill, 1984.

IV B. Tech. - I Semester
(16BT71508) INTERNET OF THINGS
(Common to CSE, IT and CSSE)
(Program Elective – 4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Computer Networks

COURSE DESCRIPTION:
Internet of Things Components; Communication models; Prototyping; Hardware; Design models; Analytics for IoT.

COURSE OUTCOMES:
On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on Protocols, functional blocks and communication models of Internet of things.
CO2. Identify appropriate sensors and communication modes used in IoT based systems.
CO3. Design appropriate solutions for IoT applications using Raspberry Pi and Arduino kits.
CO4. Appropriately synthesize the models and applications for usage in Home automation and cities.
CO5. Apply evolutionary techniques to perform analytics on the data integrated from IoT based systems.
CO6. Use advances in IoT technology to design and develop applications.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION TO INTERNET OF THINGS (08 Periods)
Definition, Characteristics, Things, Protocols, Logical Design, Functional Blocks, Communication models, APIs, Enabling Technologies, Levels & Deployment templates.

UNIT II: DEVICES AND END POINTS (10 Periods)
IoT Devices-Examples-Raspberry PI interfaces, Arduino interfaces, Programming Raspberry PI with Python, Other IOT devices, Domain Specific IoTs.

UNIT III: SENSORS AND CONNECTIVITY (08 Periods)
Sensors-Types of Sensor Nodes; Internet Communications, IP Addresses, MAC Address, TCP & UDP ports, Application Layer Protocols.

UNIT IV: DESIGN METHODOLOGY AND CASE STUDIES (10 Periods)

Design Methodology:
Purpose and Requirements specifications, Process Specifications, Domain Model specifications, Information Model specifications, Service specification, Level Specifications, Functional View specifications, Operational View specifications, Device and Component integration, Application development.

Case Studies: Home Automation, Cities.

UNIT V: DATA ANALYTICS FOR IoT (09 Periods)
Analytics, Apache Hadoop, Hadoop MapReduce for Batch Data Analysis, Apache Oozie, Chef & Case studies.

Total Periods: 45

TEXT BOOK:
1. Arshdeep Bahga, Vijay Madisetti, *Internet of Things – A hands-on approach*, University Press, 2015.

REFERENCE BOOKS:
1. Adrian McEwen and Hakim Cassimally, *Designing the Internet of Things*, Wiley Publishing, 2013.
2. CharlesBell, *Beginning Sensor Networks with Arduino and Raspberry Pi*, Apress, 2013.
3. Marco Schwartz, *Internet of Things with the Arduino Yun,* Packt Publishing, 2014.

4. Matt Richardson, Shawn Wallace, *Getting Started with Raspberry Pi*, Maker Media, Inc, 2012.

IV B. Tech. -I Semester

(16BT71509) SECURE SOFTWARE ENGINEERING

(Program Elective – 4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Software Engineering

COURSE DESCRIPTION:

Security in software; Requirements engineering for secure software; Secure software architecture & design, secure coding & testing; and Governance & managing.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on security issues in:
- Requirements Engineering
- Architecture and Design
- Coding and Testing
- System Assembling

CO2. Analyze complex software projects to describe security risks and its mitigation techniques.

CO3. Design secure software system with minimal risks and attacks.

CO4. Use statistical methods to collect metrics for assessing and improving the security of a product, process, and project objectives.

CO5. Create software solutions for secure access and protection of data.

CO6. Apply ethical principles and methods for secure software system design.

DETAILED SYLLABUS:

UNIT I: SECURITY IN SOFTWARE (10 Periods)

The problem, Software assurance and software security, Threats to software security, Sources of software insecurity, the benefits of detecting software security defects early, managing secure software development, Defining properties of secure software.

Secure Software: Defining Properties of Secure Software, Core Properties of Secure Software, Influential Properties of Secure Software, Influencing the Security Properties of Software, The Defensive Perspective, The Attacker's Perspective.

UNIT II: REQUIREMENTS ENGINEERING (09 Periods)

Requirements Engineering For Secure Software: Misuse and abuse cases, the SQUARE process Model, SQUARE sample outputs, Requirements elicitation, Requirements prioritization.

UNIT III: SECURITY PRINCIPLES (09 Periods)

Secure Software Architecture and Design: Software security practices for architecture and design: Architectural risk analysis. Software security knowledge for architecture and design: Security principles, Security guidelines, and Attack patterns.

UNIT IV: SECURE CODING AND TESTING (08 Periods)

Considerations for Secure Coding and Testing: Code analysis, Coding practices, Software security testing, Security testing considerations throughout the SDLC.

UNIT V: GOVERNANCE AND MANAGEMENT (09 Periods)

Governance and Managing for More Secure Software: Governance and security, Adopting an enterprise software security framework, security extent, Security and project management, Maturity of Practice.

Total Periods: 45

TEXT BOOK:

1. Julia H. Allen, Sean Barnum, Robert J. Ellison, Gary McGraw, and Nancy R. Mead, *Software Security Engineering: A Guide for Project Managers,* Pearson Education (India), 2009.

REFERENCE BOOKS:

1. Gary McGraw, *Software Security: Building Security In*, Addison-Wesley, 2006.
2. Mark Dowd, John McDonald and Justin Schuh, *The Art of Software Security Assessment: Identifying and Preventing Software Vulnerabilities,* Addison-Wesley, 2006.

IV B. Tech. – I Semester
(16BT60503) WIRELESS NETWORKS
(Common to CSE, IT and CSSE)
(Program Elective – 4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Computer Networks

COURSE DESCRIPTION:

Generations of Wireless Networks; Voice and Data Processing; Wireless Network Topology; GSM; TDMA; CDMA; Wireless LANs; Wireless WANs; Wireless PAN;

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on
- Wireless Medium Access methods.
- Network Topology
- Wireless LAN, HIPERLAN
- GSM, CDMA, GPRS

CO2. Analyze the network topologies in Wireless Networks

CO3. Design solutions for network communications at physical and transport layers

CO4. Solve complex problems related to network communications and wireless networks

CO5. Apply GSM, CDMA, GPRS and Bluetooth to create Home Access Networks and wireless Personal Area Network.

CO6. Apply contextual knowledge to solve problems using societal applications like health care devices, Internet of Things.

DETAILED SYLLABUS:

UNIT I: OVERVIEW OF WIRELESS NETWORKS AND WIRELESS MEDIUM ACCESS ALTERNATIVES (09 Periods)

Overview of Wireless Networks: Different generations of wireless networks.

Wireless Medium Access Alternatives: Fixed assignment access for voice-oriented networks – Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), Code Division Multiple Access (CDMA); Random access for data-oriented networks – Access methods for wireless LANs; Integration of voice and data traffic.

UNIT II: NETWORK PLANNING AND WIRELESS NETWORK OPERATIONS (09 Periods)

Network Planning: Wireless network topologies – Infrastructure of network topology, Ad hoc network topology; Cellular topology, Cellular concept, Cellular hierarchy; Cell fundamentals.

Wireless Network Operations: Mobility management – Location management, Handoff management, Mobile IP; Security in wireless networks – Security requirements for wireless networks, Overview of network security, Identification schemes.

UNIT III:INTRODUCTION TO WIRELESS LANS AND IEEE 802.11 WIRELESS LANS(09 Periods)

Introduction to Wireless LANs: Historical overview of the LAN industry, Wireless home networking-Home Access Networks (HAN), Needs of HAN, HAN technologies.

IEEE 802.11 WLANs: IEEE 802.11 – Overview of IEEE 802.11, Reference architecture, Layered protocol architecture; The PHY Layer – FHSS, DSSS, DFIR, IEEE 802.11a, IEEE 802.11b; MAC sublayer – General MAC frame format; MAC management sublayer – Registration, Handoff, Security.

UNIT IV: GSM TECHNOLOGY, CDMA TECHNOLOGY AND MOBILE DATA NETWORKS (10 Periods)

GSM Technology: GSM – Reference architecture; Mechanisms to support a mobile environment – Registration, Call establishment, Handoff, Security.

CDMA Technology: CDMA – IS-95 CDMA forward channel, IS-95 CDMA reverse channel, Packet and frame formats in IS-95.

Mobile Data Networks: GPRS – Reference architecture in GPRS, Mobility support in GPRS, Protocol layers in GPRS; SMS – Overview of SMS Operation; Mobile application protocols – Wireless application protocol, i-Mode.

UNIT V: WIRELESS ATM, HIPERLAN AND WIRELESS PAN (08 Periods)

Wireless ATM and HIPERLAN: Wireless ATM – Reference model, Protocol entities, PHY and MAC layer alternatives, Mobility support; HIPERLAN – HIPERLAN-1, Requirements and architecture, PHY and MAC layers; HIPERLAN-2 – Architecture and reference model, PHY layer, DLC layer, Convergence layer, Security, Overall comparison with 802.11.

Wireless PAN: IEEE 802-15 WPAN, Home RF – Architecture; Bluetooth – Overall architecture, Protocol stack, Physical connection, Security. **Total Periods: 45**

TEXT BOOK:

1. Kaveh Pahlavan and Prashant Krishna Murthy, *Principles of Wireless Networks*, PHI Learning Pvt. Ltd., 2009.

REFERENCE BOOKS:

1. William Stallings, *Wireless Communications and Networks,* Pearson Education, 2nd Edition, 2012.

2. C. Sivaram Murthy and B.S. Manoj, *Ad-hoc Wireless Networks Architectures and Protocols,* Pearson Education, 2nd Edition, 2007.

IV B. Tech. I Semester

(16BT70432) **EMBEDDED SYSTEMS LAB**

(Common to EEE, ECE and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITE: A course on Embedded systems.

COURSE DESCRIPTION:

IDE for Embedded System Design using MSP430; Interfacing Switch & LED; Timers-WDT, Configuring, Programming; ADC-usage; Power down modes; DAC; PWM Generator; Networking – SPI, Wi-Fi.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge in designing complex energy efficient embedded systems.

CO2. Analyze usage of various on-chip resources like GPIO, Timers, Interrupts, ADC, DAC, Comparator, SPI.

CO3. Design embedded systems to suit market requirements.

CO4. Solve engineering problems by proposing potential solutions using industry choice advanced Microcontrollers.

CO5. Apply appropriate techniques, resources, and CCSV6 based IDE for modeling embedded systems with understanding of limitations.

CO6. Provide embedded system solutions for societal needs.

CO7. Work individually and in a group to develop embedded systems.

CO8. Communicate effectively in oral and written form in the field of embedded systems.

LIST OF EXCERSISES:

1. Introduction to MSP430 launch pad and Programming Environment.
2. Read input from switch and Automatic control/flash LED (software delay).
3. Interrupts programming example using GPIO.
4. Configure watchdog timer in watchdog & interval mode.
5. Configure timer block for signal generation (with given frequency).
6. Read Temperature of MSP430 with the help of ADC.
7. Test various Power Down modes in MSP430.
8. PWM Generator.
9. Use Comparator to compare the signal threshold level.
10. Speed Control of DC Motor
11. Master slave communication between MSPs using SPI.
12. Networking MSPs using Wi-Fi.

Tool Requirement:

Code Composer Studio Version 6, *MSP430 based launch pads*, Wi-Fi booster pack.

REFERENCE BOOKS:

1. John H Davies, *MSP430 Microcontrollers Basics,* Newnes Publishers, 1st Edition, 2008.
2. C P Ravikumar, *MSP430 Microcontrollers in Embedded System Projects,* Elite Publishing House , 1st Edition, 2012.

IV B. Tech. - I Semester

(16BT71531) SYSTEM MODELING AND SIMULATION LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on Programming in C Lab and System Modeling and Simulation

COURSE DESCRIPTION:

Hands on Experience on Generation of random numbers; Input Modeling; Queuing System; Simulation models.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate Knowledge to solve complex engineering problems using Modeling and simulation.

CO2. Analyze the problems to develop models for applications to meet requirements of the system.

CO3. Design and develop solutions through modeling for computer based systems.

CO4. Apply simulation methods to interpret data and provide valid conclusions for problems in systems engineering

CO5. Use modern engineering techniques in modeling systems to provide effective solutions for real world problems.

CO6**.** Apply appropriate ethics and follow principles to model systems incrementally.

List of Experiments:

1. A baker is trying to figure out how many dozens of bagels to bake each day. The probability distribution of the number of bagel customers is as follows:

Number of Customers/Day	8	10	12	14
Probability	0.35	0.30	0.25	0.10

   Customers order 1,2,3 or 4 dozen bagels according to the following probability distribution.

Number of Dozen Ordered /Customer	1	2	3	4
Probability	0.4	0.3	0.2	0.1

   Bagels sell for $8.40 per dozen. They cost $5.80 per dozen to make. All Bagels not sold at the end of the day are sold at half price to a local grocery store. Based on 5 days of simulation, how many dozen bagels should be baked each day?

2. Develop a function for generation of pseudo-random numbers between 0 and 1.
3. Develop functions for generating random variates for continuous and discrete probability distributions using inverse transform technique and acceptance-rejection technique.
4. A self service car wash has 4 washing stalls. When in a stall, a customer may choose from among three options: 1. Rinse only 2. Wash and Rinse 3. Wash, Rinse and Wax. Each option has a fixed time to complete: Rinse only 3 minutes; wash and rinse 7 minutes; wash, rinse and wax 12 minutes. The owners have observed that 20% of customers choose rinse only; 70% wash and rinse; and 10% wash, rinse and wax. There are no scheduled appointments; the customers arrive at a rate of about 34 cars per hour. There is room for only 3 cars to wait in the parking lot, so, currently many customers are lost. The owners want to know how much more business they will do if they add another stall. Adding a stall will take away one space in the parking lot.

   Develop a queuing model of the system. Estimate the rate at which customers will be lost in the current and proposed system. Carefully state any assumptions or approximations you make.

5. Records pertaining to the monthly number of job-related injuries at an underground coal mine were being studied by a federal agency. The values for the past 100 months were as follows:

Injuries per month	Frequency of occurrence
0	35
1	40
2	13
3	6
4	4
5	1
6	1

a. Apply chi-square test to these data to test the hypothesis that the underlying distribution is poisson. Use the level of significance á = 0.05.

b. Apply chi-square test to these data to test the hypothesis that the distribution is poisson with mean 1.0. Again let á = 0.05.

c. What are the differences between parts (a) and (b), and when might each case arise.

6. Simulate a Single Server Queuing System.

7. Simulate Two-Server Queuing System.

8. Simulate and control a conveyor belt system

9. Perform Two-sample Kolmogorov-Smirnov test on sample data with atleast hundred entries.

10. Design and development of a simulation model for determining the parameters of periodic Review System.

REFERENCE BOOKS:

1. Jerry Banks, John S. Carson II, Barry L.Nelson and David M.Nicol, *Discrete-Event System Simulation*, Pearson India, 5th Edition, 2013.

2. Jared P. Lander, *R for Everyone,* Pearson India, 2014.

3. Narsingh Deo, *System Simulation with Digital Computer,* Prentice Hall India, 2009.

4. Averill M. Law, *Simulation Modeling and Analysis,* McGraw Hill Education (India) Private ltd, 4th Edition, 2007.

IV B. Tech. – I Semester

(16BT71532) COMPREHENSIVE ASSESSMENT

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
	100	100	-	-	-	2

PRE-REQUISITES: All the courses of the program.

COURSE DESCRIPTION: Assessment of student learning outcomes in the courses of the program.

COURSE OUTCOMES:

Comprehensive Assessment enables a successful student to demonstrate:

CO1. Knowledge on the courses of the program.

CO2. Analytical ability in the courses of the program.

CO3. Design skills in the courses of the program.

CO4. Ability to investigate and solve complex engineering problems in the courses of the program.

CO5. Ability to apply tools and techniques to complex engineering activities with an understanding of limitations in the courses of the program.

CO6. Ability to provide solutions as per societal needs with consideration to health, safety, legal and cultural issues in the courses of the program.

CO7. Understanding of the impact of the professional engineering solutions in environmental context and need for sustainable development in the courses of the program.

CO8. Ability to apply ethics and norms of the engineering practice in the courses of the program.

CO9. Ability to function effectively as an individual in the courses of the program.

CO10. Ability to present views cogently and precisely in the courses of the program.

CO11. Ability to engage in life-long leaning in the courses of the program.

IV B. Tech. – II Semester

(16BT81531) **PROJECT WORK**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
100	100	200	-	-	-	12

PRE-REQUISITES: All the courses of the program.

COURSE DESCRIPTION:
Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Preparation of thesis and presentation.

COURSE OUTCOMES:

Completion of the project work enables a successful student to demonstrate:

CO1. Knowledge on the project topic.

CO2. Analytical ability exercised in the project work.

CO3. Design skills applied on the project topic.

CO4. Ability to investigate and solve complex engineering problems faced during the project work.

CO5. Ability to apply tools and techniques to complex engineering activities with an understanding of limitations in the project work.

CO6. Ability to provide solutions as per societal needs with consideration to health, safety, legal and cultural issues considered in the project work.

CO7. Understanding of the impact of the professional engineering solutions in environmental context and need for sustainable development experienced during the project work.

CO8. Ability to apply ethics and norms of the engineering practice as applied in the project work.

CO9. Ability to function effectively as an individual as experienced during the project work.

CO10. Ability to present views cogently and precisely on the project work.

CO11. Project management skills as applied in the project work.

CO12. Ability to engage in life-long leaning as experience during the project work.

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(Autonomous)

COURSE STRUCTURE

ELECTRONICS AND COMMUNICATION ENGINEERING

I B.Tech. (I Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits (C)	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
I Year - I Semester										
1.	16BT1BS02	Engineering Physics	3	1	-	4	3	30	70	100
2.	16BT1BS03	Matrices and Numerical Methods	3	1	-	4	3	30	70	100
3.	16BT1BS04	Multi-variable calculus and Differential equations	3	1	-	4	3	30	70	100
4.	16BT10241	Network Analysis	4	1	-	5	4	30	70	100
5.	16BT10501	Programming in C	3	1	-	4	3	30	70	100
6.	16BT1BS32	Engineering Physics Lab	-	-	3	3	2	50	50	100
7.	16BT10232	Electrical and Electronics Workshop Practice	-	-	3	3	2	50	50	100
8.	16BT10251	Network Analysis Lab	-	-	3	3	2	50	50	100
9.	16BT10531	Programming in C Lab	-	-	3	3	2	50	50	100
Total			**16**	**5**	**12**	**33**	**24**	**350**	**550**	**900**

I B.Tech. (II Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits (C)	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
I Year - II Semester										
1.	16BT1HS01	Technical English	3	1	-	4	3	30	70	100
2.	16BT1BS01	Engineering Chemistry	3	1	-	4	3	30	70	100
3.	16BT2BS01	Transformation Techniques and Partial Differential Equations	3	1	-	4	3	30	70	100
4.	16BT20401	Electronic Devices and Circuits	3	1	-	4	3	30	70	100
5.	16BT20541	Foundations of Data Structures	3	1	-	4	3	30	70	100
6.	16BT1HS31	English Language Lab	-	-	3	3	2	50	50	100
7.	16BT1BS31	Engineering Chemistry Lab	-	-	3	3	2	50	50	100
8.	16BT10331	Computer Aided Engineering Drawing	-	1	6	7	3	50	50	100
9.	16BT20551	Foundations of Data structures Lab	-	-	3	3	2	50	50	100
Total			**15**	**6**	**15**	**36**	**24**	**350**	**550**	**900**

II B.Tech. (I Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits (C)	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
II Year - I Semester										
1.	16BT3HS01	Environmental Studies	3	-	-	3	3	30	70	100
2.	16BT3BS02	Special Functions and Complex Analysis	3	1	-	4	3	30	70	100
3.	16BT30401	Electronic Circuit Analysis and Design	3	1	-	4	3	30	70	100
4.	16BT30402	Signals and Systems	3	1	-	4	3	30	70	100
5.	16BT30403	Switching Theory and Logic Design	3	1	-	4	3	30	70	100
6.	16BT30241	Electrical Technology	3	1	-	4	3	30	70	100
7.	16BT30251	Electrical Technology Lab	-	-	3	3	2	50	50	100
8.	16BT30431	Basic Electronics and Digital Design Lab	-	-	3	3	2	50	50	100
9.	16BT30432	Signal and Systems Lab	-	-	3	3	2	50	50	100
Total			**18**	**5**	**9**	**32**	**24**	**330**	**570**	**900**

II B.Tech. (II Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits (C)	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
II Year - II Semester										
1.	16BT40401	Analog Communications	3	1	-	4	3	30	70	100
2.	16BT40402	Digital IC Applications	3	1	-	4	3	30	70	100
3.	16BT40403	Electromagnetic Theory and Transmission Lines	3	1	-	4	3	30	70	100
4.	16BT40404	Linear IC Applications	3	1	-	4	3	30	70	100
5.	16BT40405	Probability and Stochastic Process	3	1	-	4	3	30	70	100
6.	16BT40406	Pulse and Digital Circuits	3	1	-	4	3	30	70	100
7.	16BT40431	Analog Communications Lab	-	-	3	3	2	50	50	100
8.	16BT40432	Electronic Circuit Analysis and Design Lab	-	-	3	3	2	50	50	100
9.	16BT40433	Pulse and Digital Circuits Lab	-	-	3	3	2	50	50	100
Total			**18**	**6**	**9**	**33**	**24**	**330**	**570**	**900**

III B.Tech. (I Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits (C)	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
III Year - I Semester										
1.	16BT3HS02	Managerial Economics and Principles of Accountancy	3	1	-	4	3	30	70	100
2.	16BT50201	Control Systems	3	1	-	4	3	30	70	100
3.	16BT50401	Digital Communications	3	1	-	4	3	30	70	100
4.	16BT50402	Microprocessors and Microcontrollers	3	1	-	4	3	30	70	100
5.	16BT50403	VLSI Design	3	1	-	4	3	30	70	100
		Interdisciplinary Elective-1								
6.	16BT50404	Electronic Measurements and Instrumentation	3	1	-	4	3	30	70	100
	16BT50501	Computer Networks								
	16BT30501	Computer Organization								
	16BT51241	Object Oriented Programming								
7.	16BT50431	Linear and Digital IC Applications Lab	-	-	3	3	2	50	50	100
8.	16BT50432	Microprocessors and Microcontrollers Lab	-	-	3	3	2	50	50	100
9.	16BT4HS31	Soft Skills Lab	-	-	3	3	2	50	50	100
Total			**18**	**6**	**9**	**33**	**24**	**330**	**570**	**900**

III B.Tech. (II Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
III Year - II Semester										
1.	16BT5HS01	Management Science	3	1	-	4	3	30	70	100
2.	16BT60401	Antennas and Waveguides	3	1	-	4	3	30	70	100
3.	16BT60402	Digital Signal Processing	3	1	-	4	3	30	70	100
		Interdisciplinary Elective-2								
4.	16BT40502	Database Management Systems	3	1	-	4	3	30	70	100
	16BT71205	Cryptography and Network Security								
	16BT31501	Operating Systems								
	16BT61241	Wireless Sensor Networks								
		Program Elective – 1								
5.	16BT60403	Analog IC Design	3	1	-	4	3	30	70	100
	16BT60404	Image Processing								
	16BT60405	Radar Engineering								
	16BT60406	Telecommunication Switching Systems								
		Program Elective - 2								
6.	16BT60407	Digital CMOS IC Design	3	1	-	4	3	30	70	100
	16BT60408	Information Theory and Coding								
	16BT60409	Light Wave Communications								
	16BT60410	Nanoelectronics								
7.	16BT60431	Digital Communications Lab	-	-	3	3	2	50	50	100
8.	16BT60432	Digital Signal Processing Lab	-	-	3	3	2	50	50	100
9.	16BT60433	Seminar	-	-	-	-	2	-	100	100
10.	16BT6MOOC	MOOC	-	-	-	-	-	-	-	-
Total			**18**	**6**	**6**	**30**	**24**	**280**	**620**	**900**

IV B.Tech. (I Semester)

<table>
<tr><th rowspan="3">S. No.</th><th rowspan="3">Course Code</th><th rowspan="3">Course Title</th><th colspan="4" rowspan="2">Contact Periods/ Week</th><th rowspan="3">Credits (C)</th><th colspan="3">Scheme of Examination</th></tr>
<tr><th colspan="3">Max. Marks</th></tr>
<tr><th>L</th><th>T</th><th>P</th><th>Total</th><th>Internal Marks</th><th>External Marks</th><th>Total Marks</th></tr>
<tr><td colspan="11">IV Year - I Semester</td></tr>
<tr><td>1.</td><td>16BT70401</td><td>Cellular and Mobile Communications</td><td>3</td><td>1</td><td>-</td><td>4</td><td>3</td><td>30</td><td>70</td><td>100</td></tr>
<tr><td>2.</td><td>16BT70402</td><td>Embedded Systems</td><td>3</td><td>1</td><td>-</td><td>4</td><td>3</td><td>30</td><td>70</td><td>100</td></tr>
<tr><td>3.</td><td>16BT70403</td><td>Microwave Engineering</td><td>3</td><td>1</td><td>-</td><td>4</td><td>3</td><td>30</td><td>70</td><td>100</td></tr>
<tr><td></td><td></td><td>Program Elective – 3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="4">4.</td><td>16BT70404</td><td>Advanced Digital Signal Processing</td><td rowspan="4">3</td><td rowspan="4">1</td><td rowspan="4">-</td><td rowspan="4">4</td><td rowspan="4">3</td><td rowspan="4">30</td><td rowspan="4">70</td><td rowspan="4">100</td></tr>
<tr><td>16BT70405</td><td>Mixed Signal Design</td></tr>
<tr><td>16BT70406</td><td>Satellite Communications</td></tr>
<tr><td>16BT70407</td><td>Wireless Communication and Networks</td></tr>
<tr><td></td><td></td><td>Program Elective – 4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="4">5.</td><td>16BT70408</td><td>Low Power CMOS VLSI Design</td><td rowspan="4">3</td><td rowspan="4">1</td><td rowspan="4">-</td><td rowspan="4">4</td><td rowspan="4">3</td><td rowspan="4">30</td><td rowspan="4">70</td><td rowspan="4">100</td></tr>
<tr><td>16BT70409</td><td>RF Engineering</td></tr>
<tr><td>16BT70410</td><td>Speech Processing</td></tr>
<tr><td>16BT70411</td><td>Spread Spectrum Communication</td></tr>
<tr><td>6.</td><td></td><td>Open Elective</td><td>3</td><td>1</td><td>-</td><td>4</td><td>3</td><td>30</td><td>70</td><td>100</td></tr>
<tr><td>7.</td><td>16BT70431</td><td>Antennas and Microwave Engineering Lab</td><td>-</td><td>-</td><td>3</td><td>3</td><td>2</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td>8.</td><td>16BT70432</td><td>Embedded Systems Lab</td><td>-</td><td>-</td><td>3</td><td>3</td><td>2</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td>9.</td><td>16BT70433</td><td>Comprehensive Assessment</td><td>-</td><td>-</td><td>-</td><td>-</td><td>2</td><td>-</td><td>100</td><td>100</td></tr>
<tr><td colspan="3">Total</td><td>18</td><td>6</td><td>6</td><td>30</td><td>24</td><td>280</td><td>620</td><td>900</td></tr>
</table>

Sl. No.	Course Code	Open Elective Course Title
1	16BT6HS01	Banking and Insurance
2	16BT6HS02	Business Communication and Career Skills
3	16BT6HS03	Cost Accounting and Financial Management
4	16BT6HS04	Entrepreneurship for Micro, Small and Medium Enterprises
5	16BT6HS05	French Language
6	16BT6HS06	German Language
7	16BT6HS07	Indian Constitution
8	16BT6HS08	Indian Economy
9	16BT6HS09	Indian Heritage and Culture
10	16BT6HS10	Indian History
11	16BT6HS11	Personality Development
12	16BT6HS12	Philosophy of Education
13	16BT6HS13	Public Administration
14	16BT60112	Building Maintenance and Repair
15	16BT60113	Contract Laws and Regulations
16	16BT60114	Disaster Mitigation and Management
17	16BT60115	Environmental Pollution and Control
18	16BT60116	Planning for Sustainable Development
19	16BT60117	Professional Ethics
20	16BT60118	Rural Technology
21	16BT60308	Global Strategy and Technology
22	16BT60309	Intellectual Property Rights and Management
23	16BT60310	Managing Innovation and Entrepreneurship
24	16BT60311	Materials Science
25	16BT70412	Green Technologies
26	16BT70413	Introduction to Nanoscience and Technology
27	16BT60505	Engineering System Analysis and Design
28	16BT71011	Micro-Electro-Mechanical Systems
29	16BT61205	Cyber Security and Laws
30	16BT61505	Bio-informatics

IV B.Tech. (II Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits	Scheme of Examination		
							(C)	Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
IV Year - II Semester										
1.	16BT80431	Project Work *	-	-	-	-	12	100	100	200
		Total	**-**	**-**	**-**	**-**	**12**	**100**	**100**	**200**

*Full-time project work

I B. Tech. - I Semester

(16BT1BS02) ENGINEERING PHYSICS

(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate / senior secondary Physics

COURSE DESCRIPTION:

Lasers; optical fibers; principles of quantum mechanics; band theory of solids; semiconductors; dielectric properties of materials; acoustics of buildings; superconductors; crystallography and nanomaterials.

COURSE OUTCOMES:

After completion of the course, a successful student will be able to:

CO1: Acquire basic knowledge of lasers, optical fibers, quantum mechanics, dielectrics, semiconductors, and superconductors, acoustic of buildings, crystallography and nanomaterials.

CO2: Analyze the construction and working of various laser systems, semiconductor devices, various types of optical fibers and its communication system and nano materials properties.

CO3: Gain skills in designing lasers, optical fiber cable, semiconductor devices, acoustically good halls and nanomaterials.

CO4: Develop problem solving skills in engineering context.

CO5: Use relevant techniques for assessing ball milling, pulsed laser deposition, p-n junction and Lasers.

DETAILED SYLLABUS:

UNIT I - LASERS AND FIBER OPTICS (11periods)

Lasers: Introduction, characteristics of lasers, spontaneous and stimulated emission of radiation, Einstein's coefficients - condition for amplification, population inversion, Nd:YAG laser, Helium-Neon laser, semiconductor laser and applications of lasers.

Fiber optics: Introduction, principle of optical fiber, acceptance angle, acceptance cone and numerical aperture, classification of optical fibers, optical fiber communication system and applications of optical fibers.

UNIT II – PRINCIPLES OF QUANTUM MECHANICS AND BAND THEORY OF SOLIDS (07 p*eriods*)

Principles of Quantum Mechanics: Introduction, de-Broglie's hypothesis, Schrödinger's one dimensional wave equation (time independent), significance of wave function, particle in a one dimensional potential box, Fermi-Dirac distribution and effect of temperature (qualitative treatment).

Band Theory of Solids: Electron in a periodic potential, Kronig-Penney model (qualitative treatment), origin of energy bands formation in solids, distinction between conductors, semiconductors and insulators based on band theory.

UNIT III – SEMICONDUCTORS AND DIELECTRIC PROPERTIES OF MATERIALS (13 periods)

Semiconductors: Introduction, types of semiconductors, intrinsic carrier concentration, electrical conductivity in semiconductors, drift and diffusion currents, Einstein's relation, Hall effect and its applications, direct and indirect band gap semiconductors, p-n junction, energy band diagram of p-n diode, LED, photo diode and Solar cell.

Dielectric Properties of Materials: Introduction, dielectric constant, electronic, ionic and orientation polarizations (qualitative treatment), local field, frequency dependence of polarizability (qualitative treatment), ferroelectricity.

UNIT IV – ACOUSTICS OF BUILDINGS AND SUPERCONDUCTIVITY (07 periods)

Acoustics of Buildings: Introduction, basic requirement of acoustically good hall, reverberation and time of reverberation, Sabine's formula for reverberation time (qualitative treatment), absorption coefficient of sound and its measurement, factors affecting the architectural acoustics and their remedies.

Superconductivity: Introduction, General properties - Meissner effect, penetration depth, Type-I and Type-II superconductors, flux quantization, Josephson effects, BCS theory (qualitative treatment), applications of superconductors.

UNIT V – CRYSTALLOGRAPHY AND NANOMATERIALS (07 p*eriods*)

Crystallography: Introduction, crystal planes, crystal directions and Miller indices, separation between successive (hkl) planes, X-ray diffraction by crystal planes, Bragg's law- powder method.

Nanomaterials: Introduction, principles of nanomaterials, properties of nanomaterials, synthesis of nanomaterials by ball milling and pulsed laser deposition and applications of nanomaterials.

Total Periods: 45

TEXT BOOK:

1. P. K. Palaniswamy, ***Engineering Physics***, Scitech Publications India Private Limited, 2nd Edition, 2009

REFERENCE BOOKS:

1. Dr. S. Mani Naidu, ***Engineering Physics***, Pearson Education, 1st Edition, 2013.

2. M.N. Avadhanulu, P.G.Kshirsagar, ***A textbook of Engineering Physics***, S.Chand & Company Ltd. Revised edition 2014.
3. K. Thyagarajan***, Engineering Physics-I***, McGraw-Hill Education (India) Pvt. Ltd. 2015.

I B. Tech. – I Semester

(16BT1BS03) MATRICES AND NUMERICAL METHODS

(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate /Senior secondary mathematics
COURSE DESCRIPTION: Fundamentals of matrix theory; numerical solutions of equations, curve fitting; interpolation; numerical differentiation and integration; numerical solutions of ordinary differential equations.
COURSE OUTCOMES: After completion of the course a successful student is able to

CO1: Acquire basic **knowledge** in
- (a) Finding the rank of matrices and analyzing them.
- (b) Solving algebraic and transcendental equations by various numerical methods.
- (c) Fitting of various types of curves to the experimental data.
- (d) Estimating the missing data through interpolation methods.
- (e) Identification of errors in the experimental data
- (f) Finding the values of derivatives and integrals through various numerical methods.
- (g) Solving differential equations numerically when analytical methods fail.

CO2: Develop skills in **analyzing** the
- (a) methods of interpolating a given data
- (b) properties of interpolating polynomials and derive conclusions
- (c) properties of curves of best fit to the given data
- (d) algebraic and transcendental equations through their solutions
- (e) properties of functions through numerical differentiation and integration
- (f) properties of numerical solutions of differential equations

CO3: Develop skills in **designing** mathematical models for
- (a) Fitting geometrical curves to the given data
- (b) Solving differential equations
- (c) Constructing polynomials to the given data and drawing inferences.

CO4: Develop numerical skills in **solving the problems** involving
- (a) Systems of linear equations
- (b) Fitting of polynomials and different types of equations to the experimental data
- (c) Derivatives and integrals
- (d) Ordinary differential equations

CO5: Use relevant numerical **techniques** for
- (a) Diagonalising the matrices of quadratic forms
- (b) Interpolation of data and fitting interpolation polynomials
- (c) Fitting of different types of curves to experimental data
- (d) obtaining derivatives of required order for given experimental data
- (e) Expressing the functions as sum of partial fractions

DETAILED SYLLABUS:

UNIT–I : MATRICES (11 periods)
Rank of a matrix, echelon form, normal form, inverse of a matrix by elementary row operations. Solutions of linear system of equations. Eigen values, Eigen vectors and properties (without proof), Diagonalization. Quadratic form (QF), reductions to canonical form using orthogonal transformation and nature of QF.

UNIT-II NUMERICAL SOLUTIONS OF EQUATIONS AND CURVE FITTING (8 periods)
Solutions of Algebraic and Transcendental equations by bisection method, Regula-Falsi method, Newton – Raphson's method. Curve fitting by the principle of least squares, fitting of a straight line, parabola and exponential curves.

UNIT- III INTERPOLATION (8 periods)
Interpolation, difference operators and their relationships, Newton's forward and backward formulae, Lagrange's interpolation formula. Partial fractions using Lagrange's interpolation formula.

UNIT-IV NUMERICAL DIFFERENTIATION AND INTEGRATION (8 periods)
Numerical differentiation using Newton's forward and backward formulae. Numerical integration using Trapezoidal rule, Simpson's $1/3^{rd}$ rule and $3/8^{th}$ rule.

UNIT- V NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS (10 periods)
Numerical solutions of first order Initial value problems using Taylor series method, Euler's method , modified Euler's method, Runge – Kutta method (4^{th}order only) and Milne's predictor – corrector method.

Total no. of periods: 45

TEXT BOOK:
1. T.K.V. Iyenger, B. Krishna Gandhi, S.Ranganadham and M.V.S.S.N.Prasad, ***Mathematical Methods,*** S.Chand and Company, 8/e, 2013

REFERENCE BOOKS:

1. B.S. Grewal, ***Higher engineering mathematics***, Khanna Publishers, 42nd Edition. 2012
2. S.S.Sastry, ***Introductory methods of Numerical Analysis***, Prentice Hall of India, 5/e, 2013

I B. Tech. - I Semester

(16BT1BS04) MULTI - VARIABLE CALCULUS AND DIFFERENTIAL EQUATIONS

(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate /Senior secondary mathematics

COURSE DESCRIPTION: First order differential equations; higher order linear differential equations; functions of several variables; applications of integration; multiple integrals; vector calculus.

COURSE OUTCOMES: After completion of the course a successful student is able to

CO1: Acquire knowledge in
- (a) Higher order Differential equations
- (b) Maximum and minimum values for the functions of several variables
- (c) Double and triple integrals
- (d) Differentiation and integration of vector functions.
- (e) Line and surface volume
- (f) transforming integrals from three dimensional surfaces and volumes on to plane surfaces

CO2: Develop skills in analyzing the
- (a) methods for differential equation for obtaining appropriate solutions,
- (b) Properties of oscillatory electrical circuits and heat transfer in engineering systems
- (c) The variations in the properties of functions near their stationary values
- (d) Flow patterns of fluids, electrical and magnetic flux and related aspects

CO3: Develop skills in designing mathematical models for
- (a) R-C and L-R-C oscillatory electrical circuits
- (b) Heat transfer and Newton's law of cooling
- (c) Engineering concepts involving lengths of curves and areas of planes, Flux across surfaces

CO4: Develop analytical skills in solving the problems involving
- (a) Newton's law of cooling
- (b) non homogeneous linear differential equations
- (c) maximum and minimum values for the functions
- (d) lengths of curves, areas of surfaces and volumes of solids in engineering
- (e) transformation of integrals from three dimensional surfaces and volumes on to plane surfaces

CO5: Use relevant mathematical techniques for evaluating
- (a) various types of particular integrals in differential equations
- (b) stationary values for multi variable functions
- (c) multiple integrals in change of variables
- (d) integrations of vector functions.

DETAILED SYLLABUS:

UNIT-I: FIRST ORDER DIFFERENTIAL EQUATIONS (6 periods)

Linear and Bernoulli type, exact equations and reducible to exact. Orthogonal trajectories (Both Cartesian and polar forms). Newton's law of cooling.

UNIT II: HIGHER ORDER LINEAR DIFFERENTIAL EQUATIONS (9 periods)

Method for solution of linear equations- Differential operator *D*, Solution of second order linear homogeneous equations with constant coefficients, Solution of Higher order homogeneous linear equations with constant coefficients, **Solution of Non homogeneous linear equations**-Operator methods for finding particular integrals- for cases – e^{ax}, sin ax, cos ax, x^n, $e^{ax}V(x)$, xV(x). Method of Variation of parameters. Applications to oscillatory electrical circuits.

UNIT-III: FUNCTIONS OF SEVERAL VARIABLES (8 periods)

Functions of Two Variables: Limits, Continuity; **Partial Derivatives**: Total Differential and Derivatives, Jacobian, Functional dependence, Taylor's Theorem, maxima and minima of functions of two variables with and without constraints – Lagrange's method of undetermined multipliers.

UNIT-IV: APPLICATIONS OF INTEGRATION AND MULTIPLE INTEGRALS (10 periods)

Applications of integration to – lengths of curves, areas of surfaces of revolution, Double and Triple integrals – change of order of integration, change of variables in integrals. Area enclosed by plane curves, volumes of solids.

UNIT-V: VECTOR CALCULUS (12 periods)

Vector differentiation: Gradient of a scalar field and Directional Derivative, Divergence and Curl of a Vector field

Line integrals: Line integrals independent of path – work done.

Surface area and Surface Integrals: Surface Area, Surface Integrals, Flux across a surface.

Green's Theorem: Green's Theorem (without proof)-verification- applications

Gauss Divergence Theorem and Stoke's Theorem: Gauss Divergence theorem (without proof), Stokes's Theorem (without proof) –verifications and applications. **Total no. of periods: 45**

TEXT BOOK:

1. T.K.V. Iyengar, B. Krishna Gandhi,S.Ranganatham and M.V.S.S.N. Prasad, ***Engineering Mathematics, Vol-1***,S. Chand &Company, 13/e, 2014

REFERENCE BOOKS:

1. Grewal, B.S., ***Higher engineering mathematics***,Khanna publishers, Delhi, 42/e. 2012.
2. Kreyszig, E., ***Advanced Engineering Mathematics***,John Wiley and Sons, Inc.,9/e.2012.

I B. Tech. - I Semester

(16BT10241) NETWORK ANALYSIS

(Common to ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	4	1	0	4

PRE-REQUISITES: --

COURSE DESCRIPTION: Basic concepts of electric circuits; Voltage - Current relationship of basic circuit elements; Mesh and Nodal analysis; Network theorems; AC circuits; Two-port network parameters; Transient analysis.

COURSE OUTCOMES: After successful completion of the course, student will be able to

CO1: Demonstrate knowledge in
- voltage and current relationships for various electric elements.
- network reduction techniques.
- concepts of AC fundamentals and single phase circuits.
- concepts of two-port networks.
- various network theorems.
- transient behavior of the circuits.

CO2: Analyze
- a circuit using conventional, mesh and nodal concepts.
- a two-port network for various network parameters.
- various types of two-port networks.
- the transient behavior of the circuits.

CO3: Design circuits to meet the required specifications

CO4: Evaluate
- electrical circuits for voltage, current and power using conventional circuit analysis methods and network theorems.
- transient response.
- two-port networks.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO ELECTRICAL CIRCUITS (12 Periods)

Concepts of charge, current, voltage, power, circuit elements, Ohm's law, Kirchoff's Laws, Network reduction techniques, voltage and current division rules, Series-Parallel circuits, Star-Delta and Delta-Star transformations, Source transformation, nodal analysis, mesh analysis- Problems.

UNIT-II: SINGLE PHASE AC CIRCUITS (12 Periods)

Introduction to AC quantities and basic definitions: Cycle, Time period, Frequency, Amplitude, determination of Average value, RMS value, Form factor and Peak factor for different alternating waveforms, phasor notation, phase and phase difference, phase relation in R, L, C circuits, series and parallel circuits, impedance and power triangle, power factor. Series and Parallel resonance, Quality factor and bandwidth-Problems.

UNIT-III: NETWORK THEOREMS (10 Periods)

Superposition, Thevenin's, Norton's, Maximum power transfer, Tellegen's, Millman's, Reciprocity, Compensation theorems for D.C. and sinusoidal excitation- Problems.

UNIT-IV: TWO-PORT NETWORKS (10 Periods)

Impedance parameters, admittance parameters, transmission (ABCD) parameters, hybrid parameters, conversion of one parameter to another, conditions for reciprocity and symmetry, interconnection of two-port networks in series, parallel and cascaded configurations - Problems.

UNIT-V: TRANSIENT ANALYSIS (10 Periods)

Transient response of R-L, R-C and R-L-C for DC excitation and Sinusoidal excitation - Solution by using Differential equation and Laplace Transforms method - Problems.

Total Periods: 54

TEXT BOOKS:

1. Sudhakar, S.P.Shyam Mohan, Circuits and Network analysis and synthesis, 5th edition, Tata McGraw Hill publishing company Ltd., New Delhi, 2007.
2. W. H. Hayt, J. E. Kemmerly, S. M. Durbin, Engineering Circuit Analysis, 6th edition, Tata McGraw Hill publishing company Ltd., New Delhi, 2008.

REFERENCE BOOKS:

1. M.E. Van Valkenberg, Network Analysis, Pearson Publications, 3rd edition, New Delhi 2006.

2. A.Chakrabarthi, Circuit Theory (analysis and synthesis), 6th edition, Dhanpat Rai & Co, New Delhi, 2014.

I B. Tech. - I Semester
(16BT10501) PROGRAMMING IN C
(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: NIL
COURSE DESCRIPTION:
Program design; Operators and Expressions; Data Input and Output; Control Statements; Functions; Arrays; Strings; Pointers; Structures & Unions and File handling Techniques;
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1: Demonstrate knowledge in:
- o Elements of C Language
- o Selection and Repetition statements.
- o Arrays, Strings and Functional statements.
- o Derived data types, Files and Pointers

CO2: Analyze complex engineering problems to develop suitable solutions
CO3: Design algorithms for specified engineering problems
CO4: Use appropriate 'C' language constructs for solving engineering problems
CO5: Write programs using 'C' language to implement algorithms
DETAILED SYLLABUS:
UNIT I – INTRODUCTION TO C PROGRAMMING, OPERATORS & EXPRESSIONS (08 periods)
Introduction to C Programming: The C Character set, Writing First Program of C, Identifiers and Keywords, Data types, Constants, Variables and Arrays, Declarations, Expressions, Statements and Symbolic Constants.
Operators and Expressions: Arithmetic Operators, Unary Operators, Relational and Logical Operators, Assignment Operators, the Conditional Operators.
UNIT II – DATA INPUT AND OUTPUT & CONTROL STATEMENTS (08 periods)
Data Input and Output: Single Character Input and Output, Input Data & Output data, The gets and puts Function.
Control Statements: Branching: The if-else Statement, Looping: The while Statement, More Looping: The do-while Statement, Still More Looping: The for Statement, Nested Control Statement, The switch Statement, The break & continue Statements, The goto Statement.
UNIT III – FUNCTIONS, PROGRAM STRUCTURES & ARRAYS (11 p*eriods*)
Functions: A Brief Overview, Defining a Function, Accessing a Function, Function Prototypes, Parsing Argument to a Function, Recursion.
Program Structure: Storage Classes, Automatic Variables, External (Global) Variables, Static Variables, Multi file Programs,
Arrays: Defining an Array, Processing an Array, Processing Array to function, Multidimensional Arrays. Linear search, Binary search, Fibonacci search, Bubble sort and Insertion sort
UNIT IV – STRINGS & POINTERS (09 periods)
Strings: Defining a String, NULL Character, Initialization of Strings, Reading and Writing a String, Processing a Strings, Character Arithmetic, Searching and Sorting of Strings, Library Functions for Strings.
Pointers: Pointer Declaration, Passing Pointers to a Function, Pointers and One-dimensional Arrays, Dynamic Memory Allocation, Operations on Pointers, Pointers and Multidimensional Arrays, Arrays of Pointers.
UNIT V – STRUCTURES AND UNIONS & FILE HANDLING (09 periods)
Structures and Unions: Defining a Structure, Processing a Structure, User-Defined Data types (typedef), Structures and Pointers, Passing Structures to Function, Self –Referential Structures, Unions
File Handling: Files introduction, Opening and Closing a Data File, Reading and Writing a Data File, Processing a Data File, Unformatted Data File, Concept of Binary Files, Accessing the File Randomly.

Total Periods: *45*

TEXT BOOK:
1. Byron Gottfried and Jitender Kumar C "*Programming with C*," Third Edition, McGraw Hill Education (India) Pvt, Ltd, New Delhi, 2016.

REFERENCE BOOKS:
1. PradipDey and Manas Ghosh, *"Programming in C",* Second Edition, Oxford University Press, NewDelhi, 2007.

2. E. Balagurusamy, "*Programming in C",* Seventh Edition, Mc Graw Hill Education (India) Pvt, Ltd, New Delhi, 2014.

I B. Tech. I-Semester

(16BT1BS32) ENGINEERING PHYSICS LAB

(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Intermediate / senior secondary Physics.

COURSE DESCRIPTION:

Characteristics of p-n junction diode, Photodiode, LED, and semiconductor laser diode. Experimental determination of carrier concentration and energy gap of a semiconductor material, wave length of a laser source, size of fine particle, numerical aperture and acceptance angle of optical fiber. Determination of frequency of electrically vibrating tuning fork and A.C source using A.C sonometer, magnetic field along axial line of a current carrying coil and rigidity modulus of material of a wire using torsional pendulum.

COURSE OUTCOMES:

After completion of the course, a successful student will be able to:

CO1: Acquire basic knowledge about semiconductor materials, magnetic materials and lasers.

CO2: Acquire analytical skills in the estimation of carrier concentration of semiconductor materials and characterization of p-n junction.

CO3: Develop skills in designing electronic circuits using semiconductor components.

CO4: Acquire skills to use instrumental techniques in A.C sonometer and Melde's experiment.

CO5: Apply diffraction techniques for determination of size of tiny particles and wave length of lasers.

ENGINEERING PHYSICS LAB

Conduct a minimum of any **Ten** of the following experiments.

1. Determination of wavelength of a laser source using Diffraction Grating.
2. Determination of particle size by using a laser source.
3. Determination of Numerical aperture and acceptance angle of an optical fiber.
4. Melde's experiment - transverse & longitudinal modes.
5. Magnetic field along the axis of a current carrying coil- Stewart and Gee's method.
6. Calculation of A.C frequency using sonometer.
7. I-V Characteristics of a p-n Junction diode.
8. Energy gap of a material of a p-n Junction.
9. Characteristics of LED source.
10. Characteristics of Photo diode.
11. Hall Effect.
12. Determination of rigidity modulus of the material of the wire using torsional pendulum.

I B. Tech. - I Semester

(16BT10232) ELECTRICAL AND ELECTRONICS WORKSHOP PRACTICE

(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: NIL

COURSE DESCRIPTION: Identification and specifications of various Electric and Electronic devices; analysis of various series, parallel and series-parallel electrical circuits; develop various electrical circuits for domestic and industrial applications.

COURSE OUTCOMES: After successful completion of the course, student will be able to

CO1: Demonstrate knowledge on various Electrical and Electronic Devices.
CO2: Analyze various series and parallel electrical circuits.
CO3: Design and develop various electrical circuits for domestic and industrial applications.
CO4: Function effectively as individual and as a member in a team.
CO5: Communicate effectively both oral and written forms

DETAILED SYLLABUS:

PART A: (Demonstration)

1. Identification and Specifications of R, L, C Components (Colour Codes), Potentiometers, Switches (SPST, DPST and DPI), Gang Condensers, Relays, Bread Boards, PCBs, Fuses, MCBs, Earthing and Electrical Wiring accessories.
2. Identification and Specifications of Active Devices: Diodes, BJTs, Low-power JFETs, MOSFETs, Power Transistors, LEDs, LCDs, Optoelectronic Devices, SCR, UJT, DIACs, TRIACs, Linear and Digital ICs.
3. Study the operation of
   - Multimeter (Analog and Digital)
   - Function Generator
   - Regulated Power Supplies
   - CRO.

PART-B:

1. Measurement of Electrical Quantities (AC & DC) using: Voltmeter, Ammeter and Wattmeter.
2. Measurement of Resistivity of a conducting wire.
3. Circuit with one lamp controlled by one switch and provision of 2-pin or 3-pin socket PVC surface conduit system.
4. Circuit with two lamps controlled by two switches with PVC surface conduit system.
5. Circuit for Stair case wiring and Godown wiring.
6. Circuit connection for a Fluorescent tube
7. Solder simple electronic circuits.
8. B-H curve of a Magnetic material
9. I-V and P-V characteristics of a Solar panel
10. Design and Fabrication of a single-phase transformer
11. PCB preparation and design of a circuit on a PCB

I B. Tech. - I Semester

(16BT10251) NETWORK ANALYSIS LAB

(Common to ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: NIL

COURSE DESCRIPTION: Verification of KVL, KCL and network theorems; analysis of AC and DC circuits; determination of resonant frequency in series and parallel RLC circuits; evaluation of transients

COURSE OUTCOMES: After successful completion of the course, student will be able to

CO1: Demonstrate knowledge in

- Identification of various circuit elements and their values.
- Concepts of electric circuits and two-port networks.

CO2: Analyze and relate physical observations and measurements in electric circuits to theoretical perception.

CO3: Design circuit parameters to meet the required specifications.

CO4: Demonstrate skills in evaluating and interpret

- Various circuit parameters using conventional and network theorems
- Network parameters

CO5: Function effectively as individual and as a member in a team.

CO6: Communicate effectively in oral format and prepare laboratory reports.

LIST OF EXPERIMENTS:

Any TEN experiments are to be conducted

1. Verification of KVL and KCL.
2. Mesh and Nodal analysis.
3. Series and Parallel resonance.
4. Phasor analysis of RL, RC and RLC circuits.
5. Measurement of active and reactive power in a single phase circuit.
6. Steady state response of series RL and RC circuits.
7. Two-port network parameters.
8. Verification of Superposition and Reciprocity theorems.
9. Verification of Thevenin's and Norton's theorem.
10. Verification of Maximum Power transfer theorem for DC and AC excitations.
11. Verification of Millmann's and compensation theorem.
12. Transient response of RL, RC and RLC circuits.

I B. Tech. - I Semester
(16BT10531) PROGRAMMING IN C LAB
(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES:-
A course on "Programming in C"
COURSE DESCRIPTION:
Hands on practice in developing and executing simple programs using C Programming constructs– Conditional statements, Loops, Arrays, Strings, Functions, Structures, Pointers and Functions.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1: Demonstrate practical knowledge of using C language constructs:
- Selection and Repetition statements.
- Arrays, Strings and Functional statements.
- Derived data types, Files and Pointers

CO2: Analyze problems to develop suitable algorithmic solutions
CO3: Design Solutions for specified engineering problems
CO4: Use appropriate 'C' language constructs for solving engineering problems
CO5: Implement and execute programs using 'C' language
CO6: Document programs and communicate effectively while conducting Professional transactions.

List of Exercises:

1. a. Let a and b are two integer variables whose values are 10 and 13 respectively. Write a program to evaluate the following arithmetic expressions.
i) a + b ii) a–b iii) a * b iv) a/b v) a % b
b. Write a program to evaluate the following algebraic expressions after reading necessary values from keyword.
i) $(ax + b)/(ax - b)$ ii) $2.5 \log x + \cos 32^0 + | x^2 + y^2 |$
iii) $x^5 + 10 x^4 + 8$ and $x^3 + 4 x + 2$ iv) ae^{kt}
2. a. Mr. Gupta deposited Rs.1000 in a bank. The bank gives simple interest at the rate of 15% per annum. Write a program to determine the amount in Mr. Gupta's account at the end of 5 years. (Use the formula I = P T R / 100)
b. A cashier has currency notes of denominations Rs.10, Rs. 50 and Rs. 100. If the amount to be withdrawn is input in hundreds, find the total number of notes of each denomination the cashier will have to give to the withdrawer.
c. In a town, the percentage of men is 52. The percentage of total literacy is 48.If total percentage of literate men is 35 of the total population; write a program to find the total number of illiterate men and women if the population of the town is 8000.
3. a. Write a program that prints the given 3 integers in ascending order using if - else.
b. Write a program to calculate commission for the input value of sales amount.
Commission is calculated as per the following rules:
i) Commission is NIL for sales amount Rs. 5000.
ii) Commission is 2% for sales when sales amount is >Rs. 5000 and <= Rs. 10000.
iii) Commission is 5% for sales amount >Rs. 10000.
c. A character is entered through keyboard. Write a program to determine whether the character entered is a capital letter, a small case letter, a digit or a special symbol. The following table shows the range of ASCII values for various characters.

Characters	**ASCII values**
A - Z	65 - 90
a - z	97- 122
0 - 9	48 - 57
Special Symbols	0 - 47, 58 - 64, 91- 96, 123 - 127

4. a. If cost price and selling price of an item is input through the keyboard, write program to determine whether the seller has made profit or incurred loss. Also determine how much profit or loss he incurred in percentage.
b. An insurance company calculates premium as follows:
i. If a person's health is excellent and the person is between 25 and 35 years of age and lives in a city and is a male then premium is Rs.4 per thousand and the policy amount cannot exceed Rs.2 lakhs.
ii. If a person satisfies all the above conditions and is female then the premium is Rs.3 per thousand and the policy amount cannot exceed Rs.1 lakh.
iii. If a person's health is poor and the person is between 25 and 35 years of age and lives in a village and is a male then premium is Rs.6 per thousand and the policy cannot exceed Rs. 10000.
iv. In all other cases the person is not insured.

Write a program to determine whether the person should be insured or not, his/her premium rate and maximum amount for which he/she can be insured.

5. a. Write a program, which takes two integer operands and one operator as input from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, %. Use switch statement)
   b. Write a program to find the grace marks for a student using switch. The user should enter the class obtained by the student and the number of subjects he has failed in. Use the following rules:
   i. If the student gets first class and the number of subjects failed is >3, then no grace marks are awarded. If the number of subjects failed is less than or equal to '3' then the grace is 5 marks per subject.
   ii. If the student gets second class and the number of subjects failed in is >2, then no grace marks are awarded. If the number of subjects failed in less than or equal to '3' then the grace is 4 marks per subject.
   iii. If the student gets third class and the number of subjects failed in is >1, then no grace marks are awarded. If the number of subjects failed in is equal to '1' then the grace is 5 marks per subject.
6. a. Write a program to find the sum of individual digits of a positive integer.
   b. A Fibonacci sequence is defined as follows:
   The first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a program to generate the first N terms of the sequence. Write a program to generate all the prime numbers between 1 and N, where N is a value supplied by the user.
7. a. Write a program to find the largest and smallest number in a given list of integers.
   b. Write a program to perform the following:
   i. Addition of two matrices.
   ii. Multiplication of two matrices.
8. a. Write a program that uses functions to perform the following operations:
   i. To insert a sub-string in main string at a specified position.
   ii. To delete N characters from a given string from a specified position.
   b. Write a program to determine whether the given string is palindrome or not.
   c. Write a program to display the position or index in the main string S where the sub string T begins. Display -1 if S does not contain T.
   d. Write a program to count the number of lines, words and characters in a given text.
9. a. Write a program to read list of student names and perform the following operations using functions.
   i. to print list of names
   ii. to sort them in ascending order
   iii. to print the list after sorting.
   b. Write a menu driven program to read list of student names and perform the following operations using array of character pointers.
   i. to insert a student name
   ii. to delete a name
   iii. to print the name
10. Write a program that uses functions to perform the following operations:
   i. Reading a complex number
   ii. Writing a complex number
   iii. Addition of two complex numbers
   iv. Multiplication of two complex numbers
   (**Note:** Represent complex number using a structure.)
11. a. Write a program to accept the elements of the structure as:
   Employee-name,Basic pay Display the same structure along with the DA, CCA and Gross salary for 5 employees.
   Note: DA=51% of Basic pay, CCA=Rs.100.consolidated.
   b. Define a structure to store employee's data with the following specifications:
   Employee-Number, Employee-Name, Basic pay, Date of Joining
   i. Write a function to store 10 employee details.
   ii. Write a function to implement the following rules while revising the basic pay.
   If Basic pay<=Rs.5000 then increase it by 15%.
   If Basic pay> Rs.5000 and <=Rs.25000 then it increase by 10%.
   If Basic pay>Rs.25000 then there is no change in basic pay.
   Write a function to print the details of employees who have completed 20 years of service from the date of joining.
12. a. Write a program which copies one 'text file' to another 'text file'.
   b.Write a program to reverse the first N characters of a given text file.

Note: The file name and N are specified through command line.

13. Write a program to print the output by giving the Customer_ID as an input.

REFERENCE BOOKS:

1. Byron Gottfried and Jitender Kumar C, "Programming with C," Third Edition, McGraw Hill Education(India) Pvt. ltd, New Delhi, 2016.

2. Pradip Dey and Manas Ghosh, "Programming in C," Second Edition, Oxford University Press, New Delhi, 2007.

I B. Tech. - II Semester

(16BT1HS01) **Technical English**

(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: English at Intermediate level

COURSE DESCRIPTION: Introduction to Communication; Active Listening; Effective Speaking; Reading; and Writing.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

CO1: Demonstrate knowledge in

- Process of communication
- Modes of listening
- Paralinguistic features
- Skimming and Scanning
- Elements of style in writing

CO2: Analyze the possibilities and limitations of language for understanding

- Barriers to Communication
- Barriers to Effective Listening
- Barriers to Speaking
- Formal and metaphorical language

CO3: Design and develop functional skills for professional practice.

CO4: Apply writing skills in preparing and presenting documents

CO5: Function effectively as an individual and as a member in diverse teams.

CO6: Communicate effectively with the engineering community and society in formal and informal situations.

DETAILED SYLLABUS:

UNIT I - INTRODUCTION TO COMMUNICATION: (9 periods)

Introduction -Language as a Tool of Communication - Communicative Skills (Listening, Speaking, Reading and Writing) - Effective Communication - Modes of Communication - Barriers to Communication (classification).

UNIT II - ACTIVE LISTENING: (9 periods)

Introduction - Reasons for poor Listening - Traits of a Good Listener - Listening Modes - Types of Listening - Barriers to Effective Listening - Listening for General Content and Specific Information.

UNIT III - EFFECTIVE SPEAKING: (9 periods)

Introduction - Achieving Confidence, Clarity and Fluency - Paralinguistic Features - Barriers to Speaking - Types of Speaking - Persuasive Speaking.

UNIT IV - READING: (9 periods)

Introduction and Reading Rates - Reading and Interpretation - Intensive and Extensive Reading - Critical Reading - Reading for Different Purposes - SQ3R Reading Technique -Study Skills.

UNIT V - WRITING: (9 periods)

Introduction - Language - Elements of Style - Techniques for Good Technical Writing - Referencing and Styling - Right Words and Phrases - Sentences. **Total Periods: 45**

TEXT BOOKS:

1.Meenakshi Raman & Sangeetha Sharma, Technical Communication, Oxford University Press, New Delhi, 2012.

REFERENCE BOOKS:

1.Ashraf Rizvi, Effective Technical Communication, McGraw-Hill Education (India) Pvt.Ltd., New Delhi, 2015.
2. Sanjay Kumar & Pushp Lata, Communication Skills, Oxford University Press, New Delhi, 2013.
3. Teri Kwal Gamble and Michael Gamble, Communication Works, Tata Mc Graw-Hill, New Delhi, 2010.

4. Rajendra Pal and J.S. Korlahalli, Essentials of Business Communication, Sultan Chand and Sons (P) Ltd., New Delhi, 2010.

I B. Tech. - II Semester

(16BT1BS01): ENGINEERING CHEMISTRY

(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITE: Intermediate/Senior Secondary Chemistry

COURSE DESCRIPTION: Water technology, Chemistry of Engineering materials, Nanochemistry, Green Chemistry, Electro chemical cells, Sensors, Corrosion and Lubricants.

COURSE OUTCOMES:

After completion of the course, a successful student is able to:

CO1: Acquire basic knowledge in water technology, engineering plastics, conducting polymers, composites, Electro chemical cells, Nano Chemistry, principles of Green Chemistry, corrosion phenomenon and lubricants.

CO2: Develop analytical skills in:
- a. Determination of hardness of water.
- b. Determination of viscosity, flame and fire points, cloud and pour points.

CO3: Develop designing skills in:
- a. Synthesis of engineering plastics.
- b. Chemical methods for the synthesis of Nano materials.

CO4: Develop skills for providing solutions through:
- a. Mitigation of hardness of water.
- b. Newer Nanomaterials and engineering plastics for specific applications

CO5: Acquire awareness to practice engineering in compliance to modern techniques such as:
- a. Nalgonda technique for defluoridation of water
- b. Electroplating technique for control of corrosion.

CO6: Acquire awareness to societal issues on:
- a. Quality of water.
- b. Bio-diesel
- c. Chemical materials utility and their impact.

DETAILED SYLLABUS:

UNIT–I: WATER TECHNOLOGY (9 periods)

Introduction: Types of water, impurities in water and their consequences, types of hardness of water, units of hardness of water, disadvantages of hardness of water, estimation of hardness of water by EDTA method, Boiler troubles: Scales and Sludges, Caustic embrittlement, Boiler corrosion and Priming and Foaming.

Softening of water: Zeolite process and Ion exchange process, advantages and disadvantages. Desalination of brackish water by Reverse Osmosis, Numerical problems on estimation of hardness of water.

Fluorides in water: Effects on human health, defluoridation method-Nalgonda method; comparison of merits and demerits of various defluoridation methods (Nalgonda, Bone Charcoal, Activated Alumina, Contact precipitation, Brick, Reverse osmosis).

UNIT – II: CHEMISTRY OF ENGINEERING MATERIALS (9 periods)

Engineering Plastics: Definition, general properties, synthesis, properties and applications of PC, PTFE, and PMMA.

Conducting polymers: Definition, types of conducting polymers: Intrinsic and extrinsic conducting polymers with examples, engineering applications of conducting polymers.

Biodegradable polymers: Definition, properties, classification, mechanism of degradation of biodegradable polymers and their applications.

Composites – Introduction, types of composites: fiber reinforced particulate and layered composites with examples, advantages of composites and applications.

UNIT– III: NANOCHEMISTRY AND GREEN CHEMISTRY (9 periods)

Nanochemistry: Introduction, classification, properties and applications of Nano materials (nano particles, nano tubes, nano wires, nano composites, dendrimers); synthesis of Nano materials – Sol-gel process.
Green Chemistry: Introduction, principles of green chemistry, Tools of Green Chemistry with Examples, Applications of Green Chemistry in science and technology.
Biodiesel: Introduction, Synthesis (Trans esterification method), advantages, disadvantages and applications.

UNIT–IV: ELECTROCHEMICAL CELLS AND SENSORS (9 periods)

Electrochemical cell: Introduction, EMF of an electrochemical cell.
Batteries: Introduction, types of Batteries: primary and secondary batteries with examples Ni-Cd batteries, Lithium-ion batteries, Lithium- Polymer batteries, Applications of batteries.
Fuel Cells: Definition, examples: $H_2 – O_2$ Fuel cell, solid oxide fuel cell, Bio-fuel cell and applications of fuel cells.
Sensors - Introduction, Types of Sensors, electrochemical sensor: construction and working principle of potentiometric sensor, and applications of electrochemical sensors.

UNIT–V: CORROSION AND LUBRICANTS (9 periods)

Corrosion: Introduction, Definition, types of corrosion (dry and wet corrosion), galvanic corrosion, concentration cell corrosion, Factors influencing corrosion, Corrosion control: cathodic protection; sacrificial anodic protection and impressed current cathodic protection; protective coatings: Galvanizing and Electroplating (Nickel).
Lubricants: Definition, functions of lubricants, mechanism of lubrication, classification of lubricants, properties of lubricants – viscosity, flash and fire points, cloud and pour points, Aniline points, neutralization number and mechanical strength.

Total periods: 45 periods

TEXT BOOKS:

1. P.C.Jain & Monika Jain, **Engineering Chemistry**, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 16th edition, 2013.
2. K.N. Jayaveera, G.V. Subba Reddy & C. Ramachandraiah **Engineering Chemistry**, Mc. Graw-Hill Higher Education, Hyderabad, 1st edition, 2015.

REFERENCE BOOKS:

1. A.K. Bandyopadhyay, **Nano Materials,** New Age international publishers, 2nd edition, 2014.
2. Paul T. Anastas and John C Warner, **Green Chemistry: Theory and practice,** Oxford University Press, 2000.

I B. Tech. - II Semester
(16BT2BS01) TRANSFORMATION TECHNIQUES AND PARTIAL DIFFERENTIAL EQUATIONS

(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITE: Intermediate /Senior secondary mathematics

COURSE DESCRIPTION: Fourier series; Fourier integrals and transforms; Laplace transforms; z – transforms; partial differential equations.

COURSE OUTCOMES:

After completion of the course a successful student is able to

CO1: Acquire basic knowledge in
- (a) Fourier series and Fourier transforms
- (b) Fourier integrals
- (c) Laplace transforms and their applications
- (d) z- transforms and their applications
- (e) solving partial differential equations

CO2: Develop skills in analyzing the
- (a) Properties of Fourier series for a given function
- (b) Partial differential equations through different evaluation methods
- (c) Difference equations through z – transforms
- (d) Engineering systems and processes involving wave forms and heat transfer

CO3: Develop skills in designing mathematical models for
- (a) Problems involving heat transfer and wave forms
- (b) Engineering concepts involving, Fourier transforms, Fourier integrals, Laplace transforms, z-transforms and difference equations

CO4: Develop analytical skills in solving the problems involving
- (a) Fourier series and Fourier transforms
- (b) Laplace transforms
- (c) Z-transforms and difference equations
- (d) Heat transfer and wave motion

CO5: Use relevant transformation techniques for
- (a) Obtaining Fourier transforms for different types of functions
- (b) Laplace transforms
- (c) Z- transforms
- (d) Partial differential equations

DETAILED SYLLABUS

UNIT- I : FOURIER SERIES (7 periods)

Fourier series: Determination of Fourier coefficients, convergence of Fourier series (Dirichlet's conditions), Fourier series of even and odd functions, Half-range Fourier sine and cosine expansions.

UNIT- II: FOURIER INTEGRALS AND FOURIER TRANSFORMS (8 periods)

Fourier integral theorem (statement only), Fourier sine and cosine integrals, Fourier transform, Fourier sine and cosine transforms –properties, Inverse transform and finite Fourier transforms.

UNIT-III: LAPLACE TRANSFORMS (12 periods)

Laplace transforms of standard functions. Properties of Laplace transforms. First and second shifting Theorems. Laplace transforms of derivatives and integrals. Inverse transforms. Convolution theorem (without proof), inverse Laplace transforms by convolution theorem. Laplace transform of periodic functions, Applications of Laplace transforms to ordinary differential equations of first and second order with constant coefficients.

UNIT-IV: Z- TRANSFORMS (9 periods)

Z – transforms, inverse Z– transforms, damping rule, shifting rule, initial and final value theorems. Convolution theorem (without proof), solution of difference equations by Z– transforms.

UNIT – V: PARTIAL DIFFERENTIAL EQUATIONS (9 periods)

Formation of Partial differential equations – Solutions of first order linear equations by method of grouping. First and second order equations by method of separation of variables – Solutions of one dimensional Wave equation, Heat equation.

Total no. of periods: 45

TEXT BOOKS:

1. T.K.V. Iyengar, B. Krishna Gandhi,S.Ranganadham and M.V.S.S.N. Prasad,***Engineering Mathematics, vol-1***, S. Chand & Company 13/e,2014.
2. T.K.V. Iyenger, B. Krishna Gandhi, S.Ranganadham and M.V.S.S.N.Prasad, ***Mathematical Methods***,S.Chand and Company, 8/e,2013.

REFERENCE BOOKS:

1. Grewal, B.S., ***Higher Engineering Mathematics***,Khanna publishers, Delhi, 42/e,2012.

2. Kreyszig, E., ***Advanced Engineering Mathematics***,John Wiley and Sons, Inc.,9/e,2013.

I B. Tech. - II Semester

(16BT20401) **ELECTRONIC DEVICES AND CIRCUITS**

(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A Course on Engineering Physics.

COURSE DESCRIPTION:

Characteristics of general and special purpose electronic devices; Rectifiers; filters and regulators; Biasing and small signal analysis of BJT and FET.

COURSE OUTCOMES:

On successful completion of this course the students will be able to:

CO1: Demonstrate knowledge in
- p-n junction diode and its characteristics
- Zener diode and its characteristics
- Rectifiers, Filters and Regulators
- Characteristics of BJT, FET, MOSFET and special purpose electronic devices.

CO2: Analyze numerical and analytical problems in
- Rectifiers using Filters
- Regulated Power Supplies
- Transistor biasing circuits and stabilization
- Transistor amplifiers
- FET biasing circuits and amplifiers

CO3: Design electronic circuits such as
- Rectifiers with and without filters
- Voltage regulators
- BJT and FET biasing circuits
- BJT and FET amplifiers

CO4: Solve engineering problems and arrive at solutions pertaining to electronic circuits.

CO5*:* Select appropriate technique for transistor modeling.

DETAILED SYLLABUS:

UNIT-I: P-N JUNCTION DIODE, RECTIFIERS AND REGULATORS (11 Periods)

P-N Junction Diode:

p-n Junction as a diode, *p-n* Junction diode equation, Volt-Ampere (V-I) characteristics, temperature dependence of *p-n* characteristics, diode resistance-static and dynamic resistances, transition and diffusion capacitances, break down mechanisms in semiconductor diodes, Zener diode characteristics.

Rectifiers and Regulators:

Half-Wave rectifier and Full-Wave rectifiers (Qualitative and quantitative analysis), Harmonic components in a rectifier circuit, Inductor filter, Capacitor filter, L - section filter, ð- section filter, comparison of various filter circuits in terms of ripple factors. Simple circuit of a regulator using Zener diode. Problems on rectifier circuits.

UNIT-II- *BIPOLAR JUNCTION TRANSISTOR, BIASING AND STABILIZATION*: (10 Periods)

Transistor construction, BJT Operation, Transistor currents and their relations, Input and Output Characteristics of a Transistor in Common Emitter, Common Base and Common Collector Configurations, BJT specifications, Transistor Operating Point, DC and AC Load Lines, Importance of Biasing, Fixed Bias, Emitter Feedback Bias, Collector to Base Feedback Bias, Voltage Divider Bias, Bias Stability, Transistor as an amplifier, Thermal Runaway, Problems on biasing circuits.

UNIT-III- *SMALL SIGNAL ANALYSIS OF BJT AMPLIFIERS*: (08 Periods)

BJT Modeling, Hybrid Modeling, Determination of h-Parameters from Transistor Characteristics, Measurement of h-Parameters, Miller's Theorem, Analysis of CE, CB and CC configurations using simplified Hybrid Model, Comparison of CB, CE and CC configurations.

UNIT-IV- *FIELD EFFECT TRANSISTORS*: (10 Periods)

Construction, Principle of operation and characteristics of JFET and MOSFET (Enhancement & Depletion), Biasing of FET, Small Signal Model of JFET, Common Source and Common Drain Amplifiers using JFET, Generalized FET Amplifier, FET as Voltage Variable Resistor, Comparison of BJT and FET.

UNIT-V- *SPECIAL PURPOSE ELECTRONIC DEVICES*: (06 Periods)

Principle of Operation and Characteristics of Tunnel Diode, Uni-Junction Transistor (UJT), Varactor Diode, Silicon Control Rectifier (SCR). Principle of operation of Schottky Barrier Diode.

Total Periods: *45*

TEXT BOOK:

1. J. Millman, Christos C. Halkias and SatyabrataJit, *Electronic Devices and Circuits,* TMH, 3rd Edition, 2010.

REFERENCE BOOKS:

1. R.L. Boylestad and Louis Nashelsky, *Electronic Devices and Circuits,* PHI, 10th Edition, 2009.
2. David A. Bell, *Electronic Devices and Circuits,* Oxford University press, 5th Edition, 2014.

3. S. Salivahanan, N. Suresh Kumar, *Electronic Devices and Circuits*, Mc-Graw Hill, 3rd Edition 2013.
4. Ben G. Streetman, Sanjay Banerjee , Solid State Electronic Devices, Pearson Prentice Hall, 2006.

I B. Tech. - II Semester

(16BT20541) **Foundations of Data Structures**

(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:

A course on "Programming in C"

COURSE DESCRIPTION:

Concepts of sorting: sorting by exchange, sorting by distribution, sorting by merging and data structures: stacks, queues, linked lists, trees, graphs, and hash table.

COURSE OUTCOMES:

On successful completion of this course the students will be able to:

CO1: Gain knowledge in Sorting techniques, Linear and Non-linear Data Structures.

CO2: Analyze the performance of sorting techniques and their relationship to Data Structures.

CO3: Design appropriate hashing function for a given application and develop programs to implement Linear and Non-Linear data structures

CO4: Apply appropriate data structure to provide solutions for real time problems using C Language.

DETAILED SYLLABUS:

UNIT I – SORTING (9 periods)

SORTING - Sorting by Exchange-Shell Sort, Quick sort. Sorting By Distribution-Counting Sort, Bucket Sort, Radix Sort. Sorting By Merging-Merge Sort.

UNIT II– STACKS AND QUEUES (9 periods)

STACKS -Introduction, Stack Operations, Applications.

QUEUES - Introduction, Operations on Queues, Circular Queues and Applications.

UNIT III –LINKED LISTS (9 periods)

LINKED LISTS –Introduction, Single Linked List, Circular Linked List, Doubly Linked List, Multiply Linked List and Applications.

LINKED STACKS AND LINKED QUEUES - Introduction, Operations on Linked Stack and Linked Queues, Dynamic Memory Management and Linked Stacks.

UNIT IV – TREES AND BINARY TREES (9 periods)

TREES– Introduction, Definition and Basic Terminologies, Representation of Trees.

BINARY TREES – Basic Terminologies and Types, Representation of Binary Trees, Binary Tree Traversals, Binary Search Trees: Definition and Operations and Applications.

UNIT V – Graphs and Hashing (9 periods)

Graphs – Introduction, Definitions and Basic Terminologies, Representation of Graphs, Graph Traversals, Applications.

Hashing – Introduction, Hash Table Structure, Hash Functions, Linear Open Addressing, Chaining and Applications.

Total Periods: *45*

TEXT BOOK:

1. G.A.V. Pai, *"Data Structures and Algorithms",* Tata McGraw Hill, Second Edition, 2009.

REFERENCE BOOK:

1. Debasis Samanta, "Classic Data Structures", PHI Learning, Second Edition, 2009.

I B. Tech. - II Semester

(16BT1HS31) **ENGLISH LANGUAGE LAB**

(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: English at intermediate or equivalent level.

COURSE DESCRIPTION: Phonetics; Vocabulary Building; Functional Grammar; Just a Minute; Elocution/Impromptu; Giving Directions/Conversation Starters; Role Play; Public Speaking; Describing People, Places, Objects and Events; Reading Comprehension; Listening Comprehension; Information Transfer.

COURSE OUTCOMES:

On successful completion of this course the students will be able to:

CO1: Demonstrate knowledge in
- Phonetics
- Information Transfer

CO2: Analyze the situations in professional context by using
- Vocabulary
- Grammar

CO3: Design and develop functional skills for professional practice.

CO4: Apply the techniques of Listening and Reading skills to comprehend Listening and Reading comprehension.

CO5: Function effectively as an individual and as a member in diverse teams through
- Extempore talk and
- Role Play

CO6: Communicate effectively in public speaking in formal and informal situations.

CO7: Recognize the need to engage in lifelong learning to upgrade competence of knowledge and communication.

LIST OF EXERCISES:

1. Phonetics
2. Vocabulary Building
3. Functional Grammar
4. Just a Minute
5. Elocution/Impromptu
6. Giving Directions/Conversation Starters
7. Role Play
8. Public Speaking
9. Describing People, Places, Objects and Events.
10. Reading Comprehension
11. Listening Comprehension
12. Information Transfer

Total Lab Slots: 10

TEXT BOOK:

1. Department Lab Manual

REFERENCE BOOKS:

1. D. Sudha Rani, *A Manual for English Language Laboratories*, Pearson Education.
2. D. Sudha Rani, *Advanced Communication Skills Laboratory Manual*, Pearson Education.
3. R. Manivannan and G. Immanuel, *Communication Skills Laboratory*, VK Publications, Sivakasi, 2013
4. Nira Kumar*, English Language Laboratories*, PHI Learning Pvt. Ltd., New Delhi, 2011.

SUGGESTED SOFTWARE:

1. ETNL Language Lab Software Version 4.0
2. GEMS - Globarena E- Mentoring System.
3. Speech Solutions.
4. English Pronunciation Dictionary by Daniel Jones.
5. Learn to Speak English 8.1, The Learning Company - 4 CDs.
6. Mastering English: Grammar, Punctuation and Composition.
7. English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
8. Dorling Kindersley Series - Grammar.
9. Language in Use 1, 2 & 3.
10. Cambridge Advanced Learner's Dictionary - 3rd Edition.
11. Centronix - Phonetics.
12. Let's Talk English, Regional Institute of English South India.
13. The Ultimate English Tutor.

I B. Tech. - II Semester
(16BT1BS31): **ENGINEERING CHEMISTRY LAB**

(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE REQUISITE: Intermediate/Senior Secondary Chemistry

COURSE DESCRIPTION: Estimation of hardness, alkalinity, dissolved oxygen of water samples and estimation of Iron by volumetric methods, determination of effect of P^H on rate of corrosion, measurement of viscosity of lubricants; Instrumental methods like potentiometer, conductivity meter, P^H meter and colorimeter; synthesis of Polymers and Nano materials.

COURSE OUTCOMES:

After completion of the course, a successful student is able to:

CO1: Acquire basic Knowledge about the volumetric analysis and synthesis of materials used for engineering applications.

CO2: Acquire analytical skills in the estimation of hardness of water, alkalinity of water, dissolved oxygen in water and estimation of Iron through wet laboratory methods.

CO3: Develop designing skills for the synthesis of polymers and Nanomaterials.

CO4: Acquire skills to use instrumental techniques for the determination of Electrical conductance of electrolytes, EMF of a cell, PH of a solution, determination of viscosity of lubricants and estimation of iron in cement.

CO5: Provide solutions for environmental issues through determination of quality of water.

List of Experiments:

A minimum of any **Ten** experiments are to be conducted among the following:.

1. Estimation of Hardness of water by EDTA method.
2. Estimation of alkalinity of Water.
3. Estimation of Dissolved Oxygen in water.
4. Estimation of Ferrous Iron by Dichrometry.
5. Preparation of Novalac Resin.
6. Synthesis of Nano metal-oxide using sol– gel process.
7. Conductometric titration of strong acid Vs strong base
8. Estimation of Ferrous ion by Potentiometry.
9. Determination of amount of corrosion of metals in different medium
10. Measurement of viscosity of lubricants by Ostwald viscometer.
11. Determination of P^H of a given solution by P^H metry.
12. Estimation of Ferric iron in cement by Colorimetric method.

Total Time Slots: 12

I B. Tech. - II Semester

(16BT10331) COMPUTER AIDED ENGINEERING DRAWING

(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	1	6	3

PRE-REQUISITES: *None*

COURSE DESCRIPTION:

Engineering drawing conventions; importance of engineering drawing; fundamental concepts of sketching; computed aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.

COURSE OUTCOMES:

After completion of the course, a successful student is able to:

- CO1: Understand, write and read the language of engineering drawing in industry through International System of Standards.
- CO2: Develop the imagination and mental visualization ability for interpreting the geometrical details of engineering objects.
- CO3: Produce different views and projection in drawing.
- CO4: Use modern CAD software for design and drafting of drawings.
- CO5: Create multi-view drawings suitable for presentation to Engineering community.
- CO6: Introduce and communicate universally accepted conventions and symbols for their usage in technical drawing.

DETAILED SYLLABUS:

UNIT : I - BASICS OF ENGINEERING DRAWING PRACTICE, GEOMETRICAL CONSTRUCTIONS, CONICS AND SPECIAL CURVES (18 periods)

Introduction, drawing instruments and its uses, sheet layout, BIS conventions, lines, lettering and dimensioning practices. Geometrical constructions: Construction of regular polygons: Pentagon, Hexagon, Heptagon and Octagon. Conic sections**:** Introduction, construction of ellipse: rectangular method, eccentricity method. Construction of parabola: rectangular method, eccentricity method. Construction of hyperbola: eccentricity method. Special curves***:*** cycloid, involute.

UNIT: II – INTRODUCTION TO COMPUTER AIDED SKETCHING (18 periods)

Computer screen, layout of the software, creation of 2D/3D environment, selection of drawing size and scale, Standard tool bar/menus, Coordinate system, description of most commonly used toolbars, navigational tools: commands and creation of lines, Co-ordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination and perpendicularity.

UNIT: III – PROJECTION OF POINTS, STRAIGHT LINES AND PLANES (21 periods)

Introduction, method of projection, planes of projection, reference line and notations. Projection of points: Points in all the four quadrants. Projection of straight lines**:** lines inclined to HP / VP plane, inclined to both HP and VP planes (straight lines are assumed to be in first quadrant only)**.** Projection of planes**:** projection of triangle, square, rectangle, rhombus, pentagon, hexagon and circular plane for the condition inclined to HP / VP by change of position method.

UNIT IV –PROJECTION OF SOLIDS AND SECTION OF SOLIDS (21 Periods)

Projections of Solids: Introduction, projection of solids: prisms, pyramids, cylinders and cones with axis perpendicular to VP/HP and axis inclined to VP/HP only. Sections of solids**:** Introduction, Cutting plane, sectional views of right regular solids resting with base on HP: prisms, pyramids, cylinder and cone and true shapes of the sections.

UNIT V –ORTHOGRAPHIC AND ISOMETRIC PROJECTIONS AND DEVELOPMENT OF SURFACES (22 periods)

Orthographic projection: simple exercises. Isometric projection: Simple exercises.

Development of surfaces: prisms, pyramids, cylinders, cone and miscellaneous surfaces

Total Periods: *100*

Note: *Student shall practice Unit-I using sketch book only and remaining units using sketch book first and later CAD package.*

TEXT BOOKS:

1. D.M.Kulkarni, A.P.Rastogi, A.K.Sarkar, Engineering Graphics with AutoCAD, PHI Learning Private Limited, New Delhi, Revised Edition, 2010.
2. N D Bhat & V M Panchal, Engineering Drawing, Charotar Publishing House, Gujarat, 51st edition, 2013.

REFERENCE BOOKS:

1. Sham Tickoo, AutoCAD 2013 for Engineers and Designers, Dreamtech Press, 2013.
2. M.H.Annaiah & Rajashekar Patil, Computer Aided Engineering Drawing, New Age International Publishers, 4th Edition, 2012.
3. T.Jeyapoovan, Engineering Drawing and Graphics Using AutoCAD, Vikas Publishing House, 3rd Edition, 2010.

4. Jolhe, Engineering Drawing, Tata McGraw Hill Education Private Limited, 1st Edition, 2007.
5. Basant Aggarwal, Engineering Drawing, Tata McGraw Hill Education Private Limited, 1st Edition, 2008.

I B. Tech. - II Semester

(16BT20551) FOUNDATIONS OF DATA STRUCTURES LAB

(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES:

A course on "Foundations of Data Structures"

COURSE DESCRIPTION:

Hands on programming to implement data structures - Linked lists, Stacks, Queues, Trees, Search trees, Sorting, and Hashing in C Language.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1: Gain practical knowledge on stacks, queues, trees, graphs and Hashing Techniques

CO2: Identify suitable data structure to solve engineering problems.

CO3: Design solutions for complex engineering problems using linear and non-linear data structures.

CO4: Develop algorithms leading to multiple solutions byconducting investigations of complex problems.

CO5: Apply 'C' language as a tool for implementing linear and non linear data structures

CO6: Communicate effectively by writing Programs and document practical work.

LIST OF PRACTICAL EXERCISES:

1. Implement the following sorting techniques
   (a) Quick Sort (b) Radix Sort (c) Merge Sort
2. Implement the following data structures using arrays
   (a)Stack (b) Queue (c) Circular Queue
3. Implement the following operations on a single linked list.
   (a) Creation (b) Insertion (c) Deletion (d) Display
4. Implement the following operations on a double linked list.
   (a) Creation (b) Insertion (c) Deletion (d) Display
5. Implement the following operations on a circular linked list.
   (a) Creation (b) Insertion (c) Deletion (d) Display
6. Implement the following data structures using linked list.
   (a) Stack (b) Queue (c) Circular Queue
7. Implement the following tree traversals on a binary tree
   (a) Preorder (b) Inorder (c) Postorder
8. Implement the following operation on binary search tree
   (a) Creation (b) Insertion (c) Deletion (d) Inorder
9. Implement the following graph traversal techniques
   (a) Breadth First traversal (b) Depth First Traversal
10. Implement the following Hashing Techniques
    (a) Separate Chaining (b) Open addressing methods

REFERENCE BOOKS:

1. G.A.V. Pai, *"Data Structures and Algorithms",* Tata McGraw Hill, Second Edition, 2009.

2. Debasis Samanta, *“Classic Data Structures”,* PHI Learning, Second Edition, 2009.

II B.Tech. - I semester
(16BT3HS01) ENVIRONMENTAL STUDIES
(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PREREQUISITES: ACourse on Engineering Chemistry
COURSE DESCRIPTION: Multidisciplinary nature of environment; Natural resources; Ecosystems; Biodiversity; Environment pollution and control; Social issues and environment; Human population and environment; Field studies.
COURSE OUTCOMES: On successful completion of the course, students will be able to:
CO1. Acquire knowledge on nature of environment, natural resources, ecosystems, biodiversity, environmental pollution and control, social issues and human population.
CO2. Analyze natural resources, ecosystems, biodiversity, environmental pollution and control, social issues and human population.
CO3. Develop strategies for environmental pollution control and natural resource management.
CO4. Solve environmental problems through proper analysis and interpretation of environmental data.
CO5. Choose appropriate techniques in environmental pollution control and natural resource management.
CO6. Understand the impact of social issues and population on environment.
CO7. Provide solutions to individuals, industries and government for environmental sustainable development.
CO8. Follow environmental protection laws for sustainable development.
CO9. Communicate effectively on environmental issues in the form reports.
DETAILED SYLLABUS:
UNIT - I: MULTIDISCIPLINARY NATURE OF ENVIRONMENT AND NATURAL RESOURCES (11 Periods)
Multidisciplinary Nature of Environment: Multidisciplinary nature of environment, Segments of environment - Lithosphere, Hydrosphere, Atmosphere, Biosphere; Need for public awareness.
Natural Resources: Renewable and non-renewable resources and associated problems - (a) Forest resources: Use and over exploitation, Deforestation-causes, effects and remedies, Case studies, (b) Water resources: Use and over utilization of surface and groundwater, Conflicts over water, Benefits and problems of large dams, Case studies, (c) Mineral resources: Mining, Adverse effects, Case studies, (d) Food resources: World food problems, Changes caused by agriculture and overgrazing, Effects of modern agriculture, Water logging and salinity, Case studies, (e)Energy resources: Growing needs, Renewable energy resources – Solar, Wind, Hydropower, Hydrogen fuel; Non-renewable energy resources - Coal, Natural gas, Nuclear energy, Role of an individual in conservation of natural resource and equitable use of resources for sustainable lifestyles.
UNIT - II: ECOSYSTEMS AND BIODIVERSITY (10 Periods)
Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem - Producers, Consumers, Decomposers; Food chains, Food webs, Ecological pyramids – Types; Characteristic features, Structure and functions of forest ecosystem, Desert ecosystem, Aquatic ecosystem, Energy flow in the ecosystem, Ecological succession.
Biodiversity: Concept and value of biodiversity, Role of biodiversity in addressing new millennium challenges, Hot spots of biodiversity, Threats to biodiversity, Man-wild life conflicts, Endemic, Endangered and extinct species of India, Conservation of biodiversity – In-situ and ex-situ.
UNIT - III: ENVIRONMETAL POLLUTION AND CONTROL (08 Periods)
Causes, Adverse effects and control measures of pollution - Air pollution, Water pollution, Soil pollution, Noise pollution, Thermal pollution, Nuclear pollution; Solid waste management – Causes, Effects and control measures of urban and industrial wastes; Hazards and disaster management – Floods, Earthquakes, Tsunamis, Case studies.
UNIT - IV: SOCIAL ISSUES AND THE ENVIRONMENT (08 Periods)
Sustainable development, Urban problems related to energy, Environmental ethics –Issues, Solutions; Global warming, Acid rain, Ozone layer depletion, Nuclear accidents and case studies, Wasteland reclamation, Consumerism and waste products, Concept of green technologies, Environment protection act, Air act, Water act, Wildlife protection act, Forest conservation act, Issues involved in enforcement of environmental legislation, Public environmental awareness.
UNIT - V: HUMAN POPULATION AND THE ENVIRONMENT (08 Periods)
Population growth, Population characteristics and variation among nations, Population explosion, Family welfare programme, Environment and human health, Human rights, Value education, HIV/AIDS, Women and child welfare, Role of information technology in environment and human health, Case studies, **Field Work/Assignment/Seminar:** Environmental assets – Pond/Forest/Grassland/Hill/ Mountain/Environment impact assessment procedures for local environmental issues.

Total Periods: 45

TEXT BOOKS:
1. A. Kaushik and C. P. Kaushik, *Environmental Studies*, New Age International (P) Ltd Publications, 4th Edition, 2014.
2. Erach Barucha, *Environmental Studies*, Orient Blackswan, 2nd Edition, 2013.
REFERENCE BOOKS:
1. R. Rajagopalan, *Environmental Studies*, Oxford University Press, 2nd Edition, 2011.

2. Benny Joseph, *Environmental Studies*, Tata McGraw- Hill, 2nd Edition, 2009.
3. B. S. Chauhan, *Environmental Studies*, University Science Press, 2008.
4. M. Anji Reddy, *Text Book of Environmental Sciences and Technology*, BS Publications, 2007.

II B.Tech. - I semester

(16BT3BS02) SPECIAL FUNCTIONS AND COMPLEX ANALYSIS

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Intermediate/senior secondary Mathematics

COURSE DESCRIPTION: Beta, Gamma functions and their properties; Limits continuity and analyticity of complex functions; Integration, power series, singularities, residues; conformal mapping.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Acquire knowledge in
- Beta and Gamma functions
- Expressing complex functions in power series
- Differentiation and integration of complex functions
- Conformal mappings and bilinear transformations
- Expressing complex functions in terms of graphs and power series

CO2. Develop skills in analyzing the
- The properties exhibited by complex functions in Argand plane
- Properties of real integrals through complex variable techniques
- The properties of improper integrals through residue theory
- Conformal transformations of complex valued functions for inferences
- The properties of complex functions by expressing them in power series and graphs

CO3. Develop skills in designing mathematical models involving
- Integrals of complex variable functions
- Improper integrals using beta and gamma functions
- Residue theory of complex functions
- Power series expansions of complex variable functions
- Transformations of complex variable functions
- Fluid flow patterns and flux functions.

CO4. Develop analytical skills in providing solutions for problems involving
- Fluid, Electrical and Magnetic Potential functions
- Integration of complex functions
- Improper real integrals

CO5. Use relevant Complex variable techniques for
- Residues and integrals of complex functions.
- Improper real integrals through complex functions
- Techniques of Beta and Gamma functions to improper integrals

DETAILED SYLLABUS

UNIT-I: SPECIAL FUNCTIONS (09 Periods)

Beta and Gamma functions - Properties - Relationship between Beta and Gamma functions- Evaluation of improper integrals using Beta and Gamma functions. Bessel function -Generating function (without proof) - Recurrence relations.

UNIT-II: ANALYTIC FUNCTIONS (09 Periods)

Function of a Complex Variable - Limits and Continuity of functions, uniform continuity, Differentiability and Analyticity – Cauchy Riemann equations (both Cartesian and polar) - Conjugate and harmonic conjugate functions - Milne Thomson method-Potential functions.

UNIT-III: COMPLEX INTEGRATION AND POWER SERIES (09 Periods)

Line integral - Evaluation of line integrals along curves and closed contours - Cauchy's Integral theorem - Cauchy's integral formula - Generalized integral formula- Evaluation of integrals using integral formula. Taylor's theorem (without proof) - Laurent's theorem (without proof) - Power series expansion of complex functions.

UNIT-IV: RESIDUE THEOREM (09 Periods)

Zeros, Singularities – Types of singularities- poles - Residues – Evaluation of residues at simple poles and poles of order m - Residue theorem - Evaluation of integrals using residue theorem – Evaluation of improper and real integrals of the type:

i) $\int_0^{2\pi} f(\cos\theta, \sin\theta)d\theta$ ii) $\int_{-\infty}^{\infty} f(x)dx$ iii) $\int_{-\infty}^{\infty} e^{imx} f(x)dx$

UNIT-V: CONFORMAL MAPPING (09 Periods)

Conformal mappings, Translation, Rotation, Inversion.Special transformations:
Bilinear transformation - Properties - Fixed points - Cross ratio - Invariance of circles under bilinear transformation - Determination of bilinear transformation using three given points. **Total Periods: 45**

TEXT BOOK:

1. T.K.V. Iyengar, B. Krishna Gandhi,S., Ranganatham and M.V.S.S.N. Prasad,*Text book of Engineering Mathematics,* Vol-III, S. Chand & Company, 9th Edition 2012.

REFERENCE BOOKS:

1. Grewal, B.S, *Higher Engineering Mathematics*, Khanna Publishers, Delhi, 42th Edition 2012.
2. Shahnaz Bathul, *Special Functions and Complex Variables*, PHI Learning,2nd Edition 2010.

II B.Tech. - I semester

(16BT30401) ELECTRONIC CIRCUIT ANALYSIS AND DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: A course on Electronic Devices and Circuits

COURSE DESCRIPTION:

Single Stage Amplifiers; Multi-Stage amplifiers; Frequency Response; Feedback Amplifiers; Oscillators; Large Signal Amplifiers; Tuned Amplifiers.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in
- Single Stage Amplifiers
- Multi Stage Amplifiers.
- BJT Frequency Response.
- Feedback Amplifiers.
- Power Amplifiers.
- Tuned Amplifiers.

CO2. Perform analysis of electronic circuits for meeting defined specifications.

CO3. Design and develop electronic circuits such as Feedback Amplifiers, Oscillators and Power amplifiers with given specifications.

CO4. Solve problems pertaining to electronic circuit design.

CO5. Select an Amplifier circuit for a specific electronic sub-system.

CO6. Apply course knowledge to assess societal issues and understand the consequent responsibilities relevant to the professional engineering practice using electronic circuits.

DETAILED SYLLABUS:

UNIT-I: BJT AMPLIFIERS (10 Periods)

Single Stage Amplifiers: Introduction, Classification of Amplifiers, Analysis of CE amplifier with an Emitter Resistance.

Multistage Amplifiers: Distortion in amplifiers, Cascading Transistor amplifiers, Methods of inter-stage coupling, RC Coupled Amplifier, Direct and Transformer Coupled Amplifier, Multistage Frequency Effects, Darlington Pair, Bootstrapped Darlington circuit, Cascode amplifier.

UNIT- II: HIGH FREQUENCY RESPONSE (09 Periods)

BJT: Frequency response of BJT amplifier, Analysis at low and high frequencies, Effect of coupling and bypass capacitors, Hybrid-ð Common Emitter transistor model, Hybrid-ð conductance, Hybrid-ð capacitances, validity of Hybrid-ð model, CE short circuit current gain, CE current gain with resistive load, Gain-Bandwidth Product.

FET: Analysis of Common Source and Common Drain Amplifier circuits at High frequencies.

UNIT-III: FEEDBACK AMPLIFIERS (10 Periods)

Negative feedback amplifiers: Feedback Concept, Classification, General characteristics, Effect of feedback on amplifier characteristics, Voltage series, Current series, Current shunt and Voltage shunt feedback configurations.

Oscillators: Conditions for oscillations, types of oscillators, RC-phase shift oscillators with BJT and FET with the relevant analysis, Wein bridge oscillator, Hartley oscillator, Colpitts oscillator, Piezoelectric crystal oscillator, Frequency Stability.

UNIT-IV: POWER AMPLIFIERS (08 Periods)

Classification, Class A large-signal amplifiers- Series Fed and Transformer-coupled Audio power amplifier, Efficiency**;** Second harmonic Distortions, Higher order harmonic Distortion, Class B amplifier- Transformer coupled Push-pull amplifier, Complementary symmetry Push-pull amplifier, Efficiency**;** MOSFET power amplifier, Thermal stability and Heat sinks.

UNIT-V: BJT TUNED AMPLIFIERS (08 Periods)

Introduction, Q-Factor, Small Signal Tuned Amplifiers, Effect of Cascading Single Tuned Amplifiers on Bandwidth, Double-tuned amplifier, Effect of Cascading Double Tuned Amplifiers on Bandwidth, Stagger Tuned Amplifiers, Stability of Tuned Amplifiers, Class-C Tuned amplifier. **Total Periods: 45**

TEXT BOOKS:

1. Jacob Millman and Christos C. Halkias, *Integrated Electronics*, Tata McGrawHill, 2nd Edition, 2010.
2. S Salivahanan, N.Suressh Kumar, A. Vallavaraj, *Electronic Devices and Circuits,* TataMcGraw Hill, 3rd Edition, 2008.

REFERENCE BOOKS:

1. Robert L. Boylestad and Louis Nashelsky, *Electronic Devices and Circuits Theory*, Pearson Education, 10th Edition, 2009.
2. David A. Bell, *Electronic Devices and Circuits*, Oxford University press, 5th Edition, 2014.

3. Donald A. Neamen, *Electronic Circuit Analysis and Design*, Tata McGraw-Hill, 3rd Edition, 2007.

II B.Tech. - I semester
(16BT30402) SIGNALS AND SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: A course on transformation techniques and partial differential equations.

COURSE DESCRIPTION:
Analysis of signals and systems; Representation of signals using Fourier series and Fourier transforms; Time-Domain and Frequency-Domain aspects of signals and systems; concept of convolution and correlation; Sampling and types of sampling; Laplace transform of signals; Z-Transform of sequences.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in
- Representation of signals and systems.
- Fourier series representation of periodic signals
- Fourier transform of signals
- Convolution and correlation of functions
- Laplace transform
- Sampling Process
- Z-Transform

CO2. Analyze various continuous and discrete time signals and systems in time and frequency domains.

CO3. Develop solutions to stable and causal systems.

CO4. Solve problems pertaining to transforms and signal processing.

CO5. Select and apply appropriate transformation techniques for understanding of the frequency content of signals at the input and output of the systems.

DETAILED SYLLABUS:

UNIT I: SIGNALS AND SYSTEMS (10 Periods)
Elementary signals- Unit Impulse and Unit Step Functions, Exponential and Sinusoidal Signals. Classification of Continuous-Time and Discrete-Time Signals, Basic operations on signals, Classification of Continuous-Time and Discrete-Time Systems, Basic System Properties, Linear Time-Invariant Systems - Discrete-Time LTI Systems- The Convolution Sum, Continuous-Time LTI Systems - The Convolution Integral, Properties of Linear Time-Invariant Systems.

UNIT II: FOURIER SERIES AND FOURIER TRANSFORM (12 Periods)
Fourier series: Representation of Fourier series, Continuous time periodic signals, Dirichlet's conditions, Properties of CT Fourier Series, Trigonometric Fourier Series and Exponential Fourier Series with examples. Complex Fourier spectrum. Fourier series representation of a periodic signals.

Fourier Transforms: Deriving Fourier Transform from Fourier series, Fourier Transform of standard signals, Fourier Transform of Periodic Signals, Properties of CT Fourier Transform, Systems characterized by Linear constant coefficient differential equations. The Magnitude-Phase Representation of the Fourier Transform, The Magnitude-Phase Representation of the Frequency Response of LTI Systems.

UNIT III: CORRELATION OF SIGNALS (07 Periods)
Cross correlation and auto correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function. Relation between convolution and correlation, Detection of periodic signals in the presence of noise bycorrelation, Extraction of signal from noise by filtering.

UNIT IV: LAPLACE TRANSFORMS (07 Periods)
The Laplace Transform, The Region of Convergence for Laplace Transforms, The Inverse Laplace Transform, Relationship between Fourier and Laplace Transforms, Properties of the Laplace Transform, Some Laplace Transform Pairs, Analysis and Characterization of LTI Systems Using the Laplace Transform.

UNIT V: SAMPLING AND Z-TRANSFORMS (09 Periods)
Sampling: Representation of a Continuous-Time Signal by its Samples - Sampling Theorem, Reconstruction of a Signal from Its Samples Using Interpolation. Effect of under sampling - Aliasing, Discrete-Time Processing of Continuous-Time Signals.

Z-Transforms: Region of Convergence for the z-Transform, The Inverse z-Transform, Relation between Fourier and Z-Transforms, Properties of the z-Transform, Some Common z-Transform Pairs, Analysis and Characterization of LTI Systems Using z-Transforms. **Total Periods: 45**

TEXT BOOK:
1. Alan V. Oppenheim, Alan S. Willsky, & S. Hamid, *Signals and Systems*, Pearson Higher Education, 2nd Edition, 2008.

REFERENCE BOOKS:
1. Simon Haykin and B. Van Veen, *Signals & Systems*, John Wiley, 2nd Edition, 2010.

2. A. Anand Kumar, Signals & Systems, PHI, 2011.
3. B.P. Lathi, *Principles of Linear Systems and Signals,* Oxford University Press, 2nd Edition, 2013.

II B.Tech. - I Semester

(16BT30403) SWITCHING THEORY AND LOGIC DESIGN

(Common to ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION:

Number system and Boolean algebra; Minimization; Analysis and synthesis of digital circuits; Asynchronous Sequential Logic & Programmable Memories.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate the knowledge in
- Conversion of number systems, Binary Codes.
- Basic theorems, properties and postulates of Boolean algebra.
- Minimization of switching functions using Map method and Tabular method.
- Combinational and sequential circuits.
- Realization of Boolean functions using PLDs.

CO2. Analyse combinational and sequential circuits.

CO3. Design and develop various combinational, sequential circuits and PLDs.

CO4. Solve problems and arrive at solutions pertaining to Digital Electronics.

CO5. Apply minimization techniques to asynchronous and synchronous designs and suggest appropriate design for engineering solutions.

CO6. Apply appropriate logic functions to obtain optimized designs useful for the society.

DETAILED SYLLABUS

UNIT I: NUMBER SYSTEM AND BOOLEAN ALGEBRA (10 Periods)

Introduction, Binary Numbers, Number base conversions, Complements of numbers, Signed binary numbers, Binary codes, Error detection and correction codes. Boolean Algebra-Basic definition, Basic theorems and properties, Boolean Functions, Canonical & Standard forms, logic operations & Logic gates.

UNIT II: GATE LEVEL MINIMIZATION (08 Periods)

Introduction, the map method, four variable, Five variable K-map, POS & SOP Simplification, Don't care conditions, NAND & NOR Implementation, Other two level Implementation, Ex-or Function, Quine-McCluskey Technique-simplification of Boolean function using tabulation Method.

UNIT III: ANALYSIS AND SYNTHESIS OF COMBINATIONAL CIRCUITS (10 Periods)

Combinational circuits, Analysis & Design procedure, Binary Adder-subtractor, Decimal Adder, Binary Multiplier, Magnitude comparator, Decoder, Encoders, Multiplexers, Demultiplexers-1-Line to 4-Line and 1-Line to 8-Line Demultiplexers.

UNIT IV: ANALYSIS AND SYNTHESIS OF SEQUENTIAL CIRCUITS (10 Periods)

Sequential Circuits, Latches, Flip-Flops, Analysis of Clocked sequential circuits, State Reduction & Assignment, Design procedure, Registers-Shift Registers, Counters- Synchronous counters and Asynchronous counters.

UNIT V: ASYNCHRONOUS SEQUENTIAL LOGIC & PROGRAMMABLE MEMORIES (07 Periods)

Introduction, Analysis procedure, Design Procedure, Reduction of State and flow tables, Hazards,Programmable Memories-ROM, PLA, PAL.

Total Periods: 45

TEXT BOOK:

1. M. Morris Mano, *Digital Design,* Pearson, 5thEdition, 2013.

REFERENCE BOOKS:

1. Anand Kumar, *Switching Theory and Logic Design*, PHI, 2008

2. ZviKohavi and NirahK.Jha, *Switching theory and Finite Automata Theory,* Tata McGraw-Hill, 2nd Edition, 1978.
3. Charles H. Roth, *Fundamentals of Logic Design*, Thomson Publications, 5thEdition, 2004.

II B.Tech. - I semester

(16BT30241) ELECTRICAL TECHNOLOGY

(Common to ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Network Analysis andEngineering Physics.

COURSE DESCRIPTION:

Analysis of phase & line quantities and measurement of power in three phase system; Constructional details, operation,performance evaluation andapplications of DC& AC machines; Testing of DC machines and Transformers;Special machines and single phase transformers.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on
- Constructionand operation of variouselectrical machines
- Measurement of powerin three-phase system
- Applications of various types of electrical machines

CO2. Analyze
- The operation and performance of various electrical machines
- The polyphase circuit for measurement of power

CO3. Design suitable accessories / controllers for various machines to meet the nominal specifications

CO4. Solve engineering problems pertaining to various machines and provide feasible solutions

CO5. Select appropriate control techniques for various electrical machines used in domestic and industrial applications

CO6. Apply the conceptual knowledge of variouselectrical machinesin relevance to industry and society

DETAILED SYLLABUS:

UNIT-I:DC MACHINES (13 Periods)

DC Generator: Construction and working principle, types, EMF equation, losses, open circuit and load characteristics, applications.

DC Motor: Working principle, types, torque equation, characteristicsand applications.Speed control of DC shunt motor.Necessity of starter, three-point starter.Swinburne's test.

UNIT-II:SINGLE PHASE TRANSFORMER (08 Periods)

Construction and working principle, EMF equation, losses, equivalent circuit,OC and SC tests on single phase transformer, predetermination of efficiency and regulation.

UNIT-III:THREE PHASE SYSTEMS (07 periods)

Introduction and advantages of polyphase system,generation of three phase voltages, phase sequence,star and delta connections, relationship between phase and line quantities in three phase balanced circuits, power measurement in three phase balanced and unbalanced systems using two wattmeter method.

UNIT-IV: THREE PHASE INDUCTION MOTOR AND ALTERNATOR (09 Periods)

Induction motor: Principle of operation, constructional details, slip, rotor frequency, starting and running torques, torque-slip characteristics.

Alternators: Principle of operation, constructional details, types, interrelation between speed and number of poles andEMF equation.

UNIT-V: SPECIAL MACHINES (07 Periods)

Construction of single phase induction motor, double field revolving theory,resistance start, capacitor start and capacitor start & run split phaseinduction motors operation and applications,Constructional details, operation and applications of shaded-pole motor, universal motor andstepper motor (VRandPM type only).

Total Periods: 44

TEXT BOOKS:

1. V.K. Mehta, Rohit Mehta, *Principles of Electrical Engineering*,S.Chand& Company Pvt. Ltd, New Delhi, 2016.
2. B.L. Theraja and A.K. Theraja, *AText Book of Electrical Technology in S. I. Units,* Vol.2, S.Chand Company Ltd, Multicolour illustrative Edition, New Delhi, 2014.

REFERENCE BOOKS:

1. A.Sudhakar and Shyammohan, *Principles of Electrical Engineering,* Tata McGraw Hill Education

Private Limited,New Delhi. 2012.
2. M.S. Naidu and S. Kamakshaiah, *Introduction to Electrical Technology*, Tata McGrawHillpublishingcompany Ltd, New Delhi, 2007.

II B.Tech. - I semester

(16BT30251) ELECTRICAL TECHNOLOGY LAB

(Common to ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Courses onNetwork Analysis and Network Analysis lab.

COURSE DESCRIPTION:
Construction, operation, types, performance evaluation of DC& ACmachines and transformers;Necessity of starter for DC motors; Three phase power measurement.

COURSE OUTCOMES:
On successful completion of course, students will be able to:

CO1. Demonstrate knowledge on
- Construction, operation of DC& ACmachines and transformers.
- Starting and speed control of DC motors.
- Testing of DC& ACmachines and transformers.
- Characteristics of DC& ACmachines and transformers.
- Measurement of three phase power.
- Applications of DC& ACmachines and transformers.

CO2. Analyzethe operation and performance of DC& ACmachines, transformers and three phase system for various operating conditions.

CO3. Design the circuit with suitable accessories / controllers for desired operation conditions of DC & AC machines.

CO4. Interpret and synthesize the data obtained from experimentation on DC& ACmachines, transformers and three phase system and provide valid conclusions.

CO5. Select and apply appropriate technique for testing and control of DC& ACmachines and transformers useful in industry.

CO6. Apply the conceptual knowledge of electrical machines in relevance to industry and society.

CO7. Commit to ethical principles and standards while exercising the practical investigations on electrical machines.

CO8. Work individually or in a group while exercising practical investigationsin the field of electrical machines.

CO9. Communicate effectively in verbal and written form in relevance to electrical machines.

DETAILED SYLLABUS:

PART -A

1. Construction of DC machines, transformers, synchronous machines, induction motorsand DC motor starters.

PART – B

Any NINE experiments are to be conducted

1. Magnetization characteristic of a DC generator.
2. Load characteristics of DC shunt generator.
3. Swinburne's test on a DC shunt machine.
4. Brake test on a DC shunt motor.
5. Speed control of DC shunt motor by
   a. Field flux control method
   b. Armature voltage control method.
6. OC and SC tests on a singlephase transformer.
7. Load test on a single phase transformer.
8. Measurement of power using two wattmeter method
9. Brake test on a threephase induction motor.
10. Regulation of a three phase alternator by synchronous impedance method.

11. Brake test on single phase induction motor.

II B.Tech. - I semester

(16BT30431) BASIC ELECTRONICS AND DIGITAL DESIGN LAB

(Common to ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Courses on Electronic Devices and Circuits & Switching Theory andLogic Design.

COURSE DESCRIPTION: Diode characteristics; Rectifiers; BJT and FET characteristics; UJT and SCR characteristics; BJT Amplifiers; Combinational Circuits; Realization of Flip-flops; Sequential Circuits; Demonstration on VHDL Programme.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in different electronic devices, analog and digital circuits

CO2. Analyze the characteristics of different electronic devices and circuits like
- Diodes-PN Junction Diodes, Zener Diodes, SCR
- Transistors-BJT,FET,UJT
- Combinational Circuits-HA, FA
- Flip Flops-JK FF, D FF
- Sequential Circuits -Counters

CO3. Design electronic circuits like FET Amplifiers, Combinational Circuits and Sequential Circuits.

CO4. Solve engineering problems with better Electronic circuits.

CO5. Work individually and also in a group in the area of Analog and Digital circuits**.**

CO6. Communicate verbally and in written form in the area of Electronic Devices and circuits.

LIST OF EXERCISES:

PART A

ANALOG DEVICES AND CIRCUITS (Minimum SIX experiments to be conducted)

1. PN Junction and Zener diodes characteristics
2. Ripple Factor and Load Regulations of Rectifier with and without filters (Full wave or Half wave)
3. Input and Output characteristics of Transistor in CE configuration
4. Drain and Transfer Characteristics of JFET
5. Design an Common Source Amplifier Stage and Plot its Frequency response
6. UJT Characteristics
7. SCR characteristics

PART B

DIGITAL CIRCUITS (Minimum FOUR experiments to be conducted)

Design and Realization of
1. Basic gates using universal gates
2. Half Adder and Full Adder using logic gates
3. Multiplexer and Demultiplexer using logic gates
4. Flip Flops using logic gates
5. Asynchronous Counter using ICs
6. Synchronous Counter using ICs

Demonstration of

VHDL Programme

II B.Tech. - I semester

(16BT30432) SIGNALS AND SYSTEMS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: A Course on Signals and Systems.

COURSE DESCRIPTION:
Generation of various signals and sequences; convolution and correlation; verification of linearity and time invariance properties; sampling theorem verification.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in
- Operations on Matrices.
- Generation of Various signals and Sequences.
- Convolution and Correlation of signals and Sequences
- Weiner-Khinchin relation and Sampling Theorem
- Fourier Transform , Laplace Transform and Z-Transform

CO2. Analyze the simulation results for a written program.
CO3. Design MATLAB programs for the given list of exercises.
CO4. Solve problems and obtain the required results to the given list of experiments.
CO5. Apply MATLAB tools for writing the programs.
CO6. Work individually or in group in the area of signals and systems.
CO7. Communicate orally and in written form in the area of signals and systems.

LIST OF EXERCISES:
(Minimum of twelve to be conducted)

1. Basic Operations on Matrices.
2. Generation of Various signals and Sequences Such as Unit Impulse, Unit Step, Square, Saw Tooth, Triangular, Sinusoidal, Ramp, Sinc function.
3. Operations on Signals and Sequences (Addition, Multiplication, Scaling, Shifting, Folding), Computation of Energy and Average Power.
4. Finding the Even and Odd Parts of Signal or Sequence and Real and Imaginary Parts of a Signal.
5. Verification of Linearity and Time Invariance Properties of a System.
6. Computation of Unit Sample, Unit Step and Sinusoidal Responses of the Given LTI System and Verifying its Stability.
7. Finding the Fourier Transform of a given Signal and plotting its Magnitude and Phase Spectrum.
8. Convolution of Signals and Sequences.
9. Autocorrelation and Cross correlation of Signals and Sequences.
10. Verification of Weiner-Khinchin Theorem.
11. Removal of Noise by Auto Correlation / Cross correlation in a given signal corrupted by noise.
12. Sampling Theorem Verification.
13. Laplace Transform for a given function.
14. Locating Zeros and Poles and plotting the Pole-Zero map in S-Plane and Z-Plane for the given Transfer Function
15. Impulse response of a Raised Cosine Filter.

II B.Tech. - II semester

(16BT40401) **ANALOG COMMUNICATIONS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Electronic Devices and circuits, Signals and Systems.

COURSE DESCRIPTION:

Continuous wave modulations; Modulators and De-Modulators; Transmitters; Receivers; Noise performance; Pulse modulations; Multiplexing.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in
- Elements of communication systems.
- Amplitude, Frequency, and Phase Modulations and De-Modulations.
- Noise
- Multiplexing.

CO2. Analyze Noise Performance in different modulation systems, calculation of total power and bandwidth.

CO3. Design Transmitters and Receivers with high signal to noise ratio.

CO4. Solve problems pertaining to modulation schemes, transmitters and receivers considering noise effects.

CO5. Select, and apply appropriate techniques for different modulation schemes understanding power and bandwidth limitations.

CO6. Follow standards while designing transmitters and receivers.

DETAILED SYLLABUS :

UNIT-I: AMPLITUDE MODULATION AND DEMODULATION (12 Periods)

Elements of Communication Systems, Modulation, Modulation Methods, Need for Modulation, Amplitude Modulation (AM), Generation of AM waves - Square law modulator, switching modulators; Demodulation of AM waves – Square law detector, Envelope detector; Double sideband suppressed carrier (DSBSC), Generation of DSBSC waves - Balanced modulator, Ring modulator; Coherent detection of DSBSC waves - Costas receiver, squaring loop; Single sideband modulation (SSB), Generation of SSB waves - Frequency Discrimination Method, Phase Discrimination Method; Demodulation of SSB waves, Vestigial sideband (VSB) modulation & demodulation, Frequency division multiplexing.

UNIT-II:ANGLE MODULATION AND DEMODULATION (09 Periods)

Basic Definitions Phase modulation (PM) and frequency modulation (FM), Single-Tone FM, Bandwidth of angle modulated waves - Narrow band frequency modulation (NBFM) and Wide band frequency modulation (WBFM); Transmission Bandwidth of FM Waves, Generation of FM waves – Indirect FM, Direct FM; Demodulation of FM Waves- Frequency Discrimination, PLL Demodulator**.**

UNIT-III: NOISE (09 Periods)

Noise in Analog communication System, Signal to Noise ratio in AM, DSB & SSB System, Signal to Noise ratio in Angle Modulation System, Threshold effect in Angle Modulation System, Pre-emphasis & De-emphasis, FM Capture Effect.

UNIT-VI: TRANSMITTERS AND RECEIVERS (10 Periods)

Radio Transmitter - Classification of Transmitters, AM Transmitter, FM Transmitter; Radio Receivers - Receiver Types, Tuned radio frequency receiver, Super heterodyne receiver, Intermediate frequency, AGC, FM Receiver, Amplitude limiting; Comparison FM with AM Receiver, Radio Receiver measurements - Sensitivity, Selectivity, and fidelity.

UNIT-V: PULSE MODULATION (05 Periods)

Analog pulse modulation schemes, Pulse amplitude modulation (PAM) & demodulation, Pulse-Time Modulation – Pulse Duration and Pulse Position modulations, and demodulation schemes; Time division multiplexing.

Total Periods: 45

TEXT BOOKS:

1. Simon Haykin, *Communication Systems,* Wiley-India edition, 3rd Edition, 2010.
2. R.P. Singh, S. P. Sapre, *Communication Systems*, TMH, 2nd Edition, 2007.

REFERENCE BOOKS:

1. Herbert Taub & Donald L Schilling, *Principles of Communication Systems*, Tata McGraw-Hill, 3rd Edition, 2009.
2. B. P. Lathi, *Modern Digital and Analog Communication Systems*, Oxford Univ. press, 3rd Edition, 2006.

3. Sham Shanmugam, *Digital and Analog Communication Systems*, Wiley-India Edition, 2006.

II B.Tech. - II semester

(16BT40402) **DIGITAL IC APPLICATIONS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:
Courses on Switching Theory and Logic Design &Electronic Devices and Circuits.

COURSE DESCRIPTION:
Logic Families – CMOS, Bipolar and its Interfacing; Verilog HDL Language Elements and Modelling; Combinational and Sequential Logic Design using ICs; Memories - ROM, SRAM, DRAM, FPGA.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in:
- Classification of Integrated Circuits.
- Characteristics of Integrated Circuits.
- MOS, TTL and ECL Logic Families.
- Interfacing Between Different Logic Families.
- Digital Integrated Circuits.
- Memories.

CO2. Perform analysis of CMOS Circuits.
CO3. Design, develop and model combinational and sequentialcircuits.
CO4. Solve problems using relevant ICs to synthesize digitalintegrated circuits.
CO5. Select appropriate source code model to optimize the design of digital ICs.
CO6. Assess and propose cost effective digital IC solutions to meet design constraints to address societal needs.

DETAILED SYLLABUS

UNIT-I: DIGITAL LOGIC FAMILIES AND INTERFACING (10 Periods)
Introduction to logic families, CMOS logic, CMOS steady state and dynamic electrical behavior, CMOS logic families.Bipolar logic, Transistor-Transistor logic, TTL families, CMOS/TTL interfacing, Low voltage CMOS logic and interfacing, Emitter Coupled Logic.

UNIT-II: HARDWARE DESCRIPTION LANGUAGE (08 Periods)
Introduction, Language Elements, Expressions, Modeling-gate level modeling, data flow modeling, behavioral modeling, structural modeling.

UNIT-III: COMBINATIONAL LOGIC DESIGN (11 Periods)
74x999 Adder and Subtractor, 74x181 Arithmetic and Logic Unit, 8x8 Combinational Multiplier, 74X138 3-to-8 Decoder, 74x148 Priority Encoder, 74x541 and 74x245 Three-State Devices, 74x151 8X1 Multiplexer, 74x155, 74x139 as 2x4 Demultiplexer, 74x86 Exclusive-OR gates,74x280 9-Bit Parity Generator, 74x85 4-bit Comparator, Barrel Shifter using 74x151 multiplexer, Simple Floating point Encoder, Dual priority Encoder, modeling of circuits by using Verilog HDL.

UNIT-IV: SEQUENTIAL LOGIC DESIGN (09 Periods)
Latches and Flip-Flops – 74LS74, 74LS109, Counters - 74x163 binary counters, 74x169 up/down counter, Ring Counters, Johnson Counters. 74x194 universal shift register.Modeling of circuits by using Verilog HDL.Synchronous Design Methodology, Impediments to Synchronous Design.

UNIT-V: MEMORIES (07 Periods)
ROM: internal structure, 2D-decoding commercial types, timing applications.
STATIC RAM: internal structure, SRAM timing, standard SRAM, synchronous RAM.
DYNAMIC RAM: internal structure, timing, synchronous DRAM.
FPGA: Architecture, Applications.

Total Periods: 45

TEXT BOOKS:
1. John F. Wakerly, *Digital Design Principles & Practices*, Pearson Education Asia, 4th Edition, 2008.
2. J. Bhaskar, *A Verilog HDL Primer*, BS Publications, 2nd Edition, 2001.

REFERENCE BOOKS:
1. Charles H. Roth Jr., *Digital System Design Using VHDL*, PWS Publications, 2nd Edition, 2008.
2. Stephen Brown and Zvonko Vranesic, *Fundamentals of Digital Logic with VHDL Design*, McGraw Hill, 2nd Edition, 2005.

II B.Tech. - II semester

(16BT40403) ELECTROMAGNETIC THEORY AND TRANSMISSION LINES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Engineering Mathematics and Engineering Physics.

COURSE DESCRIPTION:
Static Fields; Maxwell's Equations; Electromagnetic Wave Characteristics; Transmission Lines.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Apply fundamental knowledge in characterizing
- Electrostatic Fields
- Magnetostatic Fields
- Boundary Conditions
- Electromagnetic Waves
- Transmission Lines

CO2. Analyze Problems in different medium conditions by using Maxwell's Equations.

CO3. Design and Develop various impedance transformation techniques.

CO4. Provide valid solutions to solve critical problems for Electromagnetic Wave Propagation in different media.

CO5. Understand limits of Electromagnetic Wave Propagation and apply appropriate technique to arrive at feasible solutions.

CO6. Create solutions to compensate impedance mismatch in real time applications for societal needs.

DETAILED SYLLABUS:
Review of calculus and vector algebra.

UNIT - I: STATIC FIELDS (15 Periods)
Coulomb's Law, Electric Field Intensity – Fields due to Different Charge Distributions.Electric Flux Density, Gauss Law and Applications, Electric Potential, Relations between E and V,Convection and Conduction Currents,Continuity Equation. Maxwell's Two Equations for Electrostatic Fields, Capacitance – Parallel Plate, Coaxial Capacitors. Biot-Savart's Law, Ampere's Circuital Law, Magnetic Flux Density, Maxwell's Two Equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law, illustrative Problems.

UNIT - II: MAXWELL'S EQUATIONS (06 Periods)
Faraday's Law and Transformer emf, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements. Conditions at a Boundary Surface: Dielectric-Dielectric and Dielectric-Conductor Interfaces, illustrative Problems.

UNIT - III: EM WAVE CHARACTERISTICS (12 Periods)
Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, Sinusoidal Variations, Wave Propagation in Lossless and Conducting Media.Conductors & Dielectrics – Characterization, Wave Propagation in Good Conductors and Good Dielectrics.Polarization,Reflection - Normal and Oblique Incidences for both Perfect Conductor and Perfect Dielectrics.Refraction of Plane Waves - Brewster Angle, Total Internal Reflection.Poynting Vector and Poynting Theorem, Illustrative Problems.

UNIT - IV: TRANSMISSION LINES - I (06 Periods)
Types, Parameters, Transmission Line Equations, Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line Concepts, Lossless/Low Loss Characterization, Condition for Distortionless Lines.

UNIT - V: TRANSMISSION LINES - II (06 Periods)
Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR. ë/4, ë/2, ë/8 Lines – Impedance Transformations. Smith Chart – Configuration and Applications, Single stub matching, Illustrative Problems.

Total Periods: 45

TEXT BOOKS:
1. Matthew N.O. Sadiku, *Elements of Electromagnetic*, Oxford University Press, 3rd Edition, 2001.
2. John D. Ryder, *Networks, Lines and Fields*, PHI, 2nd Edition, 1999.

REFERENCE BOOKS:
1. Nathan Ida, *Engineering Electromagnetics,* Springer (India) Pvt. Ltd., New Delhi, 2nd Edition, 2005.
2. William H. Hayt Jr. and John A. Buck, *Engineering Electromagnetics*, TMH, 7th Edition, 2006.
3. Schaum's Outlines, *Electromagnetics*, TMH, 2nd Edition, 2006.

4. E.C. Jordan and K.G. Balmain, *Electromagnetic Waves and Radiating Systems*, PHI, 2nd Edition, 2000.

II B.Tech. - II semester

(16BT40404) LINEAR IC APPLICATIONS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses onNetwork Analysis & Pulse and digital Circuits.

COURSE DESCRIPTION:

Operational Amplifier (Op-Amp) basics and its characteristics; Op-Amp Linear and Non- Linear Applications; Voltage Regulators and Analog filter Design; study of internal functional blocks and the applications of special ICs like IC 555 Timer; PLL circuits; DAC and ADCs; DAC and ADC Specification.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate the knowledge of
- operational amplifiers
- Regulators and filters
- 555 timer and PLL
- D-A and A-D convertors

CO2. Analyze Operational Amplifier circuits and evaluate parameters of Operational Amplifier circuits.

CO3. Using linear ICs, design and develop
- V to I and I to V convertors
- Integrators and Differentiators
- Multivibrators
- Triangular wave generators.

CO4. Solve engineering problems and arrive at solutions using electronic circuits designed using linear ICs.

CO5. Select appropriate technique for operating op amp and 555 timer in different modes of operation based on applications.

DETAILED SYLLABUS:

UNIT I: INTEGRATED CIRCUITS ANDOPERATIONAL AMPLIFIER (10 Periods)

Basics of IC fabrication, Differential amplifier – DC and AC analysis of Dual input balanced output configuration, Cascade differential amplifier stages, Level Translator; Basic information of OP-AMP, OP-Amp Block diagram, ideal and practical OP-Amp Specifications, DC and AC characteristics, 741 OP-Amp, input and output offset voltages and currents, slew rate, CMRR, PSRR, drift, Frequency compensation technique.

UNIT II: OPERATIONAL AMPLIFIER APPLICATIONS (11 Periods)

Introduction, Basic Op-Amp applications, Instrumentation Amplifiers, AC Amplifier, V to I and I to V Converters, Op-amp circuits using diodes, Sample and Hold Circuit, Log and Antilog Amplifiers, Differentiator & Integrator, Introduction to comparators and their applications, Multivibrators, Triangular Wave Generator.

UNIT III: VOLTAGE REGULATOR AND ANALOG FILTERS (08 Periods)

Voltage Regulator: Introduction, Series Op-amp Regulator, IC Voltage Regulators-Fixed Voltage Series Regulator, Characteristics, Line and Load Regulation, Dual Voltage Supply. 723 General Purpose Regulator.

Analog Filters: Introduction, RC Active Filters- first order and second order all pass, Low pass &High pass, Band pass and Band reject.

UNIT IV: IC 555 TIMERS AND PLL (09 Periods)

IC 555 Timer: Introduction to 555 Timer, functional diagram, Monostable Operations, Astable operations & their applications

PLL: Introduction, Basic principles, Phase Detector/Comparator, SE/NE 566 Voltage Controlled Oscillator (VCO), Low Pass Filter. Monolithic Phase-Locked Loop IC 566, Derivation of capture range and lock range of PLL, Applications of PLL- Frequency multiplication & frequency translation.

UNIT V: D-A AND A-D CONVERTERS (07 Periods)

D-A Converter: Introduction, Basic DAC techniques-Weighted resistor DAC, R-2R Ladder DAC, Inverted R-2R DAC and Monolithic DAC (IC1408).

A-D Converters: Introduction, Direct type ADCs- parallel comparator, Counter, Successive Approximation Converter & Dual slope ADC. DAC and ADC specifications. **Total Periods: 45**

TEXT BOOKS:

1. D. Roy Chowdhury, *Linear Integrated Circuits*, New Age International (p) Ltd, 4thEdition, 2011.
2. Ramakanth A. Gayakwad, *Op-Amps & Linear ICs*, PHI, 3rd Edition, 1998.

REFERENCE BOOKS

1. David A. Bell,*Operational Amplifiers & Linear ICs*, Oxford University Press, 2ndEdition, 1997.

2. R.F.Coughlin & Fredrick Driscoll, *Operational Amplifiers & Linear Integrated Circuits*, PHI, 6th Edition, 2001.

II B.Tech. - II semester

(16BT40405) PROBABILITY AND STOCHASTIC PROCESS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: A Course on Engineering Mathematics.

COURSE DESCRIPTION:

Probability theory; The Random Variable; Operations on Single and Multiple Random Variables; Temporal Characteristics of Stochastic Processes; Noise analysis.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Apply knowledge of
- Concepts in Probability
- Single and multiple random variables
- Operations on Single and multiple random variables
- Random processes and their characteristics
- Noise

CO2. Analyze operations on single and multiple random variables and processes.

CO3. Formulate solutions for engineering problems involving probability and random processes.

CO4. Model random processes for the analysis of communication Systems.

DETAILED SYLLABUS :

UNIT-I: PROBABILITY (07 Periods)

Probability introduced through Sets and Relative Frequency, Experiments and Sample Spaces - Discrete and Continuous Sample Spaces; Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Probability as a Relative Frequency, Joint Probability, Conditional Probability, Total Probability, Baye's Theorem, Independent Events, Bernoulli Trials.

UNIT-II: THE RANDOM VARIABLE (11 Periods)

Introduction, Random Variable Concept - Definition of Random variable, Condition for a function to be a Random Variable, Discrete and Continuous Random Variable; Distribution Function, Density FunctionProperties, The Gaussian Random Variable, Other distribution and density examples - Binomial, Poission, Uniform, Exponential, Rayleigh; Conditional Distribution and Density Functions, Properties.

Operations on One Random Variable: Introduction, Expectation, Moments - Moments about Origin, Central Moments, Variance and Skew; Chebychev's Inequality, Functions that give moments - Characteristic Function, Moment Generating Function; Transformations of a random Variable.

UNIT-III: MULTIPLE RANDOM VARIABLES (11 Periods)

Multiple Random Variables: Vector Random Variables, Joint Distribution and its Properties, Joint density and its Properties, Marginal Distribution and Density, Conditional Distribution and Density, Statistical Independence, Distribution and density of a sum of random variables, Central Limit Theorem.

Operations on Multiple Random Variables: Expected Value of a Function of Random Variables - Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables; Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

UNIT-IV: STOCHASTIC PROCESSES–TEMPORAL CHARACTERISTICS (10 Periods)

Concept of Stochastic process, Stationary and Statistical Independence, Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes, Correlation Functions - Auto correlation function and its properties, Cross correlation function and its properties, Covariance Functions;Gaussian Random Processes, Poisson Random Process, Linear system response of Mean and Mean-Squared Value, Autocorrelation function of Response, Cross-Correlation functions of Input and Output.

UNIT-V: NOISE ANALYSIS (06 Periods)

Noise classification - Uncorrelated Noise, External Noise, Atmospheric Noise, Extraterrestrial Noise, ManmadeNoise, Internal Noise, Shot Noise, Transit-Time Noise, Thermal noise, Noise power, Noise voltage, Correlated Noise, Impulse Noise; Interference, Signal-to-Noise Power Ratio, Noise Factor and Noise Figure, Equivalent Noise Temperature. **Total Periods: 45**

TEXT BOOKS:

1. Peyton Z. Peebles, *Probability, Random Variables & Random Signal Principles,* TMH, 4th Edition, 2002
2. Wayne Tomasi, *Electronic communications systems*, Pearson Education, 5th Edition, 2004

REFERENCE BOOKS:

1. George R. Cooper and Clare D. McGillem, *Probabilistic Methods of Signal and System Analysis,* Oxford, 3rd Edition, 1999

2. Athanasios Papoulis and S. Unnikrishna Pillai, *Probability, Random Variables and Stochastic Processes,* PHI, 4th Edition, 2002.

II B.Tech. - II semester

(16BT40406) PULSE AND DIGITAL CIRCUITS

(Common to ECE &EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Electronic Devices and Circuits & Network Analysis.

COURSE DESCRIPTION:
Linear and non-linear Wave shaping circuits; Switching characteristics of Diode and Transistor; Design of multivibrators; Sweep circuits; Sampling and logic gates.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Apply the knowledgein
- Responses of High-pass and low-pass RC circuits for different inputs
- Clipping and clamping operations.
- Multivibrators.
- Methods of generating the Time-base waveforms
- Operating Principles of of Sampling gates
- Realization of logic gates using Diodes and Transistors

CO2. Analyze theperformance of Linear and non-linear Wave shaping Circuits.
CO3. Design and develop different Multivibrator Circuits, Sweep circuits, clipper and clamper circuits.
CO4. Solve engineering problems pertaining to pulse and Digital circuits to provide valid conclusions.
CO5. Apply appropriate techniques to obtain optimum solution in the field of pulse and digital circuits.
CO6. Apply contextual knowledge in pulse and digital circuits to assess propagation delay and power dissipation parameters to the Professional engineering practice for societal use.

DETAILED SYLLABUS :

UNIT-I: LINEAR WAVE SHAPING (09 Periods)
High-pass, Low-pass RC circuits, Their response for Sinusoidal, Step, Pulse, Square and Ramp inputs. High pass RC network as a Differentiator and Low pass RC network as an Integrator, Ringing circuit, Attenuators and its application as a CRO probe.

UNIT-II: NONLINEAR WAVE SHAPING (09 Periods)
Diode clippers, Transistor clipper, Clipping at two independent levels, Comparators, Clamping operation, Clamping circuit taking source and Diode resistances into account, Clamping circuit theorem, Practical clamping circuits, Effect of Diode characteristics on Clamping voltage, Synchronized Clamping.

UNIT-III: MULTIVIBRATOR CIRCUITS (09 Periods)
Transistor as a switch, Analysis and Design of Fixed-Bias Bistable, Monostable, Astable Multivibrators (Collector-Coupled), Symmetrical and Asymmetrical triggering, Schmitt trigger Circuit.

UNIT-IV: TIME-BASE GENERATORS (10 Periods)
Voltage Time-Base Generators: General features of a Time-Base signal, Exponential Sweep Circuit, Constant Current Sweep Circuit, UJT Sweep Circuit, Miller and Bootstrap Time-Base generators - basic principles, Transistor Miller Time-Base generator, Transistor Bootstrap Time-Base generator.
Current Time-Base Generators: A Simple Current Sweep, Linearity Correction through Adjustment of Driving Waveform, Transistor Current Time-Base generator.

UNIT-V: SAMPLING GATES AND DIGITAL LOGIC CIRCUITS (08 Periods)
Sampling Gates: Basic operating principles of sampling gates, Unidirectional and Bi-directional sampling gates, Reduction of pedestal in gate circuits, Four Diode Sampling gate, Applications of sampling gates.
Digital Logic Circuits: Realization of Logic gates (OR, AND & NOT) using diodes & transistors,Introduction to DTL, TTL, ECL and CMOS Logic.

Total periods: 45

TEXT BOOKS:

1. Jacob Millman, Herbert Taub and Suryaprakash Rao Mothiki, *Pulse, Digital and Switching Waveforms*, TMH, 3rd Edition,2011.
2. David A. Bell,*Solid State Pulse Circuits*, PHI,4th Edition, 2009.

REFERENCE BOOKS:

1. A. Anand Kumar, *Pulse and Digital Circuits*, PHI, 2nd Edition, 2008.
2. R.Venkataraman, *Pulse Digital Circuits and Computer Fundamentals*, DhanapatRai Publications, 3rd Edition, 1994.

II B.Tech. - II semester

(16BT40431) **ANALOG COMMUNICATIONS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: ACourse on Analog Communications.

COURSE DESCRIPTION:
Simulation and study of various modulation schemes and analog Communications.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in different analog communications.
CO2. Analyze the characteristics of different communication circuits like
- Pre-emphasis & De-emphasis.
- Mixer.
- Radio Receiver.

CO3. Design and simulate various modulation systems for communication needs.
CO4. Solve problems pertaining to modulation schemes and communication systems.
CO5. Use MATLAB tools for simulation of modulation schemes.
CO6. Function effectively as an individual and as a member in a group in the area of analog communications.
CO7. Communicate in verbal and written form in the area of analog communications.

LIST OF EXERCISES:

1. Amplitude Modulation and Demodulation.
2. DSB SC Modulation and Demodulation.
3. SSB Modulation and Demodulation.
4. Spectral analysis of AM signals using spectrum analyzer.
5. Frequency modulation and Demodulation.
6. Pre-emphasis & De-emphasis.
7. Characteristics of mixer.
8. Response of squelch circuit.
9. AGC characteristics.
10. Radio receiver measurements – Sensitivity, Selectivity and Fidelity.
11. Pulse Amplitude Modulation and demodulation
12. Pulse Width Modulation and demodulation

II B.Tech. - II semester
(16BT40432) ELECTRONIC CIRCUIT ANALYSIS AND DESIGN LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES:
A Course onElectronic Circuit Analysis and Design.

COURSE DESCRIPTION:
Design, Simulation and Implementation of Single stage, Multistage Amplifiers, Feedback Amplifiers and Oscillators, Power Amplifiers, Tuned BJT Amplifiers.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge in different electronic circuits and PSPICE tool.
CO2. Analyze amplifiers, Oscillator and Tuned circuits.
CO3. Design and develop single stage, multistage & Power amplifiers and Oscillator circuits.
CO4. Conduct of experiments, analysis and interpretation of data, and synthesis of the information to provide valid solutions.
CO5. Model an electronic circuit using simulation tools.
CO6. Function effectively as an individual and as a member in a group in the area of electronic circuits.
CO7. Communicate in verbal and written form in the area of electronic circuits.

LIST OF EXERCISES:
(Minimum of Twelve experiments to be conducted)

Part-A: Design and Simulation of the following circuits using simulation software
(Minimum of Six Experiments to be conducted):

1. Common Emitter (CE) amplifier
2. A Two Stage RC Coupled Amplifier
3. Cascode Amplifier
4. Current shunt and Voltage Series Feedback Amplifier
5. RC Phase Shift Oscillator
6. Class A Power Amplifier (Transformer less)
7. Class B Complementary Symmetry Amplifier

Part-B: Design and Implementation of the following circuits through hardware
(Minimum of Six Experiments to be conducted):

Any Three circuits from part-A
Any Three of the following

1. Darlington Pair
2. Hartley and Colpitt’s Oscillators
3. Class A Power Amplifier (with transformer load)
4. Class-B push-pull amplifier
5. Class C Tuned Power Amplifier

II B.Tech. - II semester
(16BT40433) **PULSE AND DIGITAL CIRCUITS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: A course on Pulse and Digital Circuits

COURSE DESCRIPTION:

Linear and non-linear Wave shaping circuits; Transistor switching times; UJT relaxation oscillator; sampling and logic gates; Design of Multivibrator circuits.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Apply the knowledge in different Pulse and digital circuits.
CO2. Analyze the characteristics of different Circuits like
- RC Low Pass and High pass Circuits
- Clipping and Clamping Circuits
- Sampling and Logic Gates

CO3. Design the circuits like Multi-vibrators, Sampling Gates, UJT Relaxation Oscillator,Bootstrap sweep circuit, Constant Current Sweep Generator using BJT.
CO4. Provide valid conclusions through the design and conduct of experiments, analysis and synthesis.
CO5. Apply conversion techniques for design of multivibrators.
CO6. Function effectively as an individual and as a member in a group in the area of pulseand digital circuits.
CO7. Communicate effectively to write report and design documentation in the area of pulse and digital circuits.

LIST OF EXERCISES:

PART – A

1. Linear wave shaping - High Pass and Low Pass RC Circuits.
2. Nonlinear wave shaping – Clippers and Clampers.
3. Transistor as a switch.
4. Schmitt Trigger.
5. UJT Relaxation Oscillator
6. Constant Current Sweep Generator using BJT.
7. Bootstrap sweep circuit.
8. Sampling Gates.
9. Characterization of CMOS Inverter.

PART – B (Design aspects included)

1. Bistable Multivibrator.
2. Monostable Multivibrator.
3. Astable Multivibrator.

III B.Tech. - I semester

(16BT3HS02) **MANAGERIAL ECONOMICS AND PRINCIPLES OF ACCOUNTANCY**

(Common to CE, EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION: Managerial Economics; Demand and Elasticity of Demand; Production Functions; Markets and Pricing Policies; Formation of different types of Business Organizations; Basic concepts of Accounting (Journal, Ledger and Trial balance); Trading Account, Profit and Loss Account and Balance sheet with simple adjustments; Computerized Accounting.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Acquire Knowledge in
- Tools and concepts of Micro Economics.
- Basic Principles and concepts of Accountancy.
- Provides life skills for effective utilization of scarce resources.
- Financial Accounting.
- Significance of Economics and Accountancy

CO2. Develop skills in managerial decision making of an organization.
CO3. Apply the Economic theories i.e., Demand, Production, Cost, Markets and Price.
CO4. Develop effective communication in Business and Accounting transactions.
CO5. Ascertain the profitability and soundness of an organization.
CO6. Practice Financial Accounting

DETAILED SYLLABUS:

UNIT – I:INTRODUCTION TO MANAGERIAL ECONOMICS, DEMAND ANALYSIS: (09 Periods)
Definition, Nature and Scope of Managerial Economics.**Demand:** Determinants of demand – Demand function - Law of demand, assumptions and exceptions - Elasticity of demand – Types of elasticity of demand - Demand forecasting and methods of demand forecasting.

UNIT – II:THEORY OF PRODUCTION AND COST ANALYSIS: (09 Periods)
Production Function: Isoquants and Isocosts – Input-output relationship - Law of returns.
Cost Concepts: Total, Average and Marginal Cost **-** Fixed vs. Variable costs – Opportunity Costs vs. Outlay Costs– Separable Costs vs. Joint Costs, Urgent Costs vs. Postponable Costs- Avoidable Costs vs. Unavoidable Costs - **Break Even Analysis (BEA)** – Assumptions, Merits and demerits - Determination of Break Even Point (Simple problems).

UNIT – III:INTRODUCTION TO MARKETS AND PRICING: (09 Periods)
Market Structure: Types of Markets - Features of perfect competition - Monopoly and monopolistic competition - Price and Output determination in perfect competition, monopoly and monopolistic Markets.
Pricing : Objectives and policies of pricing – Sealed bid pricing - Marginal cost pricing - Cost plus pricing - Going rate pricing – penetration Pricing –skimming Pricing - Block pricing – Peak load pricing - Cross subsidization.

UNIT – IV: INTRODUCTION TO PRINCIPLES OF ACCOUNTING AND CAPITAL: (09 Periods)
Accountancy: Introduction – Concepts – Conventions – Double Entry Book Keeping – Journal – Ledger - Trial Balance (Simple problems).
Capital : Significance - Types of capital – Sources of Capital.

UNIT – V:FINAL ACCOUNTS - COMPUTERIZATION OF ACCOUNTING SYSTEM: (09 Periods)
Introduction to Final Accounts - Trading account - Profit and Loss account and Balance Sheet with simple adjustments (Simple problems).
Computerization of Accounting System: Manual Accounting *Vs* Computerized Accounting – Advantages and Disadvantages of Computerized Accounting.

Total Periods: 45

TEXT BOOKS:
1. A.R. Aryasri, *Managerial Economics and Financial Analysis*, Tata McGraw Hill, New Delhi, 3rd Edition, 2007.
2. R.Cauvery, U.K. Sudhanayak, M. Girija and R. Meenakshi, *Managerial Economics*, S.Chand and Company, New Delhi, 2nd Edition, 2010.

REFERENCE BOOKS:
1. Varshaney and Maheswari, *Managerial Economics,* Sultan Chand and Sons, New Delhi, 19th Edition, 2005.
2. Ms. Samba Lalita, *Computer Accounting Lab Work*, 1st Edition, Kalyani Publishers, Ludhiana, 2009.

3. S.P. Jain and K.L. Narang, *Financial Accounting,* Kalyani Publishers, Ludhiana, 6th Edition, 2002.

III B.Tech. - I semester

(16BT50201) CONTROL SYSTEMS

(Common to EEE & ECE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:
Courses on Multivariable Calculus and Differential Equations, Transformation Techniques and Partial Differential Equations.

COURSE DESCRIPTION:
Concepts of control system, transfer function ofvarious physical systems, time response analysis, frequency responseanalysis, controller design, state space analysis.

COURSEOUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on
- The concepts of open and closed loop control systems.
- Stability analysis in time and frequency domain.
- Controllers and compensators to meet the desired specifications.
- State variable techniques.

CO2. Analyze
- Timeand frequency response of second order systems.
- Stability analysis using root-locus, bode and Nyquist plots.
- Controllers and compensators to meet the desired response.
- State space representation from transfer function.

CO3. Design a compensator to meet the design specifications of control system.

CO4. Solve problems pertaining to control systems to provide feasible solutions inreal time environment.

CO5. Selectappropriate techniques to solve control system problems in relevance to industry.

CO6. Apply the conceptual knowledge of control systems in domestic and industrial applications.

DETAILED SYLLABUS:

UNIT-I: MATHEMATICAL MODELING OF SYSTEMS (11 Periods)
Introduction to control systems.Basic elements of control system – open loop and closed loop systems. Effect of feedback.Modeling of physical systems - electrical systems, mechanical systems, analogous systems, armature control and field control of DC motor, DC servomotor.Transfer function - block diagram reduction techniques, signal flow graph.

UNIT-II: TIME RESPONSE AND STABILITY ANALYSIS (13 Periods)
Various test signals and its importance. Time response of first and second order systems, Time-domain specifications, steady state response, steady state error and error constants, static and generalized error coefficients.Routh-Hurwitz stability criterion, Root locus technique- root locus diagram, rules to construct root loci, effect of pole zero additions on the root loci.

UNIT-III: FREQUENCY DOMAIN ANALYSIS (08 Periods)
Performance specifications in the frequency domain. Stability Analysis - Bode plot, Polar plot and Nyquist plot.

UNIT-IV: CONTROLLERS AND COMPENSATORS (06 Periods)
Introduction to controllers, effect of P, PI and PID controllers. Compensators - lag, lead, lead-lag compensator design using bode plot.

UNIT-V: STATE SPACE ANALYSIS (07 Periods)
Transfer function Vs. state space representation. Concepts of state, state variables and state model.Modeling of physical system in state space. Transfer function to state model and vice-versa.State transition matrix and its properties.Controllability and observability using Kalman's test.

Total Periods: 45

TEXT BOOKS:

1. A. Anand kumar, *Control Systems*, PHI learning Pvt. Ltd., 2ndEdition, 2014.
2. Katsuhiko Ogata, *Modern Control Engineering*, Pearson Education Publishers, 5th Edition, 2010.

REFERENCE BOOKS:

1. Nagrath I.J. and Gopal M, *Control Systems Engineering*, New Age International Publications, 5th Edition, 2010.
2. Richard C. Dorf and Robert H. Bishop,*Modern Control Systems,* Prentice Hall, 12th Edition, 2010.
3. Benjamin C.Kuo and FaridGolnaraghi, *Automatic Control Systems,* John Wiley & Sons Publications, 8th Edition, 2002.

4. A.Nagoorkani, *Control Systems*, RBA Publications, 2ndEdition, 2006.

III B.Tech. - I semester

(16BT50401) DIGITAL COMMUNICATIONS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Signals and Systems, Analog Communications & Probability and Stochastic Processes.

COURSE DESCRIPTION: Digitization techniques - PCM, DPCM, Delta modulation and Adaptive Delta Modulation; Digital Baseband and Passband signal transmission; Detection of Baseband and Passband signals and error probability; Information Theory - Source and channel coding techniques.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Apply knowledge in
- Elements of Digital Communication systems.
- Digitization techniques such as PCM, DPCM, DM and ADM
- Digital carrier modulation techniques
- Error Probability and detection of Baseband and Bandpass modulated signals
- Measure of information
- Source and Error Control Coding techniques.

CO2. Analyze different types of digital modulation schemes based on bit error probability.

CO3. Design methods for digital communications systems according to the required specifications like transmission power, bandwidth and SNR.

CO4. Solve problems using different coding techniques to improve error performance of Digital communication system.

CO5. Select appropriate coding techniques to improve transmission rates.

CO6. Apply the knowledge and skills to meet societal needs relevant to communication systems.

DETAILED SYLLABUS:

UNIT-I: PULSE DIGITAL MODULATION (10 Periods)

Elements of Digital Communication Systems; Advantages of Digital Communication Systems; Quantization of signals, Quantization error; Electrical representation of binary digits, Pulse Code Modulation (PCM);PCM System; Companding, Differential PCM, Delta Modulation and its drawbacks, Adaptive Delta Modulation.

UNIT-II: NOISE IN PULSE-CODE AND DELTA-MODULATION SYSTEMS (08 Periods)

PCM Transmission: Calculation of Quantization noise, Output Signal Power, Effect of thermal noise in PCM, Output Signal To Noise Ratio in PCM.

Delta Modulation: Quantization Noise in DM, Output signal power, Effect of thermal noise in DM, Output Signal To Noise Ratio in DM; Comparison of PCM and DM systems.

UNIT-III: DIGITAL MODULATION SCHEMES (12 Periods)

Base Band Data Transmission: Elements of Baseband Binary PAM Systems, Baseband Shaping, Correlative coding, Eye Pattern.

Band Pass Data Transmission: Introduction, Amplitude Shift Keying (ASK); Frequency Shift Keying (FSK); Phase Shift Keying (PSK); Quadrature PSK and M-ary PSK; Differential Phase Shift Keying (DPSK); M-ary QAM; Probability of error, Optimum filter, Matched filter, Correlator, Calculation of error Probability of ASK, PSK, FSK and QPSK.

UNIT-IV: INFORMATION THEORY (08 Periods)

Measure of Information, Source Encoding - Huffman coding, Shanon-Fano Coding; Error Free Communication over Noisy Channel, Channel Capacity of Discrete Memoryless Channel, Channel Capacity of Continuous Channel, Practical Communication Systems in light of Shannon's Equation.

UNIT-V: ERROR CORRECTION CODES (07 Periods)

Introduction, Linear Block codes, Cyclic Codes, Convolution Codes, Comparison of Coded and Uncoded Systems.

Total Periods: 45

TEXT BOOKS:

1. H. Taub and D. Schilling, *Principles of Communication Systems*, TMH, 2nd Edition, 2003.
2. B.P.Lathi, *Modern Digital and Analog Communication Systems,* Oxford reprint, 3rd Edition, 2004.

REFERENCE BOOKS:

1. Simon Haykin, *Digital communications*, John Wiley, 2005.
2. Sam Shanmugam, *Digital and Analog Communication Systems*, John Wiley, 2005.

3. R.P Singh and S.D Sapre, *Communication Systems Analog and Digital*, TMH, 2nd Edition, 2007.

III B.Tech. - I semester
(16BT50402) MICROPROCESSORS AND MICROCONTROLLERS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:ACourse on Switching Theory and Logic Design.

COURSE DESCRIPTION:

Architecture, Instruction set and programming of 8086; Programmable interfacing devices - architecture and programming; Interfacing Memory and I/O devices with 8086; 8051 Microcontroller - Architecture, programming, interrupts and applications.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in
- Internal hardware details of Intel 8086, 8051 and programmable devices like 8255, 8251, 8259, 8257.
- Interfacing various peripherals to build standalone systems.

CO2. Critically analyze the requirements to meet the specifications of microprocessors and microcontrollers based systems.

CO3. Design and develop suitable interfaces for real time applications.

CO4. Exhibit programming skills, choose suitable hardware and program the devices to solve Engineering problems.

CO5. Apply appropriate techniques, resources to complex engineering activities for modeling microcomputer and microcontroller based systems with understanding of limitations.

CO6. Apply concepts of microprocessors and microcontrollers for solving societal problems.

DETAILED SYLLABUS:

UNIT - I: 8086 ARCHITECTURE AND PROGRAMMING (10 Periods)

Microprocessor Evolution, Review of Intel 8085, 8086 internal Architecture - register organization, memory segmentation, memory organization; Introduction to programming the 8086 - Assembler directives, addressing modes, instruction set, simple programs, procedures and macros;

UNIT - II: 8086 INTERFACING AND INTERRUPTS (08 Periods)

Pin description, minimum & maximum mode operation of 8086, timing diagram. Interfacing memory (RAM and EPROM) to 8086. 8086 Interrupts - types and interrupt responses, Interrupt vector table, priority of interrupts; 8259 priority interrupt controller - architecture, system connections and cascading, initialization of 8529;

UNIT - III: PROGRAMMABLE DATA COMMUNICATION DEVICES (11 Periods)

Introduction to serial and parallel communication, methods of parallel data transfer. 8255 PPI - Internal architecture and system connections, operational modes and initialization, interfacing stepper motor, ADC, DAC, Optical Shaft Encoder; Methods of serial data transfer, 8251 USART - architecture and its initialization, sending and receiving characters; Serial communication standard - RS232C, USB; Architecture and operation of 8257 DMA controller.

UNIT - IV: MICROCONTROLLERS AND PROGRAMMING (08 Periods)

Microcontroller Vs. General purpose microprocessor, 8051/8052 Microcontroller – architecture, features, register organization, pin diagram, internal and external memories & their interfacing, instruction set, addressing modes, simple programs;

UNIT - V: 8051 INTERFACING (08 Periods)

Timer/Counters – Registers, modes and programming; Serial communication – registers, programming 8051 for serial communication; Interrupts – registers, programming; 8051 applications – Interfacing key board, LEDs and LCD;

Total Periods: 45

TEXT BOOKS:

1. Douglas V. Hall, *Microprocessors and Interfacing: Programming and Hardware,* Tata McGraw-Hill, revised 2nd Edition, 2006.
2. Muhammad Ali Mazidi and Janice Gillispie Mazidi, *The8051 Microcontroller and Embedded Systems,* Prentice Hall of India, 2000.

REFERENCE BOOKS:

1. A.K. Ray and K.M. Bhurchandi, *Advanced Microprocessors and Peripherals- Architecture, Programming and Interfacing,* Tata McGraw Hill, 2002 reprint.
2. Kenneth J. Ayala, *The 8051 microcontroller, Thomson Delmar learning,* 3rd Edition, 2004.

III B. Tech. I Semester
(16BT50403) **VLSI DESIGN**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:
A Course on Digital IC Applications.

COURSE DESCRIPTION:
CMOS Technology; Stick Diagrams and Layouts; Subsystem design; Programmable Interconnect structures; Synthesis and Test Principles.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in
- Understanding the Fabrication Process of MOS Transistors
- Electrical properties of CMOS Circuits
- Designing Static Combinational and Sequential logic at transistor level, including Mask layout.
- Estimating and optimizing combinational RC Circuit delay using RC delay models and logical effort.
- Design methodology and tools.
- Test Principles.

CO2. Analyze characteristics and performance of CMOS Circuits.
CO3. Design solutions for subsystems to compensate tradeoff between area, speed and power requirements.
CO4. Synthesize and extract information from designs and layouts for optimum solutions.
CO5. Select and apply appropriate designs to overcome the limitations of CMOS devices for high speed applications.
CO6. Assess test strategies for design and development of Integrated Circuits for societal needs.

DETAILED SYLLABUS:

UNIT-I: FABRICATION AND ELECTRICAL PROPERTIES OF MOS (10 Periods)
Basic Electrical Properties of MOS: Ids – Vds relationships, Threshold Voltage VT, gm-, gds and ù0; Pass Transistor, NMOS inverter, Pull up to pull down ratio for an NMOS inverter, CMOS Inverter, Fabrication Process for NMOS and CMOS technology.

UNIT-II: CMOS CIRCUIT DESIGN PROCESS (10 Periods)
VLSI design flow, MOS layers, stick diagrams, NMOS design style, CMOS design style, lambda based design rules, layouts for inverters, sheet resistance, capacitances of layers, Gate delays, Delay estimation, Limitations of Scaling.

UNIT-III: SUBSYSTEM DESIGN - I (08 Periods)
Adders – Transmission based Adder, Carry look-ahead adder, Manchester carry chain adder, Carry Skip Adder, Carry Select Adder; Barrel Shifter, Multipliers – Array Multiplier, Booth Multiplier; ALUs.

UNIT-IV: SUBSYSTEM DESIGN - II (09 Periods)
Counters- Synchronous and Asynchronous Counter; High Density Memory Elements - Design Approach, FPGAs, Programmable Interconnect structures - Fusible links, Antifuse via link, UV Erasable, Electrically Erasable; CPLDs, Cell based Design Methodology.

UNIT-V: LOW POWER DESIGN AND TESTING (08 Periods)
Need for Low Power VLSI Chips, Basic Principles Of Low Power Design, Low Power Techniques for SRAM, CMOS Testing, Need for testing, Test Principles, Design Strategies for test.

Total Periods: 45

TEXT BOOKS:

1. Kamran Eshraghian, Douglas A. Pucknell and Sholeh Eshraghian, *Essentials of VLSI Circuits and Systems*, PHI, 2005.
2. Weste and Eshraghian, *Principles of CMOS VLSI Design*, Pearson Education, 1999.

REFERENCE BOOKS:

1. Gary Yeap, *Practical Low-Power Digital VLSI Design*, Springer Publication, 1998.
2. John M. Rabaey, *Digital Integrated Circuits: A Design Perspective*, PHI, 2nd Edition, 1997.

3. Stephen Brown, Zvonko Vranesic, *Fundamentals of Digital Logic with VHDL Design*, TMH, 2007.

III B.Tech. - I semester

(16BT50404) ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

(Interdisciplinary Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION:

Measurements and Measuring Systems; Signal Analyzers and Oscilloscopes; Transducers; Display Devices and Recorders; Data Acquisition Systems and Telemetry.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in
- Working of measuring instruments
- Operating principles of various display and recording devices
- Various measurement techniques
- Errors in measurements and their rectification
- Transmitting techniques of various electrical and non-electrical quantities
- Application of digital techniques in development of instrumentation systems

CO2. Analyse and compare the performance of various measuring systems based on the response to the given inputs.

CO3. Design of basic electronic instruments according the required specifications.

CO4. Solve engineering problems using different transducers for measurement of an electrical or non-electrical quantity and establish the drawbacks of instruments.

CO5. Create effective and suitable techniques to overcome limitations of the instruments and display devices in measuring systems.

CO6. Apply the instrumentation technology to provide wide range of solutions for the problems of Societal, Health and Safety issues in real time world.

DETAILED SYLLABUS:

UNIT-I: MEASUREMENTS AND MEASURING SYSTEMS (10 Periods)

Static characteristics – Accuracy, Precision, Resolution, Sensitivity, measurement Errors; Dynamic Characteristics - Speed of response, fidelity, Lag, Dynamic error and Statistical Analysis; Basic meter movement; Ammeters – Multirange, Universal Shunt, Extending Ranges; DC voltmeters – Multirange, Range extension, Loading, Transistorized Voltmeter; AC voltmeters – Rectifier type, Thermocouple Type; Ohmmeters - Series type and Shunt type; Calibration of DC Instrument & Ohmmeter, Multimeter for Voltage, Current & Resistance measurements.

UNIT-II: TRANSDUCERS AND BRIDGES (10 Periods)

Transducers: Classification of Transducers; Measurement of Displacement (Resistance, Capacitance, Inductance, LVDT), Force (Strain Gauges), Pressure (Piezoelectric Transducers), Temperature (Resistance Thermometers, Thermocouples, Thermistors); Measurement of Velocity, Acceleration, Vibration, Moisture and pH value.

Bridges: Wheatstone bridge, Kelvin Bridge, Practical Kelvin's double bridge, Maxwell's bridge, Hay's bridge, Schering bridge, Wien Bridge, Anderson Bridge, Errors and precautions in using bridges, Q-meter.

UNIT-III: SIGNAL ANALYZERS AND OSCILLOSCOPES (12 Periods)

Signal Analyzers: Wave analyzers - Frequency Selective Wave Analyzer, Heterodyne Wave Analyzer, Application of Wave Analyzers, Harmonic Distortion Analyzers, Total Harmonic Distortion; Spectrum Analyzers – Basic Spectrum Analyzer, Spectral Displays, Spectra of Different Spectrum Analyzers.

Oscilloscopes: Oscilloscope Block diagram, Cathode Ray Tube, Vertical Deflection System, Delay Line, Horizontal Deflection System - Triggered Sweep, Delayed sweep; CRO Probes, Dual Beam & Trace CROs, Measurement of Amplitude, Frequency and Phase (Lissajous method), Sampling Oscilloscope, Analog Storage Oscilloscope, Digital Storage Oscilloscope.

UNIT-IV: DISPLAY DEVICES AND RECORDERS (07 Periods)

Display Devices: Segment Displays – Seven Segment Display, Dot Matrix Display; LCD Display, BCD to 7 Segment Converter, BCD to Dot Matrix Converter.

Recorders: Strip Chart Recorder and X-Y Recorder.

UNIT-V: DATA ACQUISITION SYSTEMS AND TELEMETRY (06 Periods)

Data Acquisition System: Generalized Data Acquisition System, Single and Multi-Channel DAS.

Telemetry: General Telemetry System, Types of Telemetry Systems, Land Line Telemetry Systems – Voltage, Current and Position Telemetering Systems; Introduction to Radio Frequency Telemetry.

Total Periods: 45

TEXT BOOKS:
1. A.D. Helfrick and W.D. Cooper, Modern *Electronic Instrumentation and Measurement Techniques*, PHI, 5th Edition, 2006.
2. A.K. Sawhney, *A Course in Electrical & Electronic Measurement and Instrumentation,* DhanpatRai& Company Private Limited, New Delhi, 18th Edition, 2007.

REFERENCE BOOKS:

1. David A. Bell, *Electronic Instrumentation & Measurements*, PHI, 2nd Edition, 2003.
2. H.S.Kalsi, *Electronic instrumentation,* TMH, 3rd Edition, 2015.

III B.Tech. - I semester

(16BT50501) COMPUTER NETWORKS

(Common to ECE, CSE, IT&CSSE)

(Interdisciplinary Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION:
Introduction to Computer Networks; The Physical Layer; The Data Link Layer; The Medium Access Control Sub layer; The Network Layer; The Transport Layer; The Application Layer.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:
- Functionalities of Various OSI and TCP/IP layers
- 3G Mobile phone networks, 802.11
- TCP,UDP and SMTP

CO2. Analyze the issues related to data link, medium access and transport layers by using channel allocation and connection management schemes.

CO3. Design and compute subnet masks and addresses for networking requirements.

CO4. Solve problems related to Flow control, Error control, congestion control and Network Routing.

CO5. Apply Network Standards - 802.3 and 802.11 for developing computer Networks.

CO6. Assess the impact of wired and wireless Networks in the context of legal, safety, health and societal issues.

DETAILED SYLLABUS:

UNIT- I: INTRODUCTION AND PHYSICAL LAYER (09 Periods)
Introduction: Network Hardware, Network Software, Reference Models - OSI, TCP/IP; Example Networks – Internet; Wireless LANs - 802.11.
Physical Layer: Guided Transmission Media, Wireless Transmission.

UNIT- II: DATA LINK LAYER AND MEDIUM ACCESS CONTROL SUBLAYER (10 Periods)
Data Link Layer: Data Link Layer Design Issues, Error Detection and Correction-CRC, Hamming Codes, Elementary Data Link Protocols, Sliding Window Protocols.
Medium Access Control Sublayer: ALOHA, Carrier Sense Multiple Access Protocols, Collision-Free Protocols, Ethernet, Data Link Layer Switching- Repeaters, Hubs, Switches, Routers, and Gateways.

UNIT-III: NETWORK LAYER (10 Periods)
Network Layer Design Issues, Routing Algorithms - Shortest Path, Flooding, Distance Vector, Link State Routing, Hierarchical, Broadcast, Multicast, Anycast; Congestion Control Algorithms, Network Layer in the Internet - The IP Version 4 Protocol, IP Addresses, IP Version 6, Internet Control Protocols.

UNIT-IV: TRANSPORT LAYER (09 Periods)
Internet Transport Protocols: UDP – Segment Header, Remote Procedure Call, Real-Time Transport Protocols; TCP **–** Service Model, Protocol, Segment Header, Connection Establishment, Connection Release, Connection Management Modeling, Sliding Window, Timer Management, Congestion Control.

UNIT-V: APPLICATION LAYER (07 Periods)
Domain Name System (DNS)-Name Space, Domain Resource Records, Name Servers; Electronic Mail-Architecture and Services, User Agent, Message Formats, Message Transfer, Final Delivery; The World Wide Web- Architectural Overview, HTTP.

Total Periods: 45

TEXT BOOK:

1. Andrew S. Tanenbaum and David J. Wetherall, *Computer Networks,* Pearson Education, 5th Edition, 2015.

REFERENCE BOOKS:

1. Behrouz A. Forouzan, *Data Communication and Networking*, Tata McGraw-Hill, 4th Edition, 2010.
2. James F. Kurose and Keith W. Ross, *Computer Networking: A Top-Down Approach Featuring the Internet,* Pearson Education, 2nd Edition, 2012.

III B.Tech. - I semester

(16BT30501) COMPUTER ORGANIZATION

(Interdisciplinary Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION:

Basic structure and operation of a digital computer; Organization and functional principles of the arithmetic and logic unit, control unit, memory unit and I/O unit; Concepts of pipelining and parallel processing techniques;

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:
- Computer Arithmetic units
- Register Transfer Language and Computer Instructions
- Design of Control Unit
- Input Output Organization and Memory system
- Pipelining and Multiprocessing.

CO2. Analyze the functional units of a digital computer.

CO3. Design the functional modules in a digital computer - Arithmetic Units, Memory and I/O.

CO4. Investigate the performance of memory, I/O, and pipelined processors.

CO5. Select appropriate techniques of I/O, Pipelining and Multiprocessing to solve computing problems.

CO6. Apply contextual knowledge of computer systems development to societal applications.

DETAILED SYLLABUS:

UNIT-I: REGISTER TRANSFER AND MICROOPERATIONS AND COMPUTER ARITHMETIC (09 Periods)

Register Transfer And Microoperations: Register transfer, Bus and memory transfers, Arithmetic microoperations, Logic microoperations, Shift microoperations, Arithmetic logic shift unit.

Computer Arithmetic: Fixed point representation, Floating point representation, Addition and subtraction, Binary multiplication algorithms, Binary division algorithms.

UNIT-II: BASIC COMPUTER ORGANIZATION AND DESIGN AND MICRO PROGRAMMED CONTROL (09 Periods)

Basic Computer Organization and Design: Instruction codes, Computer registers, Computer instructions, Instruction formats, Addressing modes, Timing and control, Instruction cycle, Memory reference instructions, Input - Output and Interrupt.

Micro Programmed Control: Control memory, Address sequencing, Design of control unit, Hardwired control, Microprogrammed control.

UNIT-III: INPUT-OUTPUT ORGANIZATION (08 Periods)

Peripheral devices, Input-Output interface, Modes of transfer, Priority interrupt, Direct Memory Access, Input-Output Processor (IOP), Serial communication.

UNIT-IV: THE MEMORY SYSTEM (10 Periods)

Semiconductor RAM memories – Internal organization, Static memories, Synchronous and Asynchronous DRAMs, Structure of larger memories, Memory system considerations, Rambus memory; Read-Only memories – ROM, PROM, EPROM, EEPROM, Flash memory; Cache memory – Mapping functions, Replacement algorithms; Performance considerations, Secondary storage – Magnetic disks, RAID disk arrays, Optical disks, Magnetic tape systems.

UNIT-V: PIPELINE AND VECTOR PROCESSING AND MULTIPROCESSORS (09 Periods)

Pipeline and Vector Processing: Parallel processing, Pipelining, Arithmetic pipeline, Instruction pipeline, Vector processing, Array processors.

Multiprocessors: Characteristics of multiprocessors, Interconnection structures, Inter-processor arbitration, Inter-processor communication and synchronization. **Total Periods: 45**

TEXT BOOKS:

1. Morris Mano, *Computer System Architecture*, 3rd Edition, Pearson Education, 2007.
2. Carl V. Hamacher, Zvonko G. Vranesic and Safwat G. Zaky, *Computer Organization*, 5th Edition, McGraw-Hill, 2002.

REFERENCE BOOKS:

1. William Stallings, *Computer Organization and Architecture: Designing For Performance*, 7th Edition, Pearson Education, 2007.
2. John P. Hayes, *Computer Architecture and Organization*, 3rd Edition, McGrawHill.

III B.Tech. - I semester

(16BT51241) OBJECT ORIENTED PROGRAMMING

(Common to ECE&EIE)

(Interdisciplinary Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION: Introduction of Java, Classes and Objects; Inheritance, Packages, Interfaces; Exception handling, Multithreading; Event handling, AWT, Collection Classes; Applets, Servlets.

COURSE OUTCOMES:
On successful completion of thecourse, students will be able to:

CO1. Demonstrate knowledge on:
- Object Oriented Programming concepts - classes, objects, inheritance, polymorphism, encapsulation and abstraction.
- Packages, interfaces, multithreading, exception handling, event handling.

CO2. Analyze complex engineering problems using object oriented concepts.
CO3. Design and develop reusable code to provide effective solutions for real world problems using inheritance and polymorphism.
CO4. Apply AWT and Applets to create interactive Graphical User Interfaces.
CO5. Use advanced programming languages to develop web applications.
CO6. Build Java Applications suitable for societal requirements.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION OF JAVA LANGUAGE (12 Periods)
Data types, Variables, Arrays, Operators, Control statements.
Classes and Objects: Concepts of Classes, Objects, Constructors, Methods, this keyword, Garbage collection, Overloading Methods and Constructors, Parameter passing, Access control, Recursion, String Class.

UNIT-II: INHERITANCE, PACKAGES AND INTERFACES (07 Periods)
Inheritance: Inheritance basics, Super Keyword, Multi-level hierarchy, Abstract classes, final Keyword with inheritance.
Packages: Definition, Creating and Accessing a package, Understanding CLASSPATH, Importing packages.
Interfaces: Definition, implementing interfaces, Nested interfaces, Applying interfaces, Variables in interface and Extending interfaces.

UNIT-III: EXCEPTION HANDLING AND MULTITHREADING (09 Periods)
Exception Handling: Concepts of exception handling, Exception Types, Usage of try, catch, throw, throws and finally, Built in exceptions, Creating own exception sub classes.
Multithreading: Java thread model, Creating threads, Thread priority, Synchronizing threads,Inter-thread communication.

UNIT-IV: COLLECTION CLASSES, THE APPLET CLASS AND AWT (09 Periods)
The Collection Classes: ArrayList Class, LinkedList Class, HashSet Class, LinkedHashSet Class, TreeSet Class, PriorityQueue Class, EnumSet Class.
The Applet Class: Types of applets, Applet Basics, Applet Architecture, Applet Skeleton, Passing Parameters to Applets.

The AWT Control Fundamentals, User interface components, Layout managers.

UNIT-V: EVENT HANDLING AND SERVLETS (08 Periods)
Delegation event model: Event Classes, Event Listener Interfaces – Mouse and Key; Adapter classes.
Servlets: Life Cycle of a Servlet, Using Tomcat for Servlet Development, Create and compile the servlet source code, Servlet API, Javax.Servlet package.

Total Periods: 45

TEXT BOOK:

1. Herbert Schildt, *Java the Complete Reference*, Oracle Press, 9thEdition, 2014.

REFERENCE BOOK:

1. Sachin Malhotra, Saurab Choudhary, *Programming in Java*, Oxford University Press, 2ndEdition, 2014.

III B.Tech. - I semester
(16BT50431) LINEAR AND DIGITAL IC APPLICATIONS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Courses on Linear IC Applications and Digital IC Applications.

COURSE DESCRIPTION: Design and verification of Op-Amp applications; Timers; Voltage regulator; ADC and DAC; Simulation and synthesis of combinational and sequential circuits; XILINX tools.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in different Linear and Digital integrated circuits applications and XILINX tools.
CO2. Analyzedifferentcircuits built with linear and digital ICs.
CO3. Design different multivibrator circuits, filters and digital circuits.
CO4. Conduct of experiments, analysis and interpretation of data, and synthesis of the information to provide valid solutions.
CO5. Model a Linear and Digital integrated circuits using HDL tools.
CO6. Function effectively as an individual and as a member in a group in the area of IC applications.
CO7. Communicate in verbal and written form in the area of IC applications.

LIST OF EXERCISES:

PART A: Linear IC Applications: (Minimum of **six experiments** to be conducted)

1. Op-Amp Applications-Adder, Subtractor and Comparator circuits.
2. Active Filter Applications-LPF, HPF (first and second order).
3. Function Generator using Op-Amps.
4. IC 555 Timer-Monostable and Astable Multivibrators.
5. IC 566-VCO Applications.
6. Voltage Regulator using IC 723.
7. 4 Bit ADC and DAC.
8. Precision Rectifier using Op-Amp.

PART B: **Digital IC Applications:** (Minimum of **six experiments** to be conducted)

Simulate the internal structure of the following Digital IC's using HDL and verify the operations of the Digital IC's (Hardware) in the Laboratory.

1. Half Adder, Full Adder, Half Subtractor & Full Subtractor.
2. 8-3 Encoder-74x148.
3. 3-8 Decoders -74x138.
4. 8x1 Multiplexer -74x151 and 2x4 Demultiplexer -74x155.
5. 4 Bit Comparator-74x85.
6. Decade counter-74x90.
7. Universal shift Register – 74X194/195

III B.Tech. - I semester
(16BT50432) MICROPROCESSORS AND MICROCONTROLLERS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: A course on Microprocessors and Microcontrollers.

COURSE DESCRIPTION:
Assembly language Programming for Intel 8086 & 8051; Interfacing standard peripherals & Programming-DAC, Stepper Motor, ADC, Logic Controller, Keyboard, Seven Segment Display.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in various aspects of microprocessors, microcontrollers and interfaces.
CO2. Analyze various programming alternatives, interfacing methods & usage of various on-chip resources like Timers, Interrupts, ADC, DAC, and Stepper Motor to build standalone systems.
CO3. Design and develop microcomputer based systems to suit to market requirements.
CO4. Solve engineering problems by proposing potential solutions using microprocessors and microcontrollers.
CO5. Apply appropriate techniques, resources, and tools for modeling microcomputer based systems with understanding of limitations.
CO6. Apply concepts of microprocessors and microcontrollers to solve societal problems.
CO7. Work individually and in a group to develop microcomputer based systems.
CO8. Communicate effectively in oral and written form in the field of microprocessors and microcontrollers.

LIST OF EXERCISES:
(Minimum of **TWELVE** experiments to be conducted)

I Programs using 8086

1. Introduction to MASM/TASM
2. Arithmetic operations
3. Logic operations
4. String operations
5. Modular program: using procedure & DOS/BIOS Programming

II Interfacing with 8086

1. Stepper motor
2. Logic controller
3. A/D converter
4. D/A Converter.
5. Seven segment display
6. Keyboard interfacing

III Programs using 8051

1. Arithmetic operations using internal and external memory.
2. Logical Operations.
3. Programs using special instructions like SWAP, bit/byte, set/ reset etc.

IV Interfacing with 8051

1. Square wave generation using Timers in Mode 0 and Mode 1
2. Stepper Motor
3. Digital to Analog Converter

III B.Tech. - I semester

(16BT4HS31) **SOFT SKILLS LAB**

(Common to EEE, ECE&EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES:

English Language Laboratory in I B.Tech or English Laboratory at Diploma Level.

COURSE DESCRIPTION:

This course coversBody Language; Assertiveness; Goal Setting; Creative Thinking; Interpersonal Skills; Team Work; Conflict Management; Etiquette; Report Writing; Group Discussions; Interviewing Skills.

COURSE OUTCOMES:

On successful completion of the course,students will be able to:

CO1. Acquire knowledge in
- Goal Setting
- Creative Thinking
- Leadership Skills and
- Team Work

CO2. Analyse the situations and develop skills for
- Body Language
- Personality Development and
- Stress Management

CO3. Apply the techniques of soft skills in a problem situation enhanced through multimedia software.

CO4. Function effectively as an individual and as a member in diverse teams.

CO5. Communicate effectively in public speaking in formal and informal forums.

LIST OF EXERCISES:

1. Body Language
2. Assertiveness
3. Goal Setting
4. Creative Thinking
5. Interpersonal Skills
6. Team Work
7. Conflict Management
8. Etiquette
9. Report Writing
10. Resume Writing
11. Group Discussions
12. Interviewing Skills

Total Lab Slots: 10

REFERENCE BOOKS:

1. R. C. Sharma & Krishna Mohan, *Business Correspondence and Report Writing*, Tata McGraw-Hill Publishing Company Limited, Third Edition, New Delhi, 2012.
2. Gopalswamy Ramesh and Mahadevan Ramesh, *The Ace of Soft Skills*, Pearson, Noida, 2010.
3. Jeff Butterfeild, *Soft Skills for Everyone, Cengage learning*, Delhi, 2011.
4. Barun K. Mitra, *Personality Development and Soft Skills*, Oxford University Press, Noida, 2012.

SUGGESTED SOFTWARE:

1. ETNL Language Lab Software Version 4.0
2. GEMS – Globarena E- Mentoring System
3. Speech Solutions.
4. English Pronunciation Dictionary by Daniel Jones.
5. Learning to Speak English 8.1, The Learning Company –4 CDs.
6. Mastering English: Grammar, Punctuation and Composition.
7. English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
8. Dorling Kindersley Series of Grammar, Punctuation, Composition etc.
9. Language in Use 1, 2 & 3.
10. Cambridge Advanced Learner's Dictionary - 3rd Edition.
11. Centronix – Phonetics.

12. Let’s Talk English, Regional Institute of English South India.
13. Ultimate English Tutor.

III B.Tech. - II semester

(16BT5HS01) MANAGEMENT SCIENCE

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION: Concepts of Management; Environmental Scanning; Concepts Related to Organization; Operations Management; Work Study; Statistical Quality Control; Inventory Management; Marketing; Human Resource Management; Project Management; Project Crashing; Entrepreneurship; Contemporary Management Practices.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate the concepts of operations management, human resources management, project management and contemporary management practices in managerial context.

CO2. Identify and analyse management problems in the business organizations reaching substantiated conclusions using principles of management.

CO3. Design appropriate organization structure for meeting the needs of the organization with consideration of the employees of the organization.

CO4. Competently employ broad based analytical tools for decision making, system design, analysis and performance.

CO5. Provide solution to organizations for sustainable development.

CO6. Apply knowledge of engineering and management principles to manage the projects in multidisciplinary environments.

DETAILED SYLLABUS:

UNIT- I: INTRODUCTION TO MANAGEMENT AND ORGANIZATION (09 Periods)

Concepts of management and Administration, Nature and Importance of management, Evolution of management thought, Functions of management, Contributions of F.W. Taylor and Henry Fayol to the management, Systems approach to management, Managerial skills, Elements of corporate planning process, Environmental scanning, SWOT Analysis, Social responsibilities of management.

Basic concepts related to organization, Objectives and Principles, Types of organizations- Line Organization, Line and Staff Organization, Functional Organization, Matrix Organization, Network organization.

UNIT- II: OPERATIONS MANAGEMENT (12 Periods)

Plant location- Factors and Principles; Plant Layout- Principles and Types; Methods of production, Work study- Basic procedure involved in method study and work measurement; Statistical Quality Control- Factors affecting quality, Control charts for variables and attributes, Acceptance sampling; Materials management- objectives, Inventory- Types of inventory, Classical EOQ model, ABC analysis; Purchase procedure, Stores management, Marketing- Functions, Channels of distribution.

UNIT-III: HUMAN RESOURCE MANAGEMENT (HRM) (06 Periods)

Nature and scope of HRM, Functions of HRM, Role of HR Manager in an organization, Job evaluation, Merit rating, Maslow’s hierarchy of human needs, McGregor’s theory X and theory Y, Herzberg’s two-factor theory of motivation.

UNIT-IV: PROJECT MANAGEMENT (PERT/CPM) AND ENTREPRENEURSHIP (09 Periods)

Network analysis - Critical path method (CPM), Program evaluation and review technique (PERT); Project cost analysis - Project crashing.

Introduction to Entrepreneurship, Entrepreneurial Traits, Entrepreneur vs. Manager, Role of Entrepreneurship in Economic Development, Women as an Entrepreneur.

UNIT-V: CONTEMPORARY MANAGEMENT PRACTICES (09 Periods)

Basic concepts of Material Requirements Planning, Enterprise resource planning (ERP), Just In Time (JIT) system, Total Quality Management (TQM), Value Chain Analysis, Business Process Outsourcing (BPO), Globalization, Management Challenges, Supply Chain Management (SCM), Role of Information Technology in managerial decision making, Six Sigma Concept, Maintenance Strategies- Preventive, Periodic and Breakdown Maintenance.

Total Periods: 45

TEXT BOOKS:

1. O.P. Khanna, *Industrial Engineering and Management*, Dhanpat Rai and Sons, 2010.
2. Martand T.Telsang, *Industrial Engineering and Production Management*, S. Chand, 2nd Edition, 2006.

REFERENCE BOOKS:

1. Koontz and Weihrich, *Essentials of Management*, TMH, 6th Edition, New Delhi, 2007.
2. N.D. Vohra, *Quantitative Techniques in Management*,TMH, 2nd Edition, New Delhi.

III B.Tech. - II semester

(16BT60401) ANTENNAS AND WAVEGUIDES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:ACourse on Electro Magnetic Theory and Transmission Lines.

COURSE DESCRIPTION:

Waveguides, Antenna Parameters; Wire antennas; Antenna Arrays; VHF, UHF and Microwave antennas; Antenna Measurements.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Apply the knowledge of fundamentals in antenna theory and waveguides.
CO2. Analyze the characteristics and performance of different antennas and waveguides.
CO3. Design and develop various antennas.
CO4. Provide solutions through different antenna designs.
CO5. Apply appropriate techniques, resources to complex engineering activities in the field of antennas.
CO6. Apply contextual knowledge for design of antennas with required radiation levels for communication needs meeting the public health and safety conditions.

DETAILED SYLLABUS:

UNIT-I: WAVEGUIDES (09 Periods)

Introduction, Rectangular waveguides-Solutions of wave equations in rectangular coordinates, TE and TM modes analysis, Expressions for fields, Characteristic equation and cutoff frequencies, Filter characteristics, Dominant and degenerate modes, sketches of TE and TM mode fields in the cross section; Mode characteristics – Phase and group velocities, Wavelengths and impedance relations, Power transmission and power losses; Micro strip lines-Introduction, ZO relations, Effective dielectric constant, Losses, Q-factor, Illustrative Problems.

UNIT-II: ANTENNA BASICS AND THIN LINEAR WIRE ANTENNAS (10 Periods)

Introduction, Radiation mechanism, Antenna parameters - patterns, Beam Area, Radiation Intensity, Beam Efficiency, Directivity-Gain-Resolution, Antenna Apertures, Effective height; Antenna Field Zones, Antenna theorems, Friis transmission equation, Retarded potentials, Radiation from small electric dipole, Quarter wave monopole and half wave dipole - Current distributions, Field components, Radiated power, Radiation resistance, Beam width, Directivity, Effective area and Effective height; Natural current distributions, far-fields and patterns of Thin linear center-fed antennas of different lengths, Illustrative problems.

UNIT-III: ANTENNA ARRAYS (10 Periods)

Point sources- Definition, Patterns, arrays of 2 isotropic sources different cases; Principle of pattern multiplication, Uniform linear arrays - Broadside arrays, End fire arrays, EFA with increased directivity, Derivation of their characteristics and comparison, BSA with non-uniform amplitude distribution - General considerations and Binomial arrays, Arrays with parasitic elements, Yagi-Uda arrays, Folded dipoles & their characteristics, Illustrative problems.

UNIT-IV: VHF, UHF AND MICROWAVE ANTENNAS (10 Periods)

Helical Antennas - Helical geometry, Helix modes, Practical design considerations for monofilar helical antenna in axial and normal modes ,Horn antenna,Microstrip antennas - Introduction, Features, Advantages and limitations; Rectangular patch antennas - Geometry and parameters, characteristics of microstrip antennas, Impact of different parameters on characteristics; Reflector antennas- Introduction, Flat sheet and corner reflectors, Paraboloidal reflectors - Geometry, Pattern characteristics, Feed methods, Reflector types, Illustrative problems.

UNIT-V: ANTENNA MEASUREMENTS (06 Periods)

Introduction, Concepts- Reciprocity, Near and far fields, Coordination system, Sources of errors, Pattern measurement arrangement, Measurement of Directivity, Gain(by comparison, Absolute and 3-Antenna Methods), Radiation pattern.

Total Periods: 45

TEXT BOOKS:

1. John D. Kraus and Ronald J. Marhefka and Ahmad S.Khan, *Antennas and wave propagation*, 4th Edition (Special Indian Edition), TMH, New Delhi, 2010.
2. Samuel Y. Liao, *Microwave devices and circuits,* Pearson Education, 3rd Edition, 2003

REFERENCE BOOKS:

1. C.A. Balanis, *Antenna Theory*, 2nd Edition, John Wiley & Sons, 2001.

2. E.C. Jordan and K.G. Balmain, *Electromagnetic Waves and Radiating Systems*, 2nd Edition, PHI, 2000.

III B.Tech. - II semester

(16BT60402) DIGITAL SIGNAL PROCESSING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: A course on Signals and Systems.

COURSE DESCRIPTION:
Continuous and discrete signals and sequences; systems**;** DFT and FFT algorithms for the analysis of discrete sequences; design and realization of Digital IIR and FIR filters; DSP processors and architectures.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Apply the knowledge of fundamentals in
- Frequency analysis of signals and systems.
- DFT and FFT transforms.
- Analog & Digital Filter Design.
- Digital Filter Realization.
- DSP Processors.

CO2. Analyze numerical and analytical problems of discrete time signals and systems in frequency domain using Transforms.

CO3. Design and develop digital filters to optimize system performance and their realization.

CO4. Interpret and synthesize the response of Digital filters to validate their characteristics.

CO5. Apply appropriate techniques and algorithms to design digital signal processing systems with an understanding of limitations.

DETAILED SYLLABUS:

UNIT I – INTRODUCTION TO DIGITAL SIGNAL PROCESSING (10 Periods)
Discrete-time signals and systems, Linear shift invariant, Stability and Causality, Linear constant coefficient difference equations, solution for difference equations using Z-transforms, Frequency analysis of signals - Fourier series and Fourier transform of Discrete time signals; Frequency domain representation of Discrete Time Systems.

UNIT II – DISCRETE AND FAST FOURIER TRANSFORMS (09 Periods)
Discrete Fourier Transform, properties of DFT, linear filtering methods based on DFT, Relationship of FT to Z Transform.

Fast Fourier transforms (FFT): Radix-2 Decimation in time (DIT) and Decimation in frequency (DIF) FFT algorithms, Inverse FFT.

UNIT III – IIR DIGITAL FILTERS (10 Periods)
Design of IIR digital filters from analog filters-IIR filter design by approximation of derivatives, impulse invariance and bilinear transformation. Characteristics of common use analog filters, Frequency transformations. Structural realization of IIR systems-direct, cascade and parallel form structures, Transposed form.

UNIT IV – FIR DIGITAL FILTERS (09 Periods)
Symmetric and anti-symmetric FIR filters, Design of linear phase FIR digital filters using windowing techniques, Frequency sampling technique, Comparison of IIR and FIR filters. Structural realization of FIR filters-direct, cascade-form structures and linear phase structures.

UNIT V – INTRODUCTION TO DSP PROCESSORS (08 Periods)
Introduction to programmable DSPs: Multiplier and Multiplier Accumulator (MAC), Modified Bus Structures and Memory Access schemes in P-DSPs, Multiple access memory, multi-ported memory, VLIW Architecture, Pipelining, Special addressing modes, On-Chip Peripherals.

Architecture of TMS 320C6X: Introduction, Features of 'C6X Processors, Internal Architecture, CPU, General-Purpose Register Files, Functional Units and Operation, Data Paths, Control Register File.

Total Periods: 46

TEXT BOOKS:
1. John G. Proakis, Dimitris G. Manolakis, *Digital Signal Processing, Principles, Algorithms and Applications*, Pearson Education/PHI, 4th Edition, 2007.
2. B.Venkataramani, M. Bhaskar, *Digital Signal Processors– Architecture, programming and Applications,* TATA McGraw Hill, 2nd Edition, 2010

REFERENCE BOOKS:
1. Alan.V. Oppenheim, Ronald.W. Schafer, John R Buck, *Discrete Time Signal Processing,* Prentice Hall, 2nd Edition, 2006.
2. Tarun Kumar Rawat, *Digital Signal Processing*, Oxford University Press, 1st Edition, 2015 .

III B.Tech. - II semester

(16BT40502) DATABASE MANAGEMENT SYSTEMS

(Interdisciplinary Elective-2)

(Common to CE & ECE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION:

Database Systems; Database Design; Relational Model; SQL Queries, Constraints and Triggers; Schema Refinement and Normal Forms; Transaction Management; Concurrency Control; Overview of Storage and Indexing.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on Data models and Database Languages
- Database design
- Normal forms
- Storage and Indexing

CO2. Analyze databases using normal forms to provide solutions for real time applications.

CO3. Design solutions for database problems using database design, views design and framing queries.

CO4. Use database techniques for designing databases, managing databases and its security.

CO5. Select SQL, Hash based Indexing and Tree based Indexing to manage data in databases.

CO6. Apply contextual knowledge to develop database applications related to societal issues.

DETAILED SYLLABUS:

UNIT- I: INTRODUCTION TO DATABASE SYSTEMS AND DATABASE DESIGN (09 Periods)

Database Systems: Database System Applications, Purpose of Database Systems, View of Data-Data Abstraction, Instances and Schemas, Data Models; Database Languages - DDL, DML; Database Architecture, Database Users and Administrators.

Database design: ER diagrams, Beyond ER design, Entities, Attributes and Entity Sets, Relationships and Relationship sets, Additional features of ER model, Conceptual Design with ER model.

UNIT II: THE RELATIONAL MODEL AND RELATIONAL ALGEBRA AND CALCULUS (08 Periods)

Relational Model: Integrity Constraints over Relations, Enforcing Integrity constraints, Querying relational data, Logical database Design, Introduction to Views, Destroying/altering Tables and Views.

Relational Algebra and Calculus: Preliminaries, Relational Algebra Operators; Relational Calculus - Tuple and Domain Relational Calculus; Expressive Power of Algebra and calculus.

UNIT III: SQL AND SCHEMA REFINEMENT (10 Periods)

SQL: Form of Basic SQL Query- Examples of Basic SQL Queries; Nested Queries- Introduction to Nested Queries, Correlated Nested Queries, Set- Comparison Operators; Aggregate Operators, NULL values-Comparison using Null values, Logical connectives AND, OR and NOT, Impact on SQL Constructs, Outer Joins, Disallowing NULL values; Complex Integrity Constraints in SQL ,Triggers and Active Databases.

Schema Refinement: Problems Caused by redundancy, Decompositions, Problem related to decomposition, Functional Dependencies, Reasoning about FDS, Normal Forms – First, Second and Third Normal forms, BCNF; Multi valued Dependencies, Fourth Normal Form, Join Dependencies, Fifth Normal form.

UNIT IV: TRANSACTIONS AND CONCURRENCY CONTROL (09 Periods)

Transactions: Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability.

Concurrency Control: Lock Based Protocols, Timestamp Based Protocols, Validation Based Protocols, Multiple Granularity, Deadlock Handling.

UNIT V: STORAGE AND INDEXING (09 Periods)

Storage and Indexing: Data on External Storage, File Organization and Indexing – Clustered Indexes, Primary and Secondary Indexes; Index data Structures – Hash Based Indexing, Tree based Indexing; Comparison of File Organizations.

Tree Structured Indexing: Intuition for Tree Indexes, Indexed Sequential Access Method (ISAM), B+ Trees- A Dynamic Index Structure; Search, Insert, Delete;B-Tree Index files. **Total Periods: 45**

TEXT BOOKS:

1. Raghu Ramakrishnan and Johannes Gehrke, *Database Management Systems*, Tata McGraw Hill, 3rd Edition, 2014.
2. A. Silberschatz, H.F.Korth and S. Sudarshan, *Database System Concepts*, Tata McGraw Hill, 5th Edition, 2006.

REFERENCE BOOKS:

1. Ramez Elmasri and Shamkant B. Navathe, *Database Systems*, 6th Edition, Pearson Education, 2013.
2. Peter Rob and Carlos Coronel, *Database Systems Design, Implementation and Management,*Cengage Learing, 7th Edition, 2009.

III B.Tech. - II semester

(16BT71205) CRYPTOGRAPHY AND NETWORK SECURITY

(Interdisciplinary Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION: Principles and Practice of Cryptography and Network Security; Classical Systems; Symmetric Block Ciphers; Public-key Cryptography; Hash Functions; Authentication; Key Management; Key Exchange; Signature Schemes; E-mail; Web Security; Malicious Software; Intrusion Detection; Phishing and Identity Theft.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:
- Cryptographic algorithms and their mathematical models
- Message Authentication
- Digital Signatures
- Malicious Software
- Intrusion Detection
- Phishing and Identity Theft

CO2. Analyze vulnerabilities and threats on information systems based on various security parameters

CO3. Apply security and privacy methods to protect and prevent cyber crimes

CO4. Solve information privacy issues using encryption and digital signatures

CO5. Use firewall and PGP to protect network and e-mail respectively

CO6. Follow standards in implementation of network security

DETAILED SYLLABUS:

UNIT-I: CLASSICAL ENCRYPTION TECHNIQUES (08 Periods)

Introduction: Services, Mechanisms, and Attacks Concepts, The OSI Security Architecture, Model for Network Security.

Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques- Ceaser Cipher, Hill Cipher, Poly and Mono Alphabetic Cipher, Transposition Techniques.

UNIT-II: BLOCK CIPHERS AND PUBLIC-KEY CRYPTOGRAPHY (09 Periods)

Block Ciphers and the Data Encryption Standard: Block Cipher Principles, The Data Encryption Standard (DES), The Strength of DES, Block Cipher Design Principles, Block Cipher Modes of Operation.

Public-Key Cryptography: Principles of Public-Key Cryptosystems, the RSA Algorithm, Diffie-Hellman Key Exchange.

UNIT-III: MESSAGE AUTHENTICATION CODES, HASH FUNCTIONS, AND DIGITAL SIGNATURES (09 Periods)

Message authentication codes: Message Authentication Requirements, Message Authentication Functions, Message Authentication Codes, Hash Functions, Security of Hash Functions and MACs, Hash algorithms-SHA, HMAC.

Digital Signatures: Digital Signatures and The Indian IT Act, Digital Signature Standard (DSS), Authentication applications- Kerberos.

UNIT-IV: ELECTRONIC MAIL SECURITY, IP SECURITY AND WEB SECURITY (09 Periods)

Electronic Mail Security: Pretty Good Privacy (PGP).

IP Security: IP Security Overview, Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations.

Web Security: Web security Considerations**,** Secure Sockets Layer (SSL),Transport Layer Security (TLS), Secure Electronic Transaction.

UNIT-V: MALICIOUS SOFTWARE, INTRUSION DETECTION, PHISHING AND IDENTITY THEFT (10 Periods)

Malicious Software: Spywares, Viruses and Worms, DoS and DDoS attacks and Countermeasures.

Intrusion Detection: Key loggers,Intrusion Detection, Password Management-Password Protection, Password selection; Firewall Design Principles, Trusted Systems.

Phishing and Identity Theft: Proxy Servers, Anonymizers, Phishing and Identity Theft (ID Theft).

Total Periods: 45

TEXT BOOKS:

1. William Stallings, *Cryptography and Network Security Principles and Practice,*Pearson Education, 4th Edition, 2010.

2. Nina Gobole, Sunit Belapure, *Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives*, Wiley India, 2011.

REFERENCE BOOK:

1. Behrouz A Forouzan and Debdeed Mukhopadhyay, *Cryptography and Network Security*, McGraw Hill Education, 2ndEdition, 2010.

III B.Tech. - II semester

(16BT31501) OPERATING SYSTEMS

(Interdisciplinary Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION: Operating systems operations, scheduling; Critical section problem, deadlocks; Paging, segmentation; File Concept, Disk scheduling; I/O interface; concepts of protection.

COURSE OUTCOMES:

On Successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on Operating system operations, services, file management, disk management, I/O management and protection.

CO2. Identify the functionality involved in process management concepts like scheduling and synchronization.

CO3. Design models for handling deadlock and perform memory management.

CO4. Synthesize and apply programming API's to perform Process management.

CO5. Use appropriate protection tools to provide access control to Operating system users.

DETAILED SYLLABUS:

UNIT I: OPERATING SYSTEMS OVERVIEW AND PROCESS MANAGEMENT (08 Periods)

Operating systems, operations, Distributed systems, Special purpose systems, Operating systems services, Systems calls, Operating system structure.

Process Management: Process scheduling, Process Control Block, Inter process communication, Signals, Forks, Multithreading models, Threading issues, Scheduling criteria, Scheduling algorithms, Multilevel queue, Multilevel feedback queue.

UNIT II: SYNCHRONIZATION AND DEADLOCKS (10 Periods)

Synchronization: The critical-section problem, Peterson's Solution, Synchronization hardware, Semaphores, Classic problems of synchronization, Monitors.

Deadlocks: System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock detection, Deadlock avoidance, Deadlock recovery.

UNIT III: MEMORY MANAGEMENT (09 Periods)

Memory-Management Strategies: Swapping, Contiguous memory allocation, Paging, Structure of the page table, Segmentation.

Virtual Memory Management: Demand paging, Copy-on-Write, Page replacement Algorithms, Thrashing.

UNIT IV: STORAGE MANAGEMENT (10 Periods)

File System: File Concept, Access methods, Directory structure, File system structure, i-node, File Descriptors, File system implementation, Directory implementation, Allocation methods.

Secondary Storage Structure: Disk structure, Disk attachment, Disk scheduling, Swap-space management, Stable-storage implementation, Tertiary storage structure.

UNIT V: I/O SYSTEMS AND PROTECTION (08 Periods)

I/O Systems: I/O Hardware, Application I/O interface, Kernel I/O subsystem.

Protection: Goals of protection, Principles of protection, Domain of protection, Access matrix, Implementation of access matrix, Access control, Revocation of access rights.

Total Periods: 45

TEXT BOOK:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, *Operating System Principles*, Wiley India Edition, 7th Edition, 2011.

REFERENCE BOOKS:

1. William Stallings, *Operating Systems, Internals and Design Principles,* Pearson Education, 7th Edition, 2013.
2. Andrew S. Tanenbaum, *Modern Operating Systems*, PHI, 3rd Edition, 2009.

III B.Tech. - II semester

(16BT61241) WIRELESS SENSOR NETWORKS

(Interdisciplinary Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION: WSN architecture, types; Physical Layer;MAC protocols;Routing related Protocols; QoS in WSNs.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrateknowledge on:
- Wireless Sensor Networks
- Physical layer
- Data link layer
- Network layer
- Transport layer

CO2. Analyze various design issues related to Data link, network and transport protocols of wireless sensor network architectures.

CO3. Solve complex engineering problems pertaining to the field of wireless sensor networks.

CO4. Design and develop feasible and optimal wireless sensor networks based solutions for societal use.

DETAILED SYLLABUS:

UNIT I– INTRODUCTION TO WIRELESS SENSOR NETWORKS (09 Periods)

Challenges for Wireless Sensor Networks, Comparison of Sensor Network with Ad Hoc Network; Single Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes; Network Architecture: Sensor Network Scenarios - Types of Sources and Sinks, Single Hop Versus Multi-Hop Networks, Multiple Sinks and Sources; Design Principles for Wireless Sensor Networks.

UNIT II – PHYSICAL LAYER (09 Periods)

Introduction, Wireless Channel and Communication Fundamentals – Frequency Allocation, Modulation and Demodulation, Wave Propagation Effects and Noise, Channels Models, Spread Spectrum Communication, Packet Transmission and Synchronization, Quality of Wireless Channels and Measures for Improvement; Physical Layer and Transceiver Design Consideration in Wireless Sensor Networks - Energy Usage Profile, Choice of Modulation, Power Management.

UNIT III –DATA LINK LAYER (09 Periods)

MAC Protocols: Fundamentals of Wireless MAC Protocols - Requirements and Design Constraints for Wireless MAC Protocols, Important Classes of MAC Protocols, MAC Protocols for Wireless Sensor Networks; Link Layer Protocols – Fundamentals Task and Requirements; Error Control - Causes and Characteristics of Transmission Errors, ARQ Techniques, FEC Techniques, Hybrid Schemes, Power Control.

UNIT IV – NETWORK LAYER (09 Periods)

Gossiping and Agent-Based Uni-Cast Forwarding - Basic Idea, Randomized Forwarding; Energy-Efficient Unicast, Broadcast and Multicast - Source-Based Tree Protocols, Shared, Core-Based Tree Protocols, Mesh-Based Protocols. Geographic Routing - Basics of Position-Based Routing, Geocasting; Mobile Nodes - Mobile Sinks, Mobile Data Collectors, Mobile Regions; Data Centric and Content-Based Networking - Introduction, Data-Centric Routing, Data Aggregation.

UNIT V – TRANSPORT LAYER (09 Periods)

The Transport Layer and QoS in Wireless Sensor Networks - Quality of Service/Reliability Transport Protocols; Coverage and Deployment - Sensing Models, Coverage Measures; Uniform Random Deployments: Poisson Point Processes, Coverage of Random Deployments: Boolean Sensing Model, General Sensing Model, Coverage Determination, Coverage of Grid Deployments; Reliable Data Transport, Single Packet Delivery - Using A Single Path, Multiple Paths, Multiple Receivers.

Total Periods:45

TEXT BOOK:

1. Holger Karl and Andreas willing,*Protocols and Architecture for Wireless Sensor Networks,*John wiley publication, 2007.

REFERENCE BOOKS:

1. Edgar H .Callaway, *Wireless Sensor Networks: Architecture and protocol*, CRC press, 2003.
2. C.S.Raghavendra Krishna, M.Sivalingam and Taribznati, *Wireless Sensor Networks,*Springer publication, 2006.

III B.Tech. - II semester

(16BT60403) **ANALOG IC DESIGN**

(Program Elective – 1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:A Course on Electronic Circuits analysis and design.

COURSE DESCRIPTION:

MOS & CMOS Devices and Modeling; Current mirrors and biasing techniques; Single stage amplifiers; Sample and Hold Circuits; Bandgap Reference Circuits and Comparators.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in
- MOS device modeling
- Current Mirrors
- Single stage amplifiers
- Bandgap Reference Circuits.
- Sample and hold circuits
- Comparators.

CO2. Analyze analog integrated circuits suitable for real time applications.
CO3. Design and Develop Analog Integrated Circuits using MOS Transistor.
CO4. Use different styles of CMOS Circuit modelling to synthesize analog ICs.
CO5. Apply appropriate biasing techniques to improve performance of analog circuits.
CO6. Assess the performance of sample and hold circuits and Bandgap reference circuits in analog ICs suitable for societal use.

DETAILED SYLLABUS:

UNIT - I: MOS DEVICE MODELING (10 Periods)

MOSFET Capacitances, Latch up in CMOS Technology, Short Channel Effects in MOS Transistors, Weak Inversion in MOS Transistors, Small Signal Modeling of MOS Transistors, Large Signal Modeling of MOS Transistors.

UNIT - II: CURRENT MIRRORS AND BIASING TECHNIQUES (10 Periods)

Current Mirrors - Simple Current Mirrors, Simple Current Mirror with Source Degeneration, Cascode Current Mirror and Wilson Current Mirror.

Biasing Techniques: CS Biasing, CG Biasing, Source Follower Biasing, Differential Pair Biasing.

UNIT - III: SINGLE STAGE AMPLIFIERS (07 Periods)

Common Source Stage with resistive load, Source follower, Common Gate Stage, Cascode Stage.

UNIT - IV: SAMPLE AND HOLD CIRCUITS, BANDGAP REFERENCE CIRCUITS (10 Periods)

Performance of Sample and Hold Circuits, MOS Sample and Hold Basics, Examples of CMOS S/H circuits, Bipolar and BICMOS Sample and Hold circuits,Band gap Voltage Reference Basics, Circuits for Band gap References.

UNIT - V: COMPARATORS (08 Periods)

Using an Opamp for a Comparator, Charge-Injection Errors, Latched Comparators, Examples of CMOS and BiCMOS Comparators.

Total Periods: 45

TEXT BOOKS:

1. David A. Johns, Ken Martin,*Analog Integrated Circuit Design*, Wiley Student Edition, 1997.
2. Behzad Razavi, *Design of Analog CMOS Integrated Circuits,* Tata McGraw Hill, 2nd Edition, 2008.

REFERENCE BOOKS:

1. Paul R. Gray, Paul J. Hurst, S. Lewis and R. G. Meyer, *Analysis and Design of Analog Integrated Circuits,* Wiley India, 5th Edition, 2013.
2. Philip E. Allen and Douglas R. Holberg, *CMOS Analog Circuit Design*, Oxford University Press, International 2nd Edition/Indian Edition, 2010.

III B.Tech. - II semester

(16BT60404) **IMAGE PROCESSING**

(Program Elective – 1)

(Common to ECE & CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Digital signal processing and Digital communications.

COURSE DESCRIPTION:
Fundamentals of image processing; Image transforms; Image enhancement techniques in spatial and frequency domains; Restoration techniques; Image segmentation techniques; Image compression techniques.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Demonstarte knowledge in
- Image Fundamentals
- Image Enhancement & Restoration Techniques
- Image Segmentation & Compression Techniques
- Color image processing

CO2. Analyze different images using various processing techniques.
CO3. Design and develop various image processing algorithms to process the images in Real Time Applications.
CO4. Solve problems related to images for feasible and optimal solutions in the core area of Image Processing.
CO5. Apply appropriate techniques to complex engineering problems in the field of image processing.
CO6. Understand the impact of the image processing for societal needs.

DETAILED SYLLABUS:

UNIT-I: IMAGE FUNDAMENTALS (10 Periods)
Fundamental steps in Image Processing, Image sampling & quantization, some basic relationships between pixels, Arithmetic operations, Logical operations, Spatial operations,
IMAGE TRANSFORMS: 2D-DFT and properties, Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Haar-Transform, Slant Transform, Hotelling Transform.

UNIT-II: IMAGE ENHANCEMENT (11 Periods)
Basic Intensity transformation functions, Histogram processing, Fundamentals of Spatial Filtering, Smoothing spatial filters, Sharpening spatial filters, Combining spatial Enhancement methods.
Basics of filtering in frequency domain, Correspondence between filtering in the spatial and frequency domains, Image smoothing using frequency domain filters, Image sharpening using frequency domain filters, Homomorphic filtering.

UNIT-III: IMAGE RESTORATION (07 Periods)
Image degradation/Restoration model, Noise models, Restoration in the presence of Noise only-spatial filtering - mean, order- statistic and adaptive filters. Estimating the degradation function, Inverse filtering, Weiner filtering, Constrained least squares filtering.

UNIT-IV: IMAGE COMPRESSION (08 Periods)
Classification of redundancy in Images, Image Compression models, Run length coding, Arithmetic coding, Dictionary based compression, bit-plane coding, Transform based coding, Fidelity Criteria, Image compression standards.

UNIT-V: IMAGE SEGMENTATION AND COLOR IMAGE PROCESSING (09 Periods)
Detection of discontinuities- Point, line and edge Detection.Thresholding- global thresholding, adaptive thresholding. Region based Segmentation. Color image fundamentals - RGB, HSI models, conversions, Pseudo Color Image Processing, Color transformations.

Total Periods: 45

TEXT BOOKS:
1. Rafael C. Gonzalez & Richard E. Woods, *Digital Image Processing*, Pearson Education, 3rd Edition, 2008

2. S.Sridhar, *Digital Image Processing*, Oxford University, 2nd Edition, 2016

REFERENCE BOOKS:

1. William K. Pratt, *Digital Image Processing*, John Wiley and Sons, 3rd Edition, 2002.
2. Anil K.Jain, *Fundamentals of Digital Image processing,* Prentice Hall, 2007.

III B.Tech. - II semester

(16BT60405) RADAR ENGINEERING

(Program Elective – 1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:

Courses on Antennas and Wave propagation &Microwave Engineering.

COURSE DESCRIPTION:

Radar equation; Targets; classification of radars; MTI and pulsed radar;Tracking with radar; radar receivers; Echo signal detection in the presence of noise; Navigational Aids.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in
- Principle of working of radars
- MTI and Pulse Doppler radars
- Tracking and detection of radar signals
- Radar displays and duplexers
- Radar receivers.
- Navigational Aids.

CO2. Analyze to detect radar echo signals, range and Doppler measurement.

CO3. Design and develop optimum matched filters, radar receivers and radar system components.

CO4. Solve engineering problems to detect radar signals for range prediction and detectable signal in the presence of noise

CO5. Apply appropriate techniques for signal detection, tracking and global positioning in the field of radar systems and navigational aids.

CO6. Provide wide range of feasible solutions for accurate echo detection and study of Navigational aids useful in real time applications.

DETAILED SYLLABUS :

UNIT I: RADAR EQUATION (10 Periods)

Introduction, Maximum Unambiguous Range, Simple form of Radar Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications, Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise, Modified Radar Range Equation, SNR, Envelope Detector, False Alarm Time and Probability, Integration of Radar Pulses, Radar Cross section of Targets (simple targets - sphere, cone-sphere), Transmitter Power, PRF and Range Ambiguities, System Losses (qualitative treatment), Illustrative Problems.

UNIT II: DOPPLER RADAR (12 Periods)

Doppler Effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW radar, Illustrative Problems. FM-CW Radar, Range and Doppler Measurement, Block Diagram and Characteristics (Approaching/ Receding Targets), FM-CW altimeter, Multiple Frequency CW Radar, MTI- Introduction, Principle, MTI Radar with - Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers – Filter Characteristics, Blind Speeds, Double Cancellation, Staggered PRFs. Range Gated Doppler Filters, MTI Radar Parameters, Limitations to MTI Performance, MTI versus Pulse Doppler radar.

UNIT III: RADAR TRACKING (06 Periods)

Tracking with Radar, Sequential Lobing, Conical Scan, Monopulse Tracking Radar – Amplitude Comparison Monopulse (one- and two- coordinates), Phase Comparison Monopulse, Tracking in Range, Acquisition and Scanning Patterns, Comparison of Trackers.

UNIT IV: RADAR TRANSMITTERS AND RECEIVERS (11 Periods)

Noise Figure and Noise Temperature, Display types. Duplexers – Branch type and Balanced type, Circulators as Duplexers. Introduction to Phased Array Antennas – Basic Concepts, Radiation Pattern, Beam Steering and Beam Width changes, Series versus Parallel Feeds, Applications, Advantages and Limitations. Detection of Radar Signals in Noise - Introduction, Matched Filter Receiver – Response Characteristics and Derivation, Correlation Function and Cross-correlation Receiver, Efficiency of Non-matched Filters, Matched Filter with Non-white Noise.

UNIT V: FUNDAMENTALS OF NAVIGATIONAL AIDS (06 Periods)

Introduction and Types of Navigational Aids, VHF Omni Directional Range (VOR) navigation system-salient features-principle of operation- advantages and limitations, Salient features of LORAN and DECCA navigation system. **Total Periods: 45**

TEXT BOOKS:

1. Merrill I. Skolnik, *Introduction to Radar Systems*, TMH Special Indian Edition, 2nd Edition, 2007.

2. G S N Raju, *Radar Engineering and Fundamentals of Navigational Aids*, I.K. International Pvt. Ltd, 1st Edition, 2010.

REFERENCE BOOKS:

1. Merrill I. Skolnik, *Introduction to Radar Systems*, TMH, 3rd Edition, 2001.
2. Byron Edde, *Radar Principles, Technology, Applications*, Pearson Education, 2004.

III B.Tech. - II semester

(16BT60406) TELECOMMUNICATION SWITCHING SYSTEMS

(Program Elective – 1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Analog and Digital Communications.

COURSE DESCRIPTION:

Overview of telecommunication switching systems; telephone networks; signaling techniques in telephone networks; ISDN; DSL technology and SONET.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in:
- Switching systems.
- Subscriber loop systems, numbering plan, charging plan and transmission plan.
- Signaling techniques and traffic in the context of telecommunication network.
- Integrated Services Digital Network (ISDN).
- Frame relay and ATM.
- DSL technologies and SONET networks.

CO2. Perform analysis of traffic load parameters like blocking probability and grade of service.

CO3. Solve engineering problems pertaining to implementation of communication networks.

CO4. Apply appropriate Signaling techniques, networks and topologies of Telecommunications systems with understanding of limitations.

CO5. Understand the probabilistic methods and statistics to solve communication network problems related to societal issues.

CO6. Use standards to meet the responsibilities and norms of the engineering practice in the area of telecommunication switching systems.

DETAILED SYLLABUS:

UNIT-I:PRINCIPLES AND EVOLUTION OF SWITCHING SYSTEMS (13 Periods)

Evolution of telecommunications, Simple telephone communication, Basics of a switching system, Manual switching system, crossbar switching, Electronic space division switching, Time division switching, Combination switching.

UNIT-II: TELEPHONE NETWORKS (06 Periods)

Subscriber loop systems, switching hierarchy and routing, transmission plan, numbering plan, charging plan.

UNIT-III: SIGNALLING TECHNIQUES (06 Periods)

In-channel signaling, common channel signaling, Network traffic load and parameters, grade of service and blocking probability.

UNIT-IV: DATA NETWORKS (12 Periods)

Data transmission in PSTNs, Switching techniques for data transmission, Motivation for ISDN, services, network and protocol architecture, transmission channels and user network interfaces, Signaling, numbering and addressing, ISDN standards, Broadband ISDN, Introduction to the basic principles of frame relay, ATM.

UNIT-V: ADVANCED TECHNOLOGIES (08 Periods)

DSL TECHNOLOGY: ADSL, Traditional Cable Networks, HFC Networks, Sharing, CM & CMTS and DOCSIS.

SONET: Devices, Frame, Frame Transmission, Synchronous Transport Signals, STS I, Virtual Tributaries.

Total Periods: 45

TEXT BOOKS:

1. Thyagarajan Viswanath, *Telecommunication Switching Systems and Networks*, PHI, 2008.
2. B.A. Forouzan, *Data Communication & Networking*, TMH, 4th Edition, 2006.

REFERENCE BOOKS:

1. Wayne Tomasi, *Advanced Electronic Communications systems*, Pearson Education, 6th Edition, 2004.
2. Achyut. S .Godbole*, Data Communications & Networks*, TMH, 2004.

III B.Tech. - II semester

(16BT60407) **DIGITAL CMOS IC DESIGN**

(Program Elective – 2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: ACourses on VLSI Design.

COURSE DESCRIPTION:

Design styles and characteristics of CMOS digital circuits; Layout design rules; Memory design; Interconnect strategies; Design Methodologies.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Apply knowledge in
- CMOS Circuits
- MOS Layouts
- Memories
- Interconnects
- Methodologies

CO2. Analyze Problems in Interconnect Design.

CO3. Design optimized CMOS Circuits and develop the corresponding Stick Diagrams and Layouts.

CO4. Provide valid solutions to critical problems in CMOS Design.

CO5. Understand the limitations of techniques applied in CMOS design.

CO6. Create Solutions to reduce the power dissipation in CMOS devices for societal needs.

DETAILED SYLLABUS:

UNIT - I: CMOS CIRCUIT AND LOGIC DESIGN (08 Periods)

CMOS Logic Gate Design, CMOS Logic Structures, Clocking Strategies – 2 phase clocking, 4 phase clocking.

UNIT - II:LAYOUT DESIGN RULES (10 Periods)

Need for Design Rules, Stick diagrams, Physical Design of Logic Gates, Design Capture Tools, Design Verification Tools.

UNIT - III: SEMICONDUCTOR MEMORIES (10 Periods)

Classification of Memories, RAM array organization, DRAM – Types, Operation, Leakage currents in DRAM cell and refresh operation; SRAM - operation, Leakage currents in SRAM cells; Flash Memory-NOR Flash and NAND Flash.

UNIT - IV: INTERCONNECT AND CLOCKING STRATEGIES (09 Periods)

Interconnect Parameters – Capacitance, Resistance and Inductance; Electrical Wire Models, Timing classification of Digital Systems, Synchronous Design, Self-Timed Circuit Design.

UNIT - V:CMOSDESIGN METHODS (08 Periods)

Introduction, Design Flows, Design Strategies, Design Methods, Design Options, Design Economics, Data Sheets and Documentation.

Total Periods: 45

TEXT BOOKS:

1. Kamran Eshranghian, Douglas A.Pucknell and Sholeh Eshranghian, *Essential of VLSI Circuits and Systems*, PHI, 1st Edition, 2005.
2. Jan M Rabaey, *Digital Integrated Circuits-A Design Perspective*, Prentice Hall, 1stEdition, 1997.

3. Neil H. E. Weste, David Harris, Ayan Banerjee, *CMOS VLSI Design-A Circuit and Systems Perspective,* Pearson Education India, 3rd Edition, 2005.

REFERENCE BOOK:

1. Jacob Baker, *CMOS: Circuit Design, Layout, and Simulation*, Wiley IEEE Press, 3rd Edition, 2010.

III B.Tech. - II semester

(16BT60408) INFORMATION THEORY AND CODING

(Program Elective - 2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: A Course on Digital Communications.

COURSE DESCRIPTION:
Information theory; Channel capacity; Linear block codes; Cyclic codes; Convolutional codes; Read-Solomon and Turbo codes.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in Information Theory, Channel Capacity and various error control coding technique.
CO2. Analyze complex engineering problems critically in the domain of information theory, source encoding techniques, channel capacity and error control coding.
CO3. Design various types of channel encoders, syndrome circuits and channel decoders.
CO4. Solve problems pertaining to entropy, source coding and channel coding.
CO5. Use appropriate source and channel coding techniques.
CO6. Apply source and channel coding techniques for providing optimal communication systems for societal use.

DETAILED SYLLABUS

UNIT I: INTRODUCTION **(09 Periods)**

Entropy: Discrete stationarysources, Markov sources, Entropy of a discrete Random variable- Joint, conditional, relative entropy, Mutual Information and conditional mutual information. Chain rules for entropy, relative entropy and mutual information, Differential Entropy - Joint, relative, conditional differential entropy and Mutual information.

Loss less Source coding: Uniquely decodable codes, Instantaneous codes, Kraft's inequality, optimal codes, Huffman code, Shannon's Source Coding Theorem.

UNIT II: CHANNEL CAPACITY **(08 Periods)**

Capacity computation for some simple channels, Channel Coding Theorem,Fano's inequality and the converse to the Coding Theorem, Equality in the converse to the coding theorem,The joint source Channel Coding Theorem, The Gaussian channels- Capacity calculation for Band limited Gaussian channels, Parallel Gaussian Channels, Capacity of channels with colored Gaussian noise.

UNIT III: CHANNEL CODING-1 **(07 periods)**

LinearBlockCodes: Introduction to Linear blockcodes, GeneratorMatrix, SystematicLinearBlockcodes, Encoder Implementation of Linear Block Codes, Parity Check Matrix, Syndrometesting, Errorcorrection, Decoder Implementation of Linear Block Codes,Error Detecting and Correcting capability of Linear Block codes.

UNITIV: CHANNEL CODING-2 **(11 Periods)**

CyclicCodes: Algebraic Structure of Cyclic Codes, Binary Cyclic Code Properties, Encoding in Systematic Form, Systematic Encoding with an (n - k)-Stage Shift Register, Error Detection with an (n - k)-Stage Shift Register, Well-Known Block Codes-Hamming Codes, Extended Golay Code, BCH Codes.

ConvolutionalCodes: Convolution Encoding, Convolutional Encoder Representation, Formulation of the Convolutional Decoding Problem, Properties of Convolutional Codes, Sequential Decoding, Application of Viterbi and sequential decoding.

UNIT V: CHANNEL CODING-3 **(11 Periods)**

Reed-Solomon Codes- Reed-Solomon Error Probability, Finite Fields, Reed-Solomon Encoding, Reed-Solomon Decoding, Interleaving and Concatenated Codes- Block Interleaving, Convolutional Interleaving, Concatenated Codes. Coding and Interleaving Applied to the Compact Disc Digital Audio System- CIRC Encoding, CIRC Decoding. Turbo Codes-Turbo Code Concepts, Encoding with Recursive Systematic Codes, Feedback Decoder, The MAP Decoding Algorithm.

Total Periods: 46

TEXT BOOKS:

1. Thomas M. Cover and Joy A. Thomas, *Elements of Information Theory*, John Wiley & Sons,1st Edition, 1999.
2. Bernard Sklar, *Digital Communications – Fundamental and Application*, PearsonEducation, 2nd Edition, 2009.

REFERENCE BOOKS:

1. John G. Proakis, *Digital Communications*, McGraw Hill Publication, 5th Edition, 2008.

2. SHU LIN and Daniel J. Costello, Jr.,*Error Control Coding – Fundamentals and Applications*, Prentice Hall, 2nd Edition, 2002.

III B.Tech. - II semester

(16BT60409) LIGHT WAVE COMMUNICATIONS

(Program Elective - 2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:
Courses on Engineering physics, Electronic devices and Circuits, Digital communications.

COURSE DESCRIPTION:
Ray theory; Single mode fibers; Fiber materials; Fiber losses; Optical sources and detectors; Power launching in to the fiber; Optical links; WDM.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Apply knowledge to understand
- Mode theory of optical communication.
- Losses in optical fibers.
- Optical sources and detectors.
- Power Launching and coupling techniques.
- Optical links.
- WDM concepts.
- Optical Networks.

CO2. Analyze Problems in analog and Digital Links.
CO3. Design and Develop Optical Sources, Detectors and Links.
CO4. Provide valid solutions to overcome losses in optical fibers.
CO5. Select appropriate optical components to suit advanced optical communications and Networks.
CO6. Assess and propose cost effective solutions to minimize the radiation hazards caused by wireless links.

DETAILED SYLLABUS:
UNIT I: INTRODUCTION TO OPTICAL FIBER WAVEGUIDES (08 Periods)
The General System, Advantages of Optical Fiber Communications, Ray Theory of Transmission, Electromagnetic Mode Theory for Optical Propagation, Cylindrical Fiber. Single Mode Fibers, Fiber Materials, Fiber Fabrication, Mechanical Properties of Fibers, Fiber Optic Cables.
UNIT II: FIBER LOSSES (07 Periods)
Attenuation, Absorption, Scattering, Bending and Core & Cladding losses. Signal Distortion in Fibers - Pulse Broadening, Intramodal Dispersion, Intermodal Dispersion, Overall Fiber Dispersion in Multi Mode and Single Mode Fibers. Polarization.
UNIT III: OPTICAL SOURCES AND DETECTORS (11 Periods)
OPTICAL SOURCES: LED Structures, Light Source Materials, Quantum Efficiency and LED Power, Modulation of LED, Laser Diode Modes and Threshold Conditions, Laser Diode Rate Equations, External Quantum Efficiencies, Resonant Frequencies.
OPTICAL DETECTORS: Physical Principles of Photo Diodes, Photo Detector Noise, Detector Response Time, Avalanche Multiplication Noise, Structures for InGaAs & APDs, Temperature Effect on Avalanche Gain, Comparisons of Photo Detectors.
UNIT IV: POWER LAUNCHING AND COUPLING (07 Periods)
Source to Fiber Power Launching, Lensing Schemes for Coupling Improvement, Fiber-to-Fiber Joints, Fiber alignment and joint loss, LED coupling to single mode fibers, Fiber Splices, Fiber Connectors.
UNIT V: OPTICAL LINKS AND COMPONENTS (12 Periods)
DIGITAL LINKS: Point-to-Point Links, Power Penalties, Error Control.
ANALOG LINKS: Overview, Carrier to Noise Ratio, Multi-channel Transmission Techniques, RF over Fiber, Radio over Fiber Links.
NETWORKS: Introduction to WDM and Optical Networks.

Total Periods: 45

TEXT BOOK:
1. Gerd keiser, *Optical Fiber Communications*, McGraw Hill International, 4th Edition, 2009.

REFERENCE BOOKS:

1. Max Ming-Kang Liu, *Principles and Applications of Optical Communications*, TMH, 2010.
2. S.C.Gupta, *Optical Fiber Communication and its Applications*, PHI, 2011.

III B.Tech. - II semester

(16BT60410) NANOELECTRONICS

(Program Elective - 2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:
Courses on Basic Engineering Physics, Basic Engineering Chemistry and Electronic Devices.

COURSE DESCRIPTION:
Basics of Nanoelectronics; Crystal structure of materials; Fabrication techniques and measurement of nanostructures; Nanoelectronic devices.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Demonstrate the basic knowledge in
- Nanoelectronics,
- Crystal structure of semiconducting material
- Various techniques for fabrication and measurement of nanostructure,
- Semiconducting nano electronic devices.

CO2. Analyze
- Crystal lattices and energy band diagram of semiconducting hetero structures of nanomaterials
- Energy states in nanomaterials.

CO3. Design and develop new semiconducting nano structures with the knowledge of density of states and electron transport.

CO4. Solve the problems related to fabrication of nanoelectronic devices.

CO5. Apply techniques of fabrication and measurement to create nanostructures.

CO6. Apply the ethical standards and legal issues while using chemical substances in fabricating nano device structures.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO NANOELECTRONICS (08 Periods)
The “Top-Down” Approach, Lithography, The “Bottom-Up” Approach; Importance of Nanoelectronics Nanotechnology Potential. The Schr’odinger wave equation, Wave mechanics of particles, Atoms and atomic orbitals.

UNIT – II: MATERIALS FOR NANOELECTRONICS (09 Periods)
Semiconductors, Crystal lattices: bonding in crystals, Electron energy bands, Semiconductor heterostructures, Lattice-matched and pseudomorphic heterostructures; Organic semiconductors, Carbon nanomaterials: nanotubes and fullerenes.

UNIT–III:FABRICATION AND MEASUREMENT TECHNIQUES FOR NANOSTRUCTURES (10 Periods)
Bulk crystal and heterostructure growth: Nanolithography, etching, physical and chemical deposition for fabrication of nanostructures and nanodevices; Techniques for characterization of nanostructures, Spontaneous formation and ordering of nanostructures; Clusters and nanocrystals, Methods of nanotube growth, Chemical and biological methods for nanoscale fabrication, Fabrication of nanoelectromechanical systems.

UNIT – IV: SEMICONDUCTING NANO STRUCTURES (09 Periods)
Time and length scales of the electrons in solids, Statistics of the electrons in solids and nanostructures; The density of states of electrons in nanostructures, Electron transport in nanostructures, Electrons in Quantum well, Quantum wire and Quantum dots.

UNIT – V: NANOELECTRONIC DEVICES (09 Periods)
Resonant tunneling diodes, Field effect transistors, Single electron transfer devices, Potential effect transistors, Light emitting diodes and lasers; Nanoelectromechanical system devices, Quantum dot cellular automata.

Total Periods:45

TEXT BOOKS:

1. Vladimir V. Mitin, Viatcheslav A. Kochelap, Michael A. Stroscio, *Introduction to Nanoelectronics: Science, Nanotechnology, Engineering, and Applications,* Cambridge University Press, 2012.
2. George W. Hanson, *Fundamentals of Nanoelectronics*, Prentice Hall, 2007.

REFERENCE BOOKS:

1. Mitin.V, Kochelap.V and Stroscio.M, *Introduction to Nanoelectronics*, Cambridge University Press, 2008.

2. Karl Goserl, Peter Glosekotter and Jan Dienstuhl, *Nanoelectronics and Nanosystems: From Transistors to Molecular and Quantum devices*, Springer, 2005.

III B.Tech. - II semester

(16BT60431) DIGITAL COMMUNICATIONS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Courses on Signal and Systems &Digital Communications .

COURSE DESCRIPTION:
Simulation and study of various Digital modulation and Demodulation schemes.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge in different Digital Communications.
CO2. Compare the characteristics of various Digital modulation schemes and analyze their performance.
CO3. Design various digital modulation and demodulation circuits and study their characteristics.
CO4. Solve problems pertaining to development of modulation schemes.
CO5. Use MATLAB tools for simulation of modulation schemes.
CO6. Function effectively as an individual and as a member in a group in the area of digital communications.
CO7. Communicate in verbal and written form in the area of digital communications.

LIST OF EXERCISES :

1. Verification of Sampling Theorem
2. Pulse code modulation and demodulation
3. Delta modulation and demodulation
4. FSK Modulation and demodulation
5. PSK Modulation and demodulation
6. DPSK Modulation and demodulation
7. QPSK Modulation and demodulation
8. Generation and Detection of PSK & DPSK signals using MATLAB
9. Generation and Detection of QPSK signal using MATLAB
10. Generation and Detection of DM and FSK signals using MATLAB
11. Generation of PCM and DPCM signals using MATLAB
12. Generation of TDM signal using MATLAB

III B.Tech. - II semester

(16BT60432) **DIGITAL SIGNAL PROCESSING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: A Course on Digital Signal Processing.

COURSE DESCRIPTION:
Implementation of Convolution; DFT and FFT; Design of Analog, Digital FIR and IIR filters.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Demonstrate Knowledge in transforms, FFT algorithm, FIR and IIR filters.
CO2. Analyze the characteristics of Digital and Analog filters such as IIR, FIR and signals using various techniques.
CO3. Design the FIR and IIR filters for feasible and optimal solutions in the core area of signal processing.
CO4. Solve engineering problems using filters in communication and allied areas.
CO5. Use CCS and MATLAB tools, techniques and resource for design of analog and digital filters with understanding of limitations.
CO6. Work individually and in a group effectively in the area of digital signal processing.
CO7. Communicate effectively in oral and written form in the area of digital signal processing.

LIST OF EXERCISES:

1. Verify linear convolution of aperiodic sequences using CCS on DSP processors and also verify using MATLAB.
2. Verify the circular convolution on Periodic sequences using CCS on DSP processors and also verify using MATLAB.
3. Verify N-point DFT & IDFT using CCS on DSP processors and also verify using MATLAB.
4. Verify N-point FFT algorithm using CCS on DSP processors and also verify using MATLAB.
5. Find the frequency response of analog Butterworth prototype filters (LP/HP/BP/BR) using MATLAB.
6. Find the frequency response of analog chebyshev prototype filters (LP/HP/BP/BR) using MATLAB.
7. Design FIR filter (LP/HP/BP/BR) using following windowing techniques with MATLAB
   A) rectangular window
   B) triangular window
8. Design FIR filter (LP/HP/BP/BR) using following windowing technique with MATLAB
   A) Hamming window
   B) Hanning window
   C) Blackman window
9. Design FIR filter (LP/HP/BP/BR) using Kaiser window with MATLAB.
10. Implement IIR Butterworth filter (LP/HP/BP/BR) using bilinear transformation techniques with MATLAB.
11. Implement IIR Chebyshev filter (LP/HP/BP/BR) using impulse-invariance transformation techniques with MATLAB.
12. Design of FIR filters using frequency sampling method with MATLAB.

III B.Tech. - II semester

(16BT60433) **SEMINAR**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
	100	100	-	-	-	2

PREREQUISITES: All the courses of the program up to III B. Tech. – I Semester.

COURSE DESCRIPTION:
Identification of topic for the seminar; Literature survey; Performing critical study and analysis of the topic identified; Preparation of report and presentation.

COURSE OUTCOMES:

Completion of the seminar work enables a successful student to demonstrate:
CO1. Knowledge on the seminar topic.
CO2. Analytical ability exercised during the seminar work.
CO3. Ability to investigate and solve complex engineering problems faced during theseminar work.
CO4. Ability to apply techniques to complex engineering activities with anunderstanding of limitations as applied in the seminar work.
CO5. Ability to function effectively as an individual as experienced during the seminar work.
CO6. Ability to present views cogently and precisely on the seminar topic.
CO7. Ability to engage in life-long leaning as experience during the seminar work.

IV B.Tech. - I semester

(16BT70401) CELLULAR AND MOBILE COMMUNICATIONS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Analog and Digital Communications &Antennasand waveguides.

COURSE DESCRIPTION: Concepts of cellular systems; Lee-model for cellular coverage; Desired C/I; Interference and reduction techniques; Frequency management in cellular systems; Handoff techniques; Various modulation techniques and Multiple Access techniques; 2G Systems - GSM - IS-95; 3G systems - WCDMA - CDMA 2000.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate fundamental knowledge in
- Cellular systems
- Interference and cell coverage in Cellular systems
- Handoffs and Dropped calls
- Modulation techniques for cellular systems
- 2G and 3G Wireless communication systems
- Introduction to 4G

CO2. Analyze low interference cellular systems.

CO3. Design omni-directional and directional antenna systems.

CO4. Provide appropriate solution for various scenarios to overcome interference problems.

CO5. Select appropriate antennas to suit the requirements of advanced communication systems.

CO6. Assess and propose cost effective solutions for societal use and minimize the radiation hazards caused by wireless links.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO CELLULAR MOBILE SYSTEMS (10 Periods)

A basic cellular system, performance criteria, uniqueness of mobile radio environment, operation of cellular systems, planning a cellular system, overview of generations of cellular systems.

Elements Of Cellular Radio Systems Design:

General description of the problem, concept of frequency reuse channels, co-channel interference reduction factor, desired C/I from a normal case in an omni directional antenna system, cell splitting, consideration of the components of cellular systems.

UNIT-II: COCHANNEL AND NONCOCHANNEL INTERFERENCE (10 Periods)

Introduction to co-channel interference, Exploring co-channel interference areas in a system, Real time cochannel interference measurement, Design of different antenna systems, Lowering the antenna height, antenna parameters and their effects, Diversity Receiver, Types of Noncochannel Interference.

UNIT-III: CELL COVERAGE FOR SIGNAL AND ANTENNA STRUCTURES (08 Periods)

General introduction, obtaining the mobile point to point model, propagation over water or flat open area, foliage loss, propagation near in distance, long distance propagation, point to point prediction model – characteristics; Cell site antenna heights and signal coverage cells, mobile to mobile propagation, Characteristics of basic antenna structures, antenna at cell site, mobile antennas.

UNIT- IV: FREQUENCY MANAGEMENT AND CHANNEL ASSIGNMENT, HAND OFF AND DROPPED CALLS (06 Periods)

Frequency Management, fixed channel assignment, non-fixed channel assignment, traffic & channel assignment, Why hand off, types of handoff and their characteristics, dropped call rates & their evaluation.

UNIT-V: DIGITAL CELLULAR SYSTEMS (2G AND 3G SYSTEMS) (12 Periods)

Advantages of Digital systems, GSM: , North American TDMA - Architecture, Transmission and modulation, Time alignment and Limitation of Emission, Error corrections, Interleaving and coding, Channels, Enhanced NA-TDMA; CDMA - Output power limits and control-modulation characteristics, Joint detection, call processing; Introduction to 3G, WCDMA-UMTS Physical layer, WCDMA TDD Physical Layer; Overview of CDMA 2000 - Physical layer; Introduction to 4G.

Total Periods: 46

TEXT BOOKS:

1. William C. Y. Lee, *Mobile Cellular Telecommunications*, McGraw Hill, 2nd Edition, 1990.
2. William C. Y. Lee, *Wireless & Cellular Telecommunications*, McGraw Hill, 3rd Edition, 2006.

REFERENCE BOOKS:

1. Theodore S Rappaport, *Wireless Communication Principles and Practice*, Pearson Education, 2nd Edition, 2002.
2. Lawrence Harte*, 3G Wireless Demystified*, McGraw Hill Publications, 2001.

IV B.Tech. - I semester

(16BT70402) **EMBEDDED SYSTEMS**

(Common to EEE, ECE & CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:
Courses on Switching Theory and Logic Design, Microprocessors and Microcontrollers.

COURSE DESCRIPTION:
Embedded system design approaches; MSP430 Architecture; Instruction Set; On-Chip Resources; Programming; Communication with peripherals; Internet of Things related Issues.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Apply knowledge in
- MSP430 Architecture, Pin out, Instruction set
- High level programming
- Usage of On-chip resources like ADC, DAC, Timers
- Internet of Things related issues

CO2. Analyze various design issues regarding
- Usage of on chip resources
- Low power modes
- Communication support

CO3. Design embedded systems using MSP430 series microcontrollers to suit market requirements.

CO4. Solve engineering problems and arrive at solutions in designing embedded systems to support interconnectivity.

CO5. Apply techniques, program skills, On-Chip resources to design networked embedded systems with an understanding of limitations.

CO6. Reason out and practice professional engineering to deliver efficient and costeffective embedded based products to society.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO EMBEDDED SYSTEMS (09 Periods)
Embedded Systems - Definition, Approaches, Applications, Anatomy of microcontroller, Memory, Software; MSP430 Introduction- Pin out, Functional Block diagram, Memory, CPU, Memory mapped input and output, Clock generator; Exceptions- Interrupts and Resets.

UNIT - II: ARCHITECTURE OF MSP430 (09 Periods)
CPU, Addressing Modes, Constant Generator and Emulated Instructions, Instruction Set, Example programs, Reflections on CPU and Instruction set, Resets, Clock System.

UNIT - III: FUNDAMENTALS FOR PROGRAMMING (09 Periods)
Development Environment, C Programming Language, Assembly Language, Programming and Debugging, Sample programs- Light LEDs in C, Read input from a switch; Automatic Control-Flashing light by delay, use of subroutines, using Timer_A; Header files and issues, Functions, Interrupts and Low power modes.

UNIT - IV: TIMERS, MIXED SIGNAL SYSTEMS AND COMMUNICATION (09 Periods)
Timers - Watchdog Timer, RTC, Measurement in capture mode; Mixed-Signal Systems- Comparator_A, ADC10 Architecture & operation, ADC12, Sigma-Delta ADC Architecture & operation, DAC; Communication- Communication Peripherals in MSP430, SPI, Inter-integrated Circuit Bus, Asynchronous communication with the USCI_A.

UNIT - V: HARDWARE SOFTWARE CO-DESIGN AND INTERNET OF THINGS (09 Periods)
CO- Design Issues: Co-design Models, Architectures, Languages, a Generic Co-design Methodology
IOT: Introduction, Origins, Drivers and Applications, IOT Communication Models - Device to Device, Device to Cloud, Device to Gateway, Back end Data Sharing Model; IPV6 and IOTs', IOT Issues, Security Issues-challenges; Privacy Considerations, Interoperability/Standards. **Total Periods: 45**

TEXT BOOKS:
1. John H. Davies, *MSP430 Microcontroller Basics*, Newnes Publications, 2008.
2. Karen Rose, Scott Eldridge, Lyman Chapin, *The Internet of Things: An Overview: Understanding the Issues and Challenges of a More Connected World, Internet Society*, Oct. 2015.
3. Jorgen Staunstrup, Wayne Wolf, *Hardware/software co-design Principles and Practice*, Springer, 2009.

REFERENCE BOOK:

1. Chris Nagy, *Embedded Systems Design using the TI MSP30 Series*, Newnes Publications, 2003.

IV B.Tech. - I semester
(16BT70403) MICROWAVE ENGINEERING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: A course on Electromagnetic Theory and Transmission Lines.

COURSE DESCRIPTION: Wave Propagation; Waveguide components; Microwave tubes; Microwave solid state devices; and Microwave measurements.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in
- Wave Propagation
- Microwave Components
- Microwave Tubes
- Microwave Measurements

CO2. Analyze the Performance of Microwave components and Microwave Tubes.

CO3. Design microwave components such as hybrid junctions, ferrite devices, and phase shifters.

CO4. Solve problems pertaining to microwave junctions and waveguide components.

CO5. Use appropriate resources to solve the problems related to microwave communication systems.

CO6. Use various microwave components like phase shifters, attenuators and tubes to model a communication system for societal needs.

DETAILED SYLLABUS:

UNIT-I: MICROWAVE COMPONENTS (10 Periods)

Introduction, Microwave spectrum and bands, applications of Microwaves, Scattering Matrix-Significance, Formulation and properties. S Matrix calculations for 2-port junction, Waveguide multiport junctions-E plane and H plane Tees, Magic Tee, Directional coupler; Ferrites- composition and characteristics, Faraday rotation, ferrite components –Isolator and Circulator. Waveguide discontinuities – waveguide Windows, tuning screws and posts, matched loads; Coupling mechanisms-probe, loop. Waveguide attenuators- resistive card, rotary vane Attenuators, waveguide phase shifters - dielectric, rotary vane phase shifters; Illustrative problems.

UNIT-II: MICROWAVE SOURCES (10 Periods)

Limitations and losses of conventional tubes at microwave frequencies.Classification of Microwave tubes.Two cavity klystron (Only Qualitative Treatment). Reflex Klystrons - structure, Velocity Modulation, Applegate diagram, mathematical theory of bunching, power output, efficiency, oscillating modes and O/P characteristics. Slow wave structures; structure of Helix TWT and amplification process. Magnetrons - different types, cylindrical travelling wave magnetron – Hull cutoff and Hartree conditions, Illustrative Problems.

UNIT-III: MICROWAVE SOLID STATE DEVICES (08 Periods)

Introduction, classification, applications, Transfer Electronic Devices, Gunn diode- principles, RWH theory, characteristics, basic modes of operation – Gunn oscillation modes, LSA Mode; Transit-Time Devices – IMPATT, TRAPATT and BARITT.

UNIT-IV: MICROWAVE MEASUREMENTS (08 Periods)

Description of Microwave bench –different blocks and their features, errors and precaution; Microwave power measurement- Bolometer method, Measurement of attenuation, frequency, low and high VSWR, Q of the cavity and impedance measurements.

UNIT-V: WAVE PROPAGATION (09 Periods)

Introduction, Modes of wave propagation, Ground wave propagation, Space wave propagation - Introduction, field strength variation with distance and height, effect of earth's curvature, absorption; Super refraction, M-curves and duct propagation, scattering phenomena, troposphere propagation, fading. Sky wave propagation-Introduction, structure of Ionosphere, refraction and reflection of sky waves by Ionosphere, Ray path, Critical frequency, MUF, LUF, OF, Virtual height and Skip distance, Relation between MUF and Skip distance, Multi-Hop propagation. **Total Periods: 45**

TEXT BOOKS:

1. Samuel Y. Liao, *Microwave devices and circuits*, Pearson Education, 3rd Edition, 2003.
2. John D. Kraus and Ronald J. Marhefka and Ahmad S.Khan, *Antennas and wave propagation*, 4th Edition (special Indian Edition), TMH, New Delhi, 2010.

REFERENCE BOOKS:

1. F.E. Terman, *Electronic and Radio Engineering*, McGraw-Hill, 4th Edition, 1955.

2. Annapurna Das and Sisir K Das, *Microwave Engineering, McGraw-Hill*, 2nd Edition, 2009.
3. M.Kulkarni, *Microwave and Radar Engineering*, Umesh Publications, 3rd Edition, 2008.

IV B.Tech. - I semester

(16BT70404) ADVANCED DIGITAL SIGNAL PROCESSING

(Program Elective - 3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: A Course on Digital Signal Processing

COURSE DESCRIPTION:
Digital filter banks; Parametric and Non-Parametric Power Spectrum Estimation methods; Computationally efficient algorithms; Applications of DSP.

COURSE OUTCOMES: On successful completion of the course, students will be able to :

CO1. Apply knowledge in
- Filter banks and Wavelets
- Linear Prediction
- Efficient power Spectral Estimation Techniques.
- Applications of Multirate signal processing

CO2. Analyze complex engineering problems in the Power Spectrum Estimation, Sampling rate conversion and Linear Prediction.

CO3. Design optimum filters, multirate DSP systems and computationally efficient DSP algorithms.

CO4. Solve Engineering problems pertaining to Digital Signal Processing.

CO5. Apply DSP Algorithms, and algorithms related to Forward and Backward Prediction in digital system design with an understanding of the limitations.

CO6. Apply computationally efficient DSP Algorithms, Optimum Filters and perfect reconstruction filters to address societal issues in multirate signal processing and communications.

DETAILED SYLLABUS:

UNIT-I: MULTIRATE FILTER BANKS (10 Periods)

Decimation, Interpolation, Sampling rate conversion by a rational factor I/D, Multistage Implementation of sampling rate conversion.

Digital Filter Banks: Two-Channel Quadrature-Mirror Filter Bank, Elimination of aliasing, condition for Perfect Reconstruction, Polyphase form of QMF bank, Linear phase FIR QMF bank, IIR QMF bank, Perfect Reconstruction Two-Channel FIR QMF Bank .

UNIT-II: POWER SPECTRAL ESTIMATIONS (09 Periods)

Estimation of spectra from finite duration observation of signals.

Non-Parametric Methods: Bartlett, Welch, Blackman &Tukey methods. Performance Characteristics of Non parametric Power Spectrum Estimators, Computational Requirements of Non parametric Power Spectrum Estimates.

Parametric Methods of Power Spectral Estimation:
Autocorrelation & Its Properties, Relationship between autocorrelation &model parameters, Yule-walker &Burg Methods, MA &ARMA models for power spectrum estimation.

UNIT-III: LINEAR PREDICTION (09 Periods)

Forward and Backward Linear Prediction – Forward Linear Prediction, Backward Linear Prediction, Optimum reflection coefficients for the Lattice Forward and Backward Predictors. Solution of the Normal Equations: Levinson Durbin Algorithm, Schur Algorithm. Properties of Linear Prediction Filters.

UNIT-IV: DSP ALGORITHMS (08 Periods)

Fast DFT algorithms based on Index mapping, Sliding Discrete Fourier Transform, DFT Computation Over a narrow Frequency Band, Split Radix FFT, Linear filtering approach to Computation of DFT using Chirp Z-Transform.

UNIT-V: APPLICATIONS OF DIGITAL SIGNAL PROCESSING (09 Periods)

Digital cellular mobile telephony, Adaptive telephone echo cancellation, High quality A/D conversion for digital Audio, Efficient D/A conversion in compact hi-fi systems, Acquisition of high quality data, Multirate narrow band digital filtering, High resolution narrowband spectral analysis.

Total Periods: 45

TEXT BOOKS:

1. John G. Proakis, Dimitris G. Manolakis, *Digital signal processing, principles, Algorithms and applications*, Prentice Hall, 4th Edition, 2007.
2. Sanjit K Mitra, *Digital signal processing, A computer base approach*, McGraw-Hill Higher Education, 4th Edition, 2011.

REFERENCE BOOKS:

1. Emmanuel C Ifeachor Barrie. W. Jervis, *DSP-A Practical Approach*, Pearson Education, 2nd Edition, 2002.

2. A.V. Oppenheim and R.W. Schaffer, *Discrete Time Signal Processing*, PHI, 2nd Edition, 2006.

IV B.Tech. - I semester
(16BT70405) MIXED SIGNAL DESIGN
(Program Elective - 3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: A course on VLSI Design.

COURSE DESCRIPTION:
Switched Capacitor Circuits; PLLs; Nyquist Rate Data Converters.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge in
- Switched Capacitor Circuits
- PLL
- Data Converters – ADC and DAC.

CO2. Analyze non-ideal effects of switched capacitor circuits and PLLs.
CO3. Design and Develop Switched Capacitor Circuits, PLLs and Data Converters.
CO4. Solve problems by using alternate data converters to compensate performance limitations.
CO5. Apply appropriate techniques to improve the performance of data converters.
CO6. Understand the impact of mixed signal design for societal needs.

DETAILED SYLLABUS:

UNIT - I: SWITCHED CAPACITOR CIRCUITS (07 Periods)
Introduction to Switched Capacitor circuits- basic building blocks, Basic Operation and Analysis - Resistor equivalance of switched capacitor, Parasitic sensitive integrator, parasitic insensitive integrator, signal flow graph analysis; Non-ideal effects in switched capacitor circuits.

UNIT - II: PHASED LOCK LOOP (08 Periods)
Simple PLL - Phase detector, Basic PLL topology, Dynamics of simple PLL; Charge pump PLLs - Problem of Lock acquisition, Phase/Frequency detector and charge pump; Non-ideal effects in PLLs.

UNIT - III: DATA CONVERTER FUNDAMENTALS (07 Periods)
Introduction to data converters, Ideal D/A converter, Ideal A/D converter, Quantization noise, Signed codes, performance limitations.

UNIT - IV: NYQUIST RATE D/A CONVERTERS (11 Periods)
Decoder based Converters - resistor string converters, folded resistor string converters, multiple R-string converters, signed outputs; Binary-Scaled converters - binary weighted resistor converters, reduced resistance ratio ladders, R-2R Based converters, charge- redistribution switched capacitor converters,current mode converters; Thermometer-code converters, Hybrid converters.

UNIT - V: NYQUIST RATE A/D CONVERTERS (12 Periods)
Successive approximation converters, Flash converter, Two-step A/D converters, Folding A/D converters, Pipelined A/D converters, Time-Interleaved Converters

Total Periods: 45

TEXT BOOKS:
1. David A. Johns, Ken Martin, *Analog Integrated Circuit Design,* Wiley Student Edition, 1997.
2. Behzad Razavi, *Design of Analog CMOS Integrated Circuits*, Tata McGraw Hill, 2008.

REFERENCE BOOKS:
1. Rudy Van De Plassche, *CMOS Integrated Analog-to-Digital and Digital-to-Analog converters*, Kluwer Academic Publishers, 2007.
2. R. Jacob Baker, *CMOS Mixed-Signal Circuit Design*, Wiley Interscience, 2014.

IV B.Tech. - I semester

(16BT70406) SATELLITE COMMUNICATIONS

(Program Elective - 3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Analog Communications and Digital Communications.

COURSE DESCRIPTION: Orbital Aspects; Satellite Subsystems; Satellite Link Design; Earth Station Technology; Multiple Access; Orbit Considerations; Global Positioning System.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in
- Basic concepts of satellite communications
- Satellite Orbits and Sub-Systems
- Satellite link design
- Earth station subsystems
- FDMA,TDMA,CDMA
- Geostationary and non-geostationary satellite systems
- Satellite navigation and global positioning system.

CO2. Identify and analyze critical engineering problems in the field of satellite subsystem design.

CO3. Design efficient uplink and downlink satellite subsystems.

CO4. Solve engineering problems with feasible and economical solutions during satellite systems link design.

CO5. Apply appropriate and efficient techniques of multiple accessing and spread spectrum while designing satellite subsystems.

CO6. Develop solutions following IEEE, ITU and FCC standards in the field of satellite communications.

DETAILED SYLLABUS :

UNIT-I: INTRODUCTION, ORBITAL MECHANICS AND LAUNCHERS (10 Periods)

Origin of Satellite Communications, Historical Background, Basic Concepts of Satellite Communications, Frequency Allocations for Satellite Services, Applications, Future Trends of Satellite. Orbital Mechanics, Kepler's Laws of planetary motion, Look Angle Determination, Orbital Perturbations, Orbit Determination, Launches and Launch Vehicles, Orbital Effects in Communication Systems Performance.

UNIT-II: SATELLITE SUBSYSTEMS AND SATELLITE LINK DESIGN (10 Periods)

Satellite Subsystems - Attitude and Orbital Control System, Telemetry, Tracking, Command and Monitoring, Power Systems, Communication Subsystems, Satellite Antennas.Equipment Reliability and Space Qualification. Basic Transmission Theory, System Noise Temperature and G/T ratio, Design of Uplink and Down Links, Design of Satellite Links for specified C/N, System Design examples.

UNIT-III: EARTH STATION SUBSYSTEMS AND MULTIPLE ACCESS (09 Periods)

EARTH STATION: Introduction, Transmitters, Receivers, Antennas, Tracking Systems, **MULTIPLE ACCESS:** Frequency Division Multiple Access (FDMA), Intermodulation, Calculation of C/N, Time Division Multiple Access (TDMA) Frame Structure, examples. Satellite Switched TDMA Onboard Processing, DAMA, Code Division Multiple Access (CDMA), Spread Spectrum Transmission and Reception.

UNIT-IV: LOW EARTH ORBIT AND NON-GEOSTATIONARY SATELLITE SYSTEMS (08 Periods)

Orbit Consideration, Coverage and Frequency Considerations, Delay and Throughput Considerations, System Considerations, Operational NGSO Constellation Designs and comparisons.

UNIT-V: SATELLITE NAVIGATION AND THE GLOBAL POSITIONING SYSTEM (09 periods)

Radio and Satellite Navigation, GPS Position Location Principles, GPS Receivers and Codes, Satellite Signal Acquisition, GPS Navigation Message, GPS Signal Levels, Timing Accuracy, GPS Receiver Operation, GPS C/A Code Accuracy, Differential GPS.

Total Periods: 46

TEXT BOOKS:

1. Timothy Pratt, Charles W Bostian and Jeremy E Allnutt, WSE, *Satellite Communications,*Wiley publications, 2nd Edition, 2003.
2. Dennis Roddy, *Satellite communications,* McGraw Hill, 4th Edition, 2009.

REFERENCE BOOKS:

1. Wilbur L.Pritchard, Henri G.Suyderhoud and Robert A. Nelson, *Satellite Communications Engineering,* Pearson Publications, 2nd Edition, 2008.
2. D.C. Agarwal, *Satellite communications,* Khanna Publications, 7th Edition, 2009.

IV B.Tech. - I semester

(16BT70407) WIRELESS COMMUNICATIONS AND NETWORKS

(Program Elective - 3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:A Course on Computer Networks.

COURSE DESCRIPTION:
Multiple Access techniques; Concepts of Wired and Wireless networks; operation of Mobile IP; Wireless Application Protocol; Architecture of Wireless LAN; Layered architecture of Bluetooth; High speed data networks.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Apply knowledge to understand
- Routing in wireless networks.
- Various protocols for Wireless networks.
- Various wireless LAN technologies.
- Bluetooth
- Architectures of various Wireless Data Networks.

CO2. Analyze various protocols related to wireless networks.
CO3. Design and Develop innovative techniques for implementation of high performance networking.
CO4. Provide valid solutions to overcome challenges in wireless networks.
CO5. Apply appropriate techniques to solve complex engineering problems in wireless networking domain.
CO6. Apply standards in area of wireless networking.

DETAILED SYLLABUS:

UNIT-I: WIRELESS NETWORKING AND DATA SERVICES (15 Periods)
Introduction, Difference between Wireless and Fixed Telephone Networks, Development of Wireless Networks, FDMA, TDMA, Spread Spectrum Multiple Access techniques, Capture Effect in Packet Radio, Traffic Routing in Wireless Networks. CDPD, ARDIS, RMD, Common Channel Signaling, ISDN, Broadband ISDN and ATM, SS7.

UNIT-II: MOBILE IP AND WIRELESS APPLICATION PROTOCOL (11 Periods)
Operation of mobile IP, Discovery, Co-located address, Registration, Tunneling, WAP Architecture, overview, WML, WML scripts.
WAPprotocol stack: Wireless Application Environment, Wireless session Protocol, Wireless Transaction Protocol, Wireless Transport Layer Security Protocol and Wireless Datagram Protocol.

UNIT-III: WIRELESS LAN TECHNOLOGY (11 Periods)
Overview, WLAN Requirements, Infrared LANs, Spread Spectrum LANs, Narrow Band Microwave LANs, IEEE 802 Protocol Architecture, IEEE802.11 Architecture and Services, 802.11 Medium Access Control, 802.11 Physical Layer. Wi-Fi and Introduction to WiMAX.

UNIT-IV: BLUETOOTH (08 Periods)
Overview, Radio Specification, Base band Specification, Links Manager Specification, Logical Link Control and Adaptation Protocol.WLL Technology.

UNIT-V: MOBILE DATA NETWORKS (10 Periods)
Introduction, Data oriented CDPD Network, GPRS and higher Data Rates, Short Messaging Service in GSM, Mobile Application Protocol. Wireless ATM, HIPER LAN - Architecture, Physical Model, Layers and Security.

Total Periods: 45

TEXT BOOKS:
1. Theodore S. Rappaport, *Wireless Communications,* 2nd Edition, PHI, 2008.
2. William Stallings, *Wireless Communications and Networks,* 2nd Edition, Pearson Education, 2007.
3. Kaveh Pahlavan and Prashant Krishna Murthy, *Principles of Wireless Networks,* PHI, 2005.

REFERENCE BOOKS:
1. Kamilo Feher, *Wireless Digital Communications,* PHI, 2001.
2. Andreaws F. Molisch, *Wideband Wireless Digital Communications,* Pearson Education, 2002.

3. Dharma Prakash Agarwal, Qing-An Zeng, *Introduction to Wireless and Mobile Systems,* 2nd Edition, Thomson, 2006.
4. Gordon L. Stuber, *Principles of Mobile Communications,* 2nd Edition, Springer International, 2007.

IV B.Tech. - I semester

(16BT70408) LOW POWER CMOS VLSI DESIGN

(Program Elective - 4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:A Course on VLSI Design.

COURSE DESCRIPTION:
Basic Principles; Methodologies and techniques of CMOS Circuit Designs; Need For Low Power VLSI Design; Principles Of Low Power Circuit Design; Simulation Analysis of Low Power; Logic and Circuit Analysis; Special Techniques Of Low Power Design; Performance Management in Architecture or System level.

COURSE OUTCOMES:
On successful completion of the course, students will be able to

CO1. Demonstrate knowledge in
- Design of logic Circuits for low power Requirements
- Power Estimation
- Low power architecture & systems
- Low Power Methodologies & Techniques.

CO2. Analyze complex problems in the domain of low power devices, CMOS Circuits, effects and related issues.
CO3. Design low power circuits to negotiate various constraints such as area, speed and power.
CO4. Solve problems using relevant methods to synthesize Low power CMOS Circuits.
CO5. Apply special techniques in evaluating the performance of low power CMOS devices.
CO6. Contribute positively towards societal issues and responsibilities in designing and developing Low Power Integrated Circuits.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO LOW POWER VLSI DESIGN (07 Periods)
Needs For Low Power VLSI Chips, Charging And Discharging Capacitances, Short Circuit Current in CMOS, CMOS Leakage Current, Static Current, Basic Principles Of Low Power Design, Low Power Figure Of Merits.

UNIT-II: POWER ANALYSIS AND ESTIMATION (10 Periods)
Spice Circuit Simulation, Discrete Transistor Modeling and Analysis, Gate Level Logic Simulation, Architecture Level Analysis, Data Correlation Analysis, Monte Carlo Simulation.

UNIT-III: LOW POWER CIRCUITS (11 Periods)
Circuit Analysis:
Transistor and Gate Sizing, Equivalent Pin Ordering, Network Restructuring and Reorganization, Special latches and Flip flops.
Logic Analysis:
Gate Reorganization, Signal Gating, Logic Encoding, State Machine Encoding, Pre computation Logic.

UNIT-IV: SPECIAL TECHNIQUES (08 Periods)
Power Reduction in Clock Networks, CMOS Floating Node, Low Power Bus, Delay Balancing, Low Power Techniques for SRAM.

UNIT-V: ARCHITECTURE AND SYSTEM (09 Periods)
Power and Performance Management, Switching Activity Reduction, Parallel Architecture with Voltage Reduction, Flow Graph Transformation.

Total Periods: 45

TEXT BOOK:
1. Gary Yeap, *Practical Low-Power Digital VLSI Design*, Springer Publication, 1998.

REFERENCE BOOKS:

1. A.P.Chandrakasan, R.W.Broadersen, *Low Power Digital CMOS Design*, Kluwer, 1995.
2. Kaushik Roy, Sharat Prasad, *Low-Power CMOS VLSI Circuit Design*, Wiley Student Edition, 2000.

IV B.Tech. - I semester

(16BT70409) **RF ENGINEERING**

(Program Elective - 4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Basic Electronics and Wave Theory

COURSE DESCRIPTION:

Concepts of transmission line theory; RF Electronics; high frequency circuit behavior; design of tuning and matching networks; RF Passive and active components; RF Transistor amplifier design; Oscillators and RF Mixers.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Understand basics of RF Electronics and transmission lines.

CO2. Analyze Transmission lines, Matching and biasing networks.

CO3. Design Matching and biasing networks, RF passive and active components, and RFtransistor amplifiers.

CO4. Solve problems in transmission lines, filters, oscillators and Mixers.

CO5. Apply appropriate Oscillators, Mixers and components to RF Circuit design.

CO6. Apply RF electronics in the field of wireless communication systems and allied areasfor societal use.

DETAILED SYLLABUS

UNIT – I: INTRODUCTION TO RF ELECTRONICS (10 Periods)

The Electromagnetic Spectrum, units and Physical Constants, Microwave bands, RF behavior of Passive components: Tuned resonant circuits, Vectors, Inductors and Capacitors. Voltage and Current in capacitor circuits, Tuned RF / IF Transformers.

UNIT – II: TRANSMISSION LINE ANALYSIS (10 Periods)

Examples of transmission lines, Transmission line equations and Biasing: Kirchoffs Voltage and current law representation, Traveling voltage and current waves, General Impedance definition, lossless transmission line model. Micro Strip Transmission Lines, Special Termination Conditions, sourced and Loaded Transmission Lines.

Single And Multiport Networks: The Smith Chart, Interconnectivity networks, Network properties and Applications, Scattering Parameters.

UNIT -III: MATCHING AND BIASING NETWORKS (10 Periods)

Impedance matching using discrete components, Micro strip line matching networks, Amplifier classes of Operation and Biasing networks.

RF Passive & Active Components: Filter Basics, Lumped filter design, Distributed Filter Design, Diplexer Filters, Crystal and Saw filters, Active Filters, Tunable filters. Power Combiners / Dividers: Directional Couplers, Hybrid Couplers, Isolators. RF Diodes: BJTs, FETs, HEMTs and Models.

UNIT – IV: RF TRANSISTOR AMPLIFIER DESIGN (09 Periods)

Characteristics of Amplifiers, Amplifier Circuit Configurations, Amplifier Matching Basics, Distortion and noise products, Stability Considerations, Small Signal amplifier design, Power amplifier design, MMIC amplifiers, Broadband High Power multistage amplifiers, Low noise amplifiers, VGA Amplifiers.

UNIT – V: OSCILLATORS and Mixers (09 Periods)

Oscillator basics, Low phase noise oscillator design, High frequency Oscillator configuration, LC Oscillators, VCOs, Crystal Oscillators, PLL Synthesizer, and Direct Digital Synthesizer.

RF Mixers: Basic characteristics of a mixer, Active mixers, Image Reject and Harmonic mixers, Frequency domain considerations.

Total Periods: 48

TEXT BOOKS:

1. Reinhold Ludwing, Pavel Bretchko, *RF Circuit design: Theory and applications*, Pearson Education Asia Publication, New Delhi 2001.
2. Joseph Carr, *Secrets of RF Design*, Tata McGraw Hill Publications, 3rd Edition, 2004.

REFERENCE BOOKS:

1. Devendra K. Misra, *Radio Frequency and Microwave Communication Circuits – Analysis and Design,* Wiley Student Edition, John Wiley & Sons, 2nd Edition, July 2004.

2. Christopher Bowick, Cheryl Aljuni and John Biyler,*RF Circuit Design*, Elsevier Science, 2008.
3. Mathew M.Radmangh, *Radio frequency and microwave electronics*, PE Asia Publication, 2001.

IV B.Tech. - I semester

(16BT70410) **SPEECH PROCESSING**

(Program Elective - 4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Signals and Systems & Digital Signal Processing

COURSE DESCRIPTION:
Acoustic Theory of speech production; model for speech signals and speech processing systems; Mathematical analysis of speech signal - Homomorphic and LPC models; Speech and Speaker recognition systems.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Demonstrate fundamental knowledge in
- Digital Model representation of speech signal
- STFT analysis
- LPC analysis
- Homomorphic models.

CO2. Analyze speech signal using homomorphic and linear predictive techniques.
CO3. Design efficient algorithms for feasible and optimal solutions in speech processing.
CO4. Synthesize features of speech signals to solve the problems in designing of speech and speaker recognition system.
CO5. Apply appropriate techniques and approaches to analyze and synthesis speech signals with an understanding of limitations.
CO6. Use speaker recognition system for societal needs.

DETAILED SYLLABUS:

UNIT-I: DIGITAL MODEL FOR THE SPEECH SIGNAL (10 Periods)
The process of speech production - the mechanism of speech production, acoustic phonetics. The Acoustic theory of speech production- sound propagation, uniform lossless tubes, Effect of losses in the vocal tract, Effect of radiation at the lips, Vocal tract transfer functions for vowels, the effect of nasal coupling, Excitation of sound in the vocal tract. Digital models for speech signals.

UNIT II: TIME DOMAIN MODELS FOR SPEECH PROCESSING (09 Periods)
Introduction, Window considerations, Short time energy and average magnitude, Short time average zero crossing rate, Speech vs silence discrimination using Average energy and zero crossing, Pitch period estimation using parallel processing approach, The short time autocorrelation function, The short time average magnitude difference function, Pitch period estimation using the autocorrelation function.

UNIT-III: HOMOMORPHIC SPEECH PROCESSING (09 Periods)
Short time Fourier transform: Definition, Fourier transform interpretation, linear filter interpretation, Filter Bank summation method, Overlap Addition method. Homomorphic systems for convolution – properties of the complex Cepstrum, computational considerations. The complex Cepstrum of speech, pitch detection, formant estimation, Homomorphic vocoder.

UNIT-IV: LINEAR PREDICTIVE CODING OF SPEECH (10 Periods)
Basic principles of linear predictive analysis – Auto correlation method, The covariance method. Computation of the gain for the model, solution of LPC Equations – Cholesky Decomposition solution for the covariance method. Durbin's Recursive solution for the autocorrelation equations.Comparison between methods of solutions of LPC analysis equations.Applications of LPC parameters – Pitch detection using LPC parameters, Formant analysis using LPC parameters.

UNIT-V: SPEECH AND SPEAKER RECOGNITION SYSTEMS (08 Periods)
Speaker Verification vs. recognition, features that distinguish speaker, Speaker recognition system- speaker verification system, speaker identification systems.

Basic pattern recognition approaches, parametric representations of Speech recognition, Speech recognition system- isolated digit recognition system, continuous digit recognition system, LPC distance measure.

Total Periods: 46

TEXT BOOK:

1. L R Rabiner and SW Schafer, *Digital processing of speech signals*, Pearson Education, 2006.

REFERENCE BOOKS:

1. Douglas O Shaughnessy, *Speech Communications*, Oxford University Press, 2nd Edition, 2000

2. L R Rabiner, BH Juang, B Yegnanarayana, *Fundamentals of Speech Recognition*, Pearson Education, 2009.

IV B.Tech. - I semester

(16BT70411) SPREAD SPECTRUM COMMUNICATIONS

(Program Elective - 4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: A Course onDigital Communications.

COURSE DESCRIPTION: Fundamentals of spread spectrum systems; Analysis of spread spectrum systems; Detection of spread spectrum signals; Applications of spread spectrum to communications.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge in various types of spread spectrum techniques, generation and detection of spread spectrum signals and their applications in communications.
CO2. Analyze problems in direct sequence and avoidance-type spread spectrum systems.
CO3. Consider design and development issues in spread spectrum communication systems.
CO4. Solve engineering problems pertaining to spread spectrum communications.
CO5. Apply spread spectrum techniques to communications.
CO6. Apply engineering standards to meet the responsibilities and norms of engineering practice.

DETAILED SYLLABUS:

UNIT-I: FUNDAMENTALS OF SPREAD SPECTRUM SYSTEMS (07 Periods)
General concepts, Direct sequence (DS), Frequency Hopping (FH), Time Hopping (TH), Comparison of modulation methods, Hybrid spread spectrum systems, Chirp spread spectrum.

UNIT-II: ANALYSIS OF DIRECT SEQUENCE SPREAD SPECTRUM SYSTEMS (09 Periods)
Properties of Pseudo noise (PN) sequences, m-sequences and their properties, Partial Correlation, PN signal from PN sequences, Partial correlation of PN signals, The PN Signal, De-spreading the PN signal, Interference rejection, Output signal to noise ratio, Anti-jam characteristics, Interception, Energy bandwidth efficiency.

UNIT-III: ANALYSIS OF AVOIDANCE – TYPE SPREAD SPECTRUM SYSTEMS & GENERATION OF SPREAD SPECTRUM SIGNALS (07 Periods)

Analysis of avoidance – type spread spectrum systems:
Thefrequency hopped signal, Interference rejection in a frequency hopping receiver, The time hopped signal.

Generation of Spread Spectrum Signals:
Shift register sequence generators, Discrete frequency synthesizers, SAW device PN generators.

UNIT-IV: DETECTION OF SPREAD SPECTRUM SIGNALS (12 Periods)
Tracking: Coherent direct sequence receivers, other method of carrier tracking, Delay lock loop analysis, Tau – Dither loop, Coherent carrier tracking, Non-coherent frequency hop receiver.
Acquisition: Acquisition of spread spectrum signals, Acquisition by cell-by-cell searching, Reduction of acquisition time, Acquisition with matched filters, Matched filters for PN sequences, Matched filters for frequency hopped signals, Matched filters with acquisition - aiding waveform.

UNIT-V: APPLICATION OF SPREAD SPECTRUM TO COMMUNICATIONS (10 Periods)
Commercial Applications: Code Division Multiple Access, Multipath channels, The FCC part-15 rules for spread spectrum systems, Direct sequence and frequency hopping.
Cellular Systems: Direct sequence CDMA, Comparison of FDMA, TDMA and CDMA, Interference-limited versus dimension-limited systems, IS-95 CDMA digital cellular system.

Total Periods: 45

TEXT BOOKS:
1. George. R. Cooper and Clare D. McGillem, *Modern Communications and Spread Spectrum,* McGraw Hill. 1986.
2. Bernard Sklar and Pabitra Kumar Ray, *Digital Communications – Fundamentals and Applications*, Pearson Education, 2nd edition, 2009.

REFERENCE BOOKS:
1. Roger L. Peterson, Rodger E.Ziemer & David E. Borth, *Introduction to Spread Spectrum Communications,* Prentice Hall, 2013.
2. Dr. Kamilo Feher, *Wireless Digital Communications: Modulation & Spread Spectrum Applications,* Pearson Education, 2006.
3. Andrea Goldsmith, *Wireless Communications*, Cambridge University Press, 2009.

4. Upendra Dalal, *Wireless Communication*, Oxford University Press, 2009.

IV B.Tech. - I Semester

(16BT6HS01) **BANKING AND INSURANCE**

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION:
Origin of Banking; Functions of Banking; Role & Functions of RBI; Bank-Customer Relationship; Deposit and Loan Services of Banks; Banking Procedures; Electronic Payment Mechanisms; Business Models; Concepts of Risk and Uncertainty; Fundamentals of Insurance; Principles of Insurance; Essentials of Insurance Contracts; Insurance players in India.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate Knowledge in · Tools and concepts of Banking and Insurance.
- Basic Principles and concepts of Insurance and Banking.
- e-fund transfers, e-payments and e-business models.

CO2. Develop skills in providing solutions for
- Online banking and e – payments...
- Risk Management through insurance benefits the society at large.
- Money management by leveraging on technology, banking and insurance services.

CO3. Exhibit conceptual soundness about banking and insurance, this would contribute to More employment opportunities.

CO4. Provide life skills for effective utilization of Banking and Insurance facilities.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO BANKING **(09 Periods)**
Origin and growth of banking, meaning and functions of banking, importance of banking, Reserve Bank of India; functions, monetary policy, open market operations.

UNIT-II:BANK-CUSTOMER RELATIONSHIP **(09 Periods)**
Debtor-creditor relationship, anti-money laundering, deposit products or services, payment and collection of cheques. Accounts – Types of accounts, procedure for opening and closing an account. Loans and Advances- principles of lending, types of loans.

UNIT-III:BUSINESS MODELS AND ELECTRONIC PAYMENT SYSTEM **(09 Periods)**
Features, types of e-payment system, e-cash,NEFT, RTGS, Credit cards, Electronic purses and Debit cards.Business models- B2B, B2C, C2C, and B2G.

UNIT-IV:INTRODUCTION TO RISK AND INSURANCE **(09 Periods)**
Concept of risk, risk *Vs* uncertainty. Insurance definition, Insurance as risk mitigation mechanism, elements of insurance.

UNIT-V:INSURANCE OVERVIEW **(09 periods)**
Principles of insurance, insurance types, LIC & GIC insurance contract- nature, elements, functions, IRDA, Insurance Players in India.

Total Periods: 45

TEXT BOOKS:

1. A.V. Ranganadha Chary, R.R. Paul,*Banking and Financial system*, Kalyani Publisher, New Delhi, 2ndedition.
2. P.K.Gupta,*Insurance and Risk Management*, Himalaya Publishing House, New Delhi.

REFERENCE BOOKS:

1. Diwan, Praq and Sunil Sharma, *Electronic Commerce-A Manager's Guide to E-Business*, Vanity Books International, Delhi,2002.
2. Kalakota Ravi and Whinston Andrew B, *Frontiers of Electronic Commerce*, Pearson Education India, New Delhi, 1996.
3. Schneider, Grey P, *Electronic Commerce, Course Technology*, Cengage Learning, 8th edition, New Delhi, 2008.

IV B.Tech. - I Semester

(16BT6HS02) BUSINESS COMMUNICATION AND CAREER SKILLS

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION:

Nature and scope of communication; Corporate communication; Writing business documents; Careers and resumes; Interviews.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge in
- Corporate Communication
- Main Stages of Writing Messages
- Career Building

CO2. Analyze the possibilities and limitations of language in
- Communication Networks
- Crisis Management/Communication

CO3. Design and develop the functional skills for professional practice inBusiness Presentations & Speeches

CO4. Applywritten and oral communicationtechniques in preparing and presenting various documents in technical writing.

CO5. Function effectively as an individual and as a member in diverse teams.

CO6. Communicate effectively with the engineering community and society in formal and informal situations.

DETAILED SYLLABUS:

UNIT-I: NATURE AND SCOPE OF COMMUNICATION (09 Periods)

Introduction: Functions of Communication – Roles of a Manager – Communication Basics – Communication Networks – Informal Communication – Interpersonal Communication –Communication Barriers.

UNIT-II: CORPORATE COMMUNICATION (09 Periods)

Introduction: What is Corporate Communication? – Corporate Citizenship and Social Responsibility – Corporate Communication Strategy – Crisis Management/Communication – Cross-Cultural Communication.

UNIT-III: WRITING BUSINESS DOCUMENTS (09 Periods)

Introduction: Importance of Written Business Communication, Types of Business Messages – Five Main Stages of Writing Business Messages – Business Letter Writing – Effective Business Correspondence – Common Components of Business Letters – Strategies for Writing the Body of a Letter.

UNIT-IV: CAREERS AND RESUMES (09 Periods)

Introduction – Career Building – Business Presentations and Speeches – Resume Formats – Traditional, Electronic and Video Resumes – Sending Resumes – Follow-up Letters – Online Recruitment Process.

UNIT-V: INTERVIEWS (09 Periods)

Introduction – Fundamental Principles of Interviewing – General Preparation for an Interview – Success in an Interview – Types of Interviewing Questions – Important Non-verbal Aspects – Types of Interviews – Styles of Interviewing.

Total Periods: 45

TEXT BOOK:

1. Meenakshi Raman and Prakash Singh, *Business Communication*, Oxford University Press, New Delhi, 2nd edition, 2012.

REFERENCE BOOKS:

1. Neera Jain and Sharma Mukherji, *Effective Business Communication*, Tata Mc Graw-Hill Education, Pvt. Ltd., New Delhi, 2012.
2. Courtland L.Bovee et al., *Business Communication Today*, Pearson, New Delhi, 2011.
3. Krizan, *Effective Business Communication*, Cengage Learning, New Delhi, 2010.
4. R.K. Madhukar, *Business Communication*, Vikas Publishing House Pvt. Ltd., New Delhi, 2005.

IV B.Tech. – ISemester

(16BT6HS03) COST ACCOUNTING AND FINANCIAL MANAGEMENT

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION:
Scope, Objectives and Elements ofcost Accounting; Cost Sheet and Tender quotations; Variance Analysis: Material variances, Labor variances; Meaning and Scope, Liquidity, Profitability Ratios: concept of Risk and Return on Investment.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Acquire Knowledge in
- Elements of Costing.
- Basic concepts of Financial Management.
- Risk and Return
- Significance of Cost Accountancy
- Behavioral Finance

CO2. Develop skills in
- Material, Labor, Overheads control.
- Excellence and ability to minimize the cost of the organization

CO3. Develop effective Communication in Cost control and Financial Management.

CO4. Providesolutions for effective investment decisions.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO COST AND COST ACCOUNTING (09 Periods)
Cost and Cost Accounting, Scope, Objectives, Advantages and disadvantages – Cost Accounting vs. Management Accounting – Elements of Costing – Installation of costing system – Material Control, Labour Control, Overhead Control.

UNIT-II: COST SHEET AND PREPARATION OF COST SHEET (09 Periods)
Analysis of Cost – Preparation of cost sheet, estimate, tender and quotation (Simple problems) – Importance of Costing while pricing the products.

UNIT-III: STANDARD COSTING AND VARIANCE ANALYSIS (09 Periods)
Introduction to Standard Costing & Variances – Variance Analysis: Material variances, Labour variances (Simple Problems).

UNIT-IV: INTRODUCTION TO FINANCIAL MANAGEMENT AND RATIO ANALYSIS (09 Periods)
Financial Management-Meaning and Scope, Liquidity, Profitability, Financial Statement Analysis through ratios (Simple Problems).

UNIT-V: INTRODUCTION TO INVESTMENT AND BEHAVIORAL FINANCE (09 Periods)
Investment-Meaning and Definition- concept of risk and returns-Investment Alternatives- Introduction to Behavioral Finance – Anomalies –Key Concepts –Anchoring – Mental Anchoring-Confirmation and Hindsight Bias-Gambler's Fallacy-Herd Behavior-Over Confidence-Overreaction and Availability Bias-Prospect Theory.

Total Periods: 45

TEXT BOOKS:
1. S.P. Jain and K.L. Narang,*Cost Accounting*, Kalyani Publishers, Ludhiana, 6th edition,2002.
2. James C Van Horne, *Financial Management and Policy*, Prentice-Hall of India/Pearson, 12th edition, 2001.

REFERENCE BOOKS:
1. The Institute of Company Secretaries of India, *Cost and Management Study Material*, New Delhi.
2. I.M. Pandey, *Financial Management*, Vikas Publishing House Pvt. Ltd., 10th edition, 2010.

IV B.Tech. – ISemester

(16BT6HS04) ENTREPRENEURSHIP FOR MICRO, SMALL AND MEDIUM ENTERPRISES

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —

COURSE DESCRIPTION:

Introduction to Entrepreneur Development; Idea generation and formation of Business Plan; Micro and Small Enterprises; Institutional Finance and Support to Entrepreneur; Woman Entrepreneurship.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Acquire Knowledge in
- Schemes and institutions encouraging entrepreneurship.
- Basic Principles and concepts of Accountancy.
- Significance of entrepreneurship.

CO2. Develop skills in providing solutions for
- Personal excellence through financial and professional freedom.
- Women entrepreneurship serving as contrivance in societal development

CO3. Develop critical thinking and evaluation ability.

CO4. Widens knowledge and build up attitude towards trouble shooting.

CO5. Demonstrate business acumen

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO ENTREPRENEURSHIP DEVELOPMENT (09 Periods)

Concept ofEntrepreneurship – Growth of Entrepreneurship in India **-** Factors affecting entrepreneurship growth - Characteristics of an Entrepreneur – Functions of Entrepreneur – Need for an Entrepreneur – Entrepreneurial Decision Process – Types of Entrepreneurs – Distinction between an Entrepreneur and a manager.

UNIT-II: IDEA GENERATION AND FORMULATION OF BUSINESS PLANS (09 Periods)

Sources of Ideas – Methods of idea generation – Steps in Setting up of a Small Business Enterprise – Formulation of Business Plan – Contents of Business Plan – Significance – Common Errors in Business Plan Formulation, The role of incubation centers for promoting Entrepreneurship, Start-up – New Guidelines.

UNIT-III: MICRO AND SMALL ENTERPRISES (09 Periods)

Meaning and Definition – Micro and Macro units – Essentials – Features – Characteristics– Scope of Micro and Small Enterprises – Objectives of Micro Enterprises – relationship between Micro and Macro Enterprises- Problems of Micro and Small Enterprises.

UNIT-IV: INSTITUTIONAL FINANCE (09 Periods)

Institutional Finance **–** Need-Scope-Services - Various Institutions offering Institutional support: – Small Industries Development of Bank of India (SIDBI), State Industrial Development Corporations (SIDCs)– Small Industries Development Organisation (SIDO) – Small Industries Service Institutes (SISIs) – District Industries Centres (DICs) – National Institute of Entrepreneurship and Small Business Development (NIESBUD) – Technical Consultancy Organizations (TCOS). Micro Units Development and Refinance Agency Bank (MUDRA).

UNIT-V:WOMEN AND RURAL ENTREPRENEURSHIP (09 Periods)

Concept of Women entrepreneur - Functions of Women entrepreneurs - Growth of women entrepreneurship in India - Challenges of Women entrepreneurs- Programmes supporting women entrepreneurship – Rural Entrepreneurship – Meaning, Need for Rural entrepreneurship, Problems of rural entrepreneurship, Role of NGOs, Role of BharatiyaMahila Bank for encouraging Women Entrepreneurs.

Total Periods: 45

TEXT BOOKS:

1. Dr.S.S.Khanka*, Entrepreneurial Development*, S. Chand and Company Ltd, Revised edition, 2012.
2. MadhurimaLall&ShikhaSahai, *Entrepreneurship*, Excel Books India, 2ndedition 2008.

REFERENCE BOOKS:

1. Nandan, H., *Fundamentals of Entrepreneurship*, PHI Learning Pvt. Ltd., 2013, New Delhi, 3rd edition 2013.

2. Vasanth Desai, *The Dynamics of Entrepreneurial Development and Management*, Himalaya Publishing House, 4th edition, 2009.
3. BholanathDutta, *Entrepreneurship Management* – Text and Cases, Excel Books, 1st edition 2009.

IV B. Tech. – I Semester

(16BT6HS05) FRENCH LANGUAGE (La Langue Francais)

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION:
Oral communications; Basic grammar; advancedgrammar;basic writing; Business French (La Francais Commercial)

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in
- Process of communication
- Modes of listening
- Paralinguistic features
- Skimming and Scanning
- Elements of style in writing

CO2. Analyze the possibilities and limitations of language, understanding
- Barriers to Communication
- Barriers to Effective Listening
- Barriers to Speaking
- Formal and metaphorical language

CO3. Design and develop language skills for professional practice.

CO4. Apply basic writing skills in writing Emails and understanding wide range of technical terminologies.

CO5. Understand French culture and civilization.

CO6. Communicate effectively with the native French in day to day situation.

DETAILED SYLLABUS:

UNIT-I: ORAL COMMUNICATION (09 Periods)
Introduction - Language as a Tool of Communication, French alphabets, Phonetics and pronunciation, making contacts, giving information, Arranging things, Expression of feelings.

UNIT-II: BASIC GRAMMAR (09 Periods)
Introduction –Articles, -Er ending Verbs, Nouns, Numbers, Gender, Pronouns, Sentence structure – Case study.

UNIT-III: ADVANCED GRAMMAR (09 Periods)
Introduction -Adjectives, Prepositions, Introduction to tenses – Present tense, past tense and future tense, Active and Passive voice.

UNIT-IV: BASIC WRITING (09 Periods)
Introduction -Introduction to written communication, Pre-writing, Creating context for writing and Data collection, fill in forms, Write greeting cards, Invitations and Short personal announcements, Short text to describe photos and pictures.

UNIT-V: BUSINESS FRENCH (La Francais Commercial) (09 Periods)
Introduction - E-mail writing, Letter writing, Learning technical vocabulary and its application.
Case study of influential French companies, Learning computer/desktop/new age- media vocabulary, Introduction to how to present a topic, Fixing an Appointment

Total Periods: 45

TEXT BOOK:
1. Annie Berther, *Alter Ego*, Hachette Publications, 2012.

REFERENCE BOOKS:

1. RegineMerieux, Yves Loiseau, *Connexions*, Goyall Publishers, 2011.
2. DelphineRipaud,*Saison*, French and Euroean Inc., 2015.

IV B.Tech. - I Semester

(16BT6HS06) GERMAN LANGUAGE (Deutsch alsFremdsprache)

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION:
Oral communication;Basic grammar; Advanced grammar; Basic writing; Berufsdeutcsch (Business German)

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in
- Process of communication
- Modes of listening
- Paralinguistic features
- Skimming and Scanning
- Elements of style in writing

CO2. Analyze the possibilities and limitations of language, understanding
- Barriers to Communication
- Barriers to Effective Listening
- Barriers to Speaking
- Formal and metaphorical language

CO3. Design and develop language skills for professional practice.
CO4. Apply basic writing skills in writing Emails and understanding wide range of technical terminologies.
CO5. UnderstandGerman culture and civilization.
CO6. Communicate effectively with the native German in day to day situation.

DETAILED SYLLABUS:

UNIT-I: ORAL COMMUNICATION (09 Periods)
Introduction - Language as a Tool of Communication, German alphabets, Phonetics and pronunciation, making contacts, giving information, Arranging things, Expression of feelings.

UNIT-II: BASIC GRAMMAR (09 Periods)
Introduction –Articles, Verbs, Nouns, Numbers, Gender, Pronouns, Sentence structure – Case study.

UNIT-III: ADVANCED GRAMMAR (09 Periods)
Introduction -Adjectives, Prepositions, Introduction to tenses – Present tense, past tense and future tense, Active and Passive voice, Introduction to Case- Akkusativ, Nominativ, Dativ&Genetiv Case.

UNIT-IV: BASIC WRITING (09 Periods)
Introduction -Introduction to written communication, Pre-writing, Creating context for writing and Data collection, fill in forms, Write greeting cards, Invitations and Short personal announcements, Short text to describe photos and pictures.

UNIT-V: BERUFSDEUTCSCH (BUSINESS GERMAN) (09 Periods)
Introduction - E-mail writing, Letter writing, Learning technical vocabulary and its application.
Case studies of influential German companies, Learning computer/desktop/new age- media vocabulary, Introduction to how to present a topic, Fixing an Appointment.

Total Periods: 45

TEXT BOOK:
1. Heuber,*Tangram Aktuelleins*, HeuberVerlagPublications, 2011.

REFERENCE BOOKS:

1. Anta Kursisa, Gerhard Newner,Sara vicenta, *Fir fuer Deutsch 1 und Deutsch 2,*HeuberVerlag Publications, 2005.
2. Herman Funk,*Studio D A1*, Cornelsen GOYAL SAAB Publication, 2011.

IV B.Tech. - I Semester

(16BT6HS07) **INDIAN CONSTITUTION**

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION:
Elements, functions and functionaries according to Indian Constitution, understanding forbetter professional practice and good citizenry.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Gain knowledge in
- Parliamentary proceedings, laws, legislature, administration and its philosophy
- Federal system and judiciary of India
- Socials problems and public services like central civil services and state civil services
- Indian and international political aspects and dynamics

CO2. Develop etiquette and professional behavior in line with the constitution of India for becoming a responsible citizen

DETAILED SYLLABUS:

UNIT-I: PREAMBLE AND ITS PHILOSOPHY (08 Periods)
Introduction and Evolution of Indian Constitution, preamble and its Philosophy.

UNIT-II: UNION GOVERNMENT (08 Periods)
Powers, Functions and Position of President, Vice-President and Council of Ministers, Composition of parliament, Constitution Amendment Procedure, Financial Legislation in Parliament.

UNIT-III:FEDERAL SYSTEM (14 Periods)
Centre-State relations, Directive Principles of State Policy, Fundamental Rights and Duties, Centre-State Relations, Features of Federal System, Administrative Relationship between Union and States, Powers, Functions and Position of Governors, Function of Chief Ministers, Council of Ministers, Composition and powers of the State Legislature.

UNIT-IV:JUDICIARY AND PUBLIC SERVICES (10 Periods)
The Union Judiciary - Supreme Court and High Court, All India Services, Central Civil Services, State Services, Local Services and Training of Civil Services.

UNIT-V: INTERNATIONAL POLITICS (05 Periods)
Foreign Policy of India, International Institutions like UNO, WTO, SAARC and Environmentalism.

Total Periods: 45

TEXT BOOK:
1. Briji Kishore Sharma, *Introduction to the Constitution of India*, Prentice Hall of India, 2005.

REFERENCE BOOKS:
1. Mahendra Pal Singh,V. N. Shukla's, *Constitution of India*, Eastern Book Company, 2011.

2. Pandey J. N, *Constitutional Law of India* - Central Law Agency, 1998.

IV B.Tech. - I Semester

(16BT6HS08) **INDIAN ECONOMY**

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION:
Introduction; Time Value of Money; Elementary Economic Analysis; Value analysis, Value Engineering; Economic Planning.

COURSE OUTCOMES:
On successful completion of the course, the students will be able to

CO1. Acquire the knowledge in
- Micro and Macro Economics.
- Traditional and Modern methods of Capital Budgeting.
- Five year plans and NITI Aayog.

CO2. Analyze
- Capital Budgeting.
- Value Analysis and Value Engineering.
- Economic analysis
- Law of supply and demand

CO3. Understand the nuances of project management and finance

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION (09 Periods)
Economics- Flow in an Economy, Law of Supply and Demand; Micro and Macro Economics; Relationship between Science, Engineering, Technology, and Economic Development;Concept of Engineering Economics-Types of Efficiency, Definition and Scope of Engineering Economics.

UNIT-II: TIME VALUE OF MONEY (12 Periods)
Concepts and Application; Capital Budgeting-Traditional and Modern Methods; Simple and Compound Interest, Cash Flow Diagram, Principle of Economic Equivalence; Evaluation of Engineering Projects – Present Worth Method, Future Worth Method, Annual Worth Method, Internal Rate of Return Method, Cost-benefit Analysis in Public Projects; Depreciation Policy-Depreciation of Capital Assets, Causes of Depreciation, Straight Line Method and Declining Balance Method.

UNIT-III: ELEMENTARY ECONOMIC ANALYSIS (09 Periods)
Economic Analysis – Meaning, Significance, Simple Economic Analysis; Material Selection for a Product, Substitution of Raw Material; Design Selection for a Product;Material Selection-Process Planning, Process Modification.

UNIT-IV: VALUE ENGINEERING (06 Periods)
Introduction- Value Analysis, Value Engineering,Functions, Aims; Value Analysis vs. Value Engineering; Value Engineering Procedure- Advantages, Application Areas.

UNIT-V: ECONOMICPLANNING (09 Periods)
Introduction- Need For Planningin India,Five year plans(1951-2012), NITI Aayog(from 2014 onwards); Inclusive Growth-Meaning, Significance, Need for inclusive growth in India, Strategy for more inclusive growth, Challenges and Prospects; Employment and Inclusive Growth in India, Role of engineers in sustaining inclusive growth.

Total Periods: 45

TEXT BOOKS:
1. PanneerselvamR ,*Engineering Economics*, PHI Learning Private Limited, Delhi, 2ndEdition,2013.
2. Jain T.R., V. K.Ohri, O. P. Khanna. *Economics for Engineers*, VK Publication, 1stEdition, 2015.

REFERENCE BOOKS:
1. DuttRudar&Sundhram K. P. M., *Indian Economy*, S. Chand, New Delhi, 62nd revised Edition, 2010.

2. Misra, S.K. & V. K. Puri., *Indian Economy: Its Development Experience*, Himalaya Publishing House, Mumbai 32ndEdition, 2010.

IV B.Tech. - I Semester

(16BT6HS09) INDIAN HERITAGE AND CULTURE

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION:
Basic traits of Indian Culture; Humanistic Reforms under Jainism and Buddhism; Culture in the medieval period; Socio Religious reforms in Indian Culture; Reform movements for harmonious relations.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Acquaint knowledge in
- Human aspirations and values in Vedic culture.
- Cultural aspects of Buddhism and Jainism
- Unification of our country under Mourya's and Gupta's administrations
- Socio Religious aspects of Indian culture
- Reform movements and harmonious relations.

CO2. Apply ethical principles and reforms as models for the upliftment of the societal status in the present cultural contexts

DETAILED SYLLABUS:

UNIT-I: BASIC TRAITS OF INDIAN CULTURE (09 Periods)
Meaning and definition and various interpretations of culture.Culture and its features.The Vedic and Upanishadic culture and society.Human aspirations and values in these societies. Chaturvidhapurushardhas, Chaturashrma and Chaturvarna theory.

UNIT-II: HUMANISTIC REFORMS UNDER JAINISM AND BUDDHISM (09 Periods)
Salient features of Jainism - contributions of Jainism to Indian culture. Contributions of Aachaarya and Mahaapragya.Buddhism as a humanistic culture.The four noble truths of Buddhism.Contributions of Buddhism to Indian culture.

UNIT-III: CULTURE IN THE MEDIEVAL PERIOD (09 Periods)
Unifications of India under Mouryas and Guptas and their cultural achievements. Cultural conditions under satavahanas. Contributions to pallavas and cholas to art and cultural achievements of vijayanagara rulers.

UNIT-IV: SOCIO RELIGIOUS REFORMS IN INDIAN CULTURE (09 Periods)
Western impact on India, Introduction of western education, social and cultural awakening and social reform movements of Rajaramohan Roy – DayanandhaSaraswathi- Anne Besant. (theosophical society)

UNIT-V: REFORM MOVEMENTS FOR HARMONIOUS RELATIONS (09 Periods)
Vivekananda, Eswar Chandra vidyasagar and Veeresalingam- emancipation of women and struggle against caste. Rise of Indian nationalism. Mahatma Gandhi- Nonviolence and satyagraha and eradication of untouchability.

Total Periods: *45*

TEXT BOOK:
1. ValluruPrabhakaraiah, *Indian Heritage and Culture*, Neelkamal Publications Pvt. Ltd. Delhi, 1st edition, 2015.

REFERENCE BOOKS:
1. L. P. Sharma, *History of Ancient India*, Konark Publishers, Pvt. Ltd., New Delhi, 2010.
2. L. P. Sharma, *History of Medieval India*, Konark Publishers, Pvt. Ltd., New Delhi, 2010.
3. L. P. Sharma, *History of Modern India*, Konark Publishers, Pvt. Ltd., New Delhi, 2010.
4. The Cultural Heritage of India Vol-I, II, III, IV, V, *The Ramakrishna Mission Institute of Culture*, Calcutta.

IV B.Tech. - I Semester
(16BT6HS10) **INDIAN HISTORY**
(Open Elective)
(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION:
Introduction; Ancient India; Classical and Medieval era; Modern India; India after independence.

COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Gain knowledge on evolution and history of India as a nation
CO2. Analyze social and political situations of past and current periods
CO3. Practice in career or at other social institutions morally and ethically

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION (08 Periods)
Elements of Indian History; History Sources: Archaeology, Numismatics, Epigraphy & Archival research; Methods used in History; History & historiography; sociological concepts-structure, system, organization, social institutions, Culture and social stratification (caste, class, gender, power), State& Civil Society.

UNIT-II: ANCIENT INDIA (09 Periods)
Mohenjo-Daro civilization; Harappa civilization; Mauryan Empire.

UNIT-III: CLASSICAL AND MEDIEVAL ERA (12 Periods)
Classic Era (200 BC - 1200 AD); Hindu - Islamic Era (1200 - 1800 AD).

UNIT-IV: MODERN INDIA (06 Periods)
Age of Colonialism (17th - 19th centuries); First war of Indian Independence;Freedom Struggle (1857-1947).

UNIT-V:INDIA AFTER INDEPENDENCE (1947-) (10 Periods)
The Evolution of the Constitution and Main Provisions; Consolidation of India as a Nation; Politics in the States; Indian economy; Modernization and globalization, Secularism and communalism, Nature of development, Processes of social exclusion and inclusion, Changing, Nature of work and organization.

Total Periods: 45

TEXT BOOK:

1. K. Krishna Reddy, *Indian History*, Tata McGraw-Hill, 21st reprint,2017.

REFERENCE BOOKS:

1. Guha, Ramachandra, *India after Gandhi*, Pan Macmillan,2007.

2. Thapar, Romila, *Early India*, Penguin, 2002.

IV B.Tech. - I Semester

(16BT6HS11) PERSONALITY DEVELOPMENT

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION:
Self-esteem & Self-Management; Developing Positive Attitudes; Self-Motivation & Self-Management; Getting Along with the Supervisor; Workplace Success.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge in
- Self-Management
- Planning Career

CO2. Analyze the situations based on
- Attitudes
- Thinking strategies

CO3. Design and develop the functional skills for professional practice in

CO4. Function effectively as an individual and as a member in diverse teams.

CO5. Communicate effectively in public speaking in formal and informal situations.

DETAILED SYLLABUS:

UNIT-I: SELF-ESTEEM AND SELF-IMPROVEMENT (09 Periods)
Know Yourself – Accept Yourself; Self-Improvement: Plan to Improve - Actively Working to Improve Yourself.
Case study: 1

UNIT-II: DEVELOPING POSITIVE ATTITUDES (09 Periods)
How Attitudes Develop – Attitudes are Catching – Improve Your Attitudes.
Case study: 2

UNIT-III: SELF-MOTIVATION AND SELF-MANAGEMENT (09 Periods)
Show Initiative – Be Responsible Self-Management; Efficient Work Habits – Stress Management – Employers Want People Who can Think – Thinking Strategies.
Case study: 3

UNIT-IV: GETTING ALONG WITH THE SUPERVISOR (09 Periods)
Know your Supervisor – Communicating with Your Supervisor – Special Communications With Your Supervisor – What Should You Expect of Your Supervisor? – What Your Supervisor Expects of You - Moving Ahead Getting Along with Your Supervisor.
Case study: 4

UNIT-V: WORKPLACE SUCCESS (09 Periods)
First Day on the Job – Keeping Your Job – Planning Your Career – Moving ahead.
Case study: 5

Total Periods: 45

TEXT BOOK:
1. Harold R. Wallace and L. Ann Masters, *Personality Development*, Cengage Learning, Delhi, 6th Indian Reprint 2011.

REFERENCE BOOKS:
1. Barun K. Mitra, *Personality Development and Soft Skills,* Oxford University Press, New Delhi, 2011.
2. Stephen R. Covey, *The 7 Habits of Highly Effective People*, Free Press, New York, 1989.
3. K. Alex, *Soft Skills*, S. Chand & Company Ltd, New Delhi, Second Revised Edition 2011.

4. Stephen P. Robbins and Timothy A. Judge*, Organizational Behaviour*, Prentice Hall, Delhi, 16thEdition 2014.

IV B.Tech. - I Semester

(16BT6HS12) **PHILOSOPHY OF EDUCATION**

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION:
Introduction to Philosophy and Engineering Education; Philosophical methods and their implications in engineering; Philosophical education in India; Values and Engineering education; Outcome based education.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Acquire knowledge in
- Philosophy of Engineering education.
- Philosophical Methods.
- Knowledge acquiring methods.
- Engineering education and responsibilities.

CO2. Understand the impact of Outcome Based Education for effective educational outcomes

CO3. Apply reasoning to assess societal issues with the contextual knowledge of engineering education and responsibilities.

DETAILED SYLLABUS:

UNIT-I:INTRODUCTION TOPHILOSOPHY AND ENGINNERING EDUCATION (09 Periods)
Concept , Significance, and Scope of Philosophy in Engineering – Aims of Engineering Education – relationship between philosophy and engineering education – speculative, normative and critical approaches of philosophy in engineering.

UNIT-II:PHILOSOPHICAL METHODS AND THEIR IMPLICATIONS INENGINEERING (09Periods)
Introduction to Philosophical approaches: Idealism, Naturalism, Pragmatism, Realism and Existentialism; Significance and Scope in Engineering Education.

UNIT-III: PHILOSOPHICAL EDUCATION IN INDIA (09 Periods)
Different branches of philosophy- meaning, Epistemology: nature and scope; Knowledge acquiring methods;Kinds and instruments of knowledge; Re-shapingof educational thoughts by Indian thinkers: Rabindranath Tagore, Sri Aurobindo Gosh, Mahatma Gandhi,Jiddu Krishnamurthy and Swamy Vivekananda.

UNIT-IV:VALUES AND ENGINEERING EDUCATION (09 Periods)
Introduction; Engineering educationand responsibilities: health,social, moral, ethics aesthetic;Value: crisis and strategies forinculcation;
Case study: Engineering Solutions given by Mokshagundam Visvesvaraya.

UNIT-V:OUTCOME-BASED EDUCATION (09 Periods)
Institutional visioning;educational objectives; programme outcomes, curriculum,stakeholders, infrastructure and learning resources; governance and management, quality in education.

Total periods: 45

TEXT BOOKS:
1. Ganta Ramesh, *Philosophical Foundations of Education*, Neelkamal Publications, 1stEdition,2013.
2. CarlMicham,*Thinking through technology(The Paths between Engineering and Philosophy)*, University of Chicago Press, 1stEdition,1994.
3. Louis L Bucciarelli,*Engineering Philosophy,*Delft University Press,1stEdition, 2003.
4. NBA/ABET Manuals.

REFERENCE BOOKS:
1. Louis L Bucciarelli, *Philosophy of Technology and Engineering Sciences*, North Holland, 1stEdition, 2009 (e-book).
2. Samuel Florman, *Existential pleasures of education*, Martins's Griffin S.T. publication, 1stEdition, 1992.

IV B.Tech. - I Semester

(16BT6HS13) PUBLIC ADMINISTRATION

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION:

Introduction; Public Policy; Good Governance; E-Governance; Development Administration.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Acquireknowledge in
- Public Policy.
- Good Governance.
- E-governance.
- Development Administration.

CO2. Analyze the possibilities and limitations of existing policies through Good Governance perspective.

CO3. Design and develop solutions in e-governance modelsto find and provide opportunities in e-governance.

CO4. Adopt principles ofe-governance in addressing the existing issues and challenges in e-governance sector.

CO5. Understand the significance of Administrative Development in finding professional engineering solutions by probing
- Bureaucracy.
- Role of civil society.

DETAILEDSYLLABUS:

UNIT-I: INTRODUCTION **(09 Periods)**

Public and Private Administration- Differences and Similarities, Meaning, Scope; Importance of Public Administration in Modern Era; Public Administration and its implications in the field of Engineering.

Case Study: **Unique Identification Authority of India (UIDAI):Aadhaar Project: Challenges Ahead.**

UNIT-II: PUBLIC POLICY **(09 Periods)**

Meaning and Scope; Policy Formulation in India; Policy making process; Policy Implementation.
Engineering and Public Policy**,**Social, ethical, Monetary and fiscal policies; policy implications of engineering;The engineer's role in Public Policy.

Case Study:NITI Aayog: Demonetization and Aftermath of Demonetization – Cashless transactions.

UNIT-III: GOOD GOVERNANCE **(09 Periods)**

Significance; Objectives;Concepts;Reforms;Organization and its basic problemsAdministrative and Governance reforms in India; Sustainable and Inclusive growth in India;Engineering and Sustainable Environment-Role of Engineers; Right to information Act.

Case Study: Strategies in Good Governance: A Case Study of Karnataka, Kerala and Orissa.

UNIT-IV: E-GOVERNANCE **(09 Periods)**

Meaning, Significance, Issues in E-governance; E-governance Models, Problems and Opportunities; Application of DataWarehousing and Data Mining in Governance; Engineers role in re-engineering E-governance.

Case Study: e-Housing System for Bhavana Nirman Dhanasahayam Online disbursement of housing assistance in Kerala.

UNIT-V: DEVELOPMENT ADMINISTRATION **(09 Periods)**

Introduction; Development Administration-Administrative Development- Sustainable Development - Significance- Objectives; Bureaucracy - Personnel administration and human resources development; Role of civil society-Citizens and administration;Development and Engineering: Issues Challenges and Opportunities.

Case Study: Neeru-Chettu (Water-Tree) of Andhra Pradesh.

Case Study: TPDDL of Delhi and Odisha. **Total Periods: 45**

TEXT BOOKS:

1. M.P. Sharma, B.L. Sadana, HarpreetKaur,*Public Administration in Theory and Practice,* KitabMahal, Mumbai,1stEdition,2014.
2. CSR Prabhu, *E., Governance – concepts and case studies*, PHI, New Delhi,2ndEdition, 2012.

REFERENCE BOOKS:

1. SurendraMunshi, Bijupaul Abraham, *Good Governance, Democratic societies and Globalization,*

Sage publications, New Delhi,1stEdition, 2004.
2. R.K.Sapru, *Public Policy,*Sterling Publishers Pvt. Ltd., New Delhi, 1stEdition, 2001.

IV B.Tech. - I Semester

(16BT60112) BUILDING MAINTENANCE AND REPAIR

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —

COURSE DESCRIPTION:
Durability of buildings, Failure and repair of buildings, Material Techniques for repair, Maintenance of buildings, Conservation and recycling.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Acquire basic knowledge on durability and serviceability, failures, repair and rehabilitation of buildings.
CO2. Analyzefailures, repair and rehabilitation techniques.
CO3. Solve complex building maintenance problems through proper investigations and interpretation.
CO4. Use modern tools and techniques for various repairs and rehabilitation of structures.
CO5. Provide solutions for building maintenance and repair problems considering health and safety.
CO6. Consider environmental sustainability in building maintenance and repair.
CO7. Maintain ethical standards for quality in repairs and rehabilitation of structures.
CO8. Evaluate specifications and perform cost analysis of building components while repair and rehabilitation.

DETAILED SYLLABUS:

UNIT-I: DURABILITY AND SERVICEABILITY OF BUILDINGS (10 Periods)
Life expectancy of different types of buildings; Effect of environmental elements such as heat, dampness, frost and precipitation on buildings; Effect ofchemical agents on building materials, Effect of pollution on buildings, Effect of fire onbuilding; Damage by biological agents like plants, trees, algae, fungus, moss, insects, etc.; Preventive measures on various aspects, Inspection, Assessment procedure for evaluating for damaged structures, Causes of deterioration, Testing techniques.

UNIT-II:FAILURE AND REPAIR OF BUILDINGS (10 Periods)
Building failure – Types, Methodology for investigation; Diagnostictesting methodsandequipment, Repair of cracks inconcrete and masonry, Materials for Repair,Methods of repair, Repair and strengthening of concrete buildings, Foundationrepair and strengthening, Underpinning, Leakage of roofs and repair methods.

UNIT-III: TECHNIQUES FOR REPAIR (08 Periods)
Rust eliminators and polymers coating for rebars during repair, Foamed concrete, Mortar and dry pack, Vacuum concrete, Gunite and shotcrete, Epoxy injection, Mortar repairs for cracks, Shoring and underpinning.

UNIT-IV: MAINTENANCE OF BUILDINGS (09 Periods)
Reliability principles and its applications in selection of systemsfor building, Routine maintenance of building, Maintenance cost, Specifications formaintenance works, Dampness-Damp proof courses, Construction details for prevention ofdampness; Termite proofing, Fire protection, Corrosion protection.

UNIT-V: CONSERVATION AND RECYCLING (08 Periods)
Performance of construction materials and components in service, Rehabilitation of constructed facilities, Conservation movement, Materials and methodsfor conservation work, Recycling of old buildings and its advantages, Examples. **Total Periods: 45**

TEXT BOOKS:
1. Dennison Campbell, Allen and Harold Roper, *Concrete Structures – Materials, Maintenance and Repair*, Longman Scientific and Technical, UK, 1991.
2. Allen, R.T. L., Edwards, S.C. and J. D. N. Shaw,*TheRepair of Concrete Structures*, Blackie Academic & Professional, UK, 1993.

REFERENCE BOOKS:
1. Peter H. Emmons, *Concrete Repair and Maintenance*, John Wiley and Sons Publications, 2002.
2. Building Constructionunder Seismic Conditions in the Balkan Region, UNDP/UNIDO Project Rer/79/015,Volume 5, *Repair and Strengthening of Reinforced Concrete, Stone and Brick Masonry Buildings*, United Nations Industrial Development Organisation, Vienna.
3. Shetty, M. S., *Concrete Technology*, S. Chand and Company.
4. Smith, P. and Julian, W., *Building Services*, Applied Science Publications, London, 1976.
5. SP: 25, BIS;*Causes and Prevention of Cracks in Buildings*.
6. Champion, S., *Failure and Repair of Concrete Structures*, John Wiley and Sons Publications, 1961.

7. Perkins, P. H., Repair, Protection and Water Proofing of Concrete Structures, E& FN Spon, UK, 3rdEdition, 1997.

IV B.Tech. - I Semester

(16BT60113) CONTRACT LAWS AND REGULATIONS

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION:
Construction contracts; Tenders; Arbitration; Legal requirements; Labour regulations.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate basic Knowledge on construction contracts, tenders, arbitration, legal requirements and labour regulations.
CO2. Analyze contracts and tenders.
CO3. Address the legal issues in contracts and tenders.
CO4. Follow laws and regulations in the preparation of contracts and tenders.
CO5. Prepare contract and tender documents as per the standards.
CO6. Consider project schedule, cost, quality and risk in the preparation of contracts and tenders.

DETAILED SYLLABUS:

UNIT-I:CONSTRUCTION CONTRACTS (09 Periods)
Indian contracts act, Elements of contracts, Types of contracts, Features, Suitability, Design of contract documents, International contract document and laws, Standard contract document, Law of torts.

UNIT-II: TENDERS (09 Periods)
Prequalification, Bidding, Accepting; Evaluation of tender from technical, contractual and financial points of view; Two cover system, Preparation of the documentation, Contract formation and interpretation, Potential contractual problems, Price variation clause, Comparison of actions and laws, Subject matter, Violations.

UNIT-III: ARBITRATION (09 Periods)
Arbitration, Comparison of actions and laws, Agreements, Appointment of arbitrators, Conditions of arbitration, Powers and duties of arbitrator, Rules of evidence, Enforcement of award, Arbitration disputes, Dispute review board.

UNIT-IV: LEGAL REQUIREMENTS (09 Periods)
Legal requirements for planning, Property law, Agency law, Tax laws – Income tax, Sales tax, Excise and custom duties, Local government approval, Statutory regulations, Insurance and bonding, Laws governing purchase and sale, Use of urban and rural land, Land revenue codes, EMD, Security deposits, Liquidated damages.

UNIT-V:LABOUR REGULATIONS (09 Periods)
Social security, Welfare legislation; Laws relating to wages, bonus and industrial disputes; Labour administration, Insurance and safety regulations, Workmen's compensation act, Maternity benefit act, Child labour act, Other labour laws.

Total Periods: 45

TEXT BOOKS:

1. SubbaRao,G.C.V., *Law of Contracts I & II*, S. Gogia & Co., 11thEdition, 2011.
2. Jimmie Hinze, *Construction Contracts,*McGraw Hill, 3rdEdition, 2011.

REFERENCE BOOKS:

1. Kishore Gajaria, *GT Gajaria's Law Relating to Building and Engineering Contracts in India*, Lexis NexisButterworths India,4thEdition, 2000.
2. Patil, B. S,*Civil Engineering Contracts and Estimates*, University Press (India) Private Ltd., 4thEdition, 2015.
3. Joseph T. Bockrath, *Contracts and the Legal Environment for Engineers and Architects*, McGraw Hill Education,7thEdition, 2010.

4. AkhileshwarPathak, *Contract Law*, Oxford University Press, 2011.

IV B.Tech. - I Semester

(16BT60114) DISASTER MITIGATION AND MANAGEMENT

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION:
Disasters; Earthquakes; Floods; Cyclones; Droughts; Landslides; Disaster management.

COURSE OUTCOMES: On successful completion of course, students will be able to:

CO1. Demonstrateknowledge on disasters, their vulnerability and mitigation measures.
CO2. Analyze disasters and their vulnerability.
CO3. Design strategies for effective disaster mitigation.
CO4. Address pre and post disaster issues for better preparedness and mitigation measures, through proper analysis and interpretation.
CO5. Use appropriate methods in disaster mitigation and management.
CO6. Use historical data of disasters to inform the people over preparedness and mitigation measures.
CO7. Solve disaster related issues considering environment.
CO8. Consider economical issues in disaster management.

DETAILED SYLLABUS:

UNIT-I: DISASTERS **(09 Periods)**

Types of disasters - Natural disasters; Impact of disasters on environment, infrastructure and development; Concepts of hazards and vulnerability analysis, Hazard Assessment, Guidelines for hazard assessment and vulnerability analysis, Basic principles and elements of disaster mitigation.

UNIT-II: EARTHQUAKES **(09 Periods)**

Introduction to earthquake, Intensity scale (MSK–64), Seismic activity in India, Seismic zones of India, Earthquakes in A.P., Action plan for earthquake disaster preparedness, Elements at risk, Recovery and rehabilitation after earthquake, Earthquake resistant design and construction of buildings; Tsunami – Onset, Types and causes,Warning, Elements at risk, Typical effects, Specific preparedness and mitigation strategies.

UNIT-III: FLOODS, CYCLONES AND DROUGHTS **(11 Periods)**

Floods and Cyclones: Onset, Types, Warnings; Elements at risk, Typical effects, Indian floods and cyclones, Hazard zones, Potential for reducing hazards, Mitigation strategies and community based mitigation.

Droughts: Onset, Types and warning; Causes, Impact, Early warning and response mechanisms, Mitigation strategies, Droughts in India.

UNIT-IV: LANDSLIDES **(08 Periods)**

Onset, Types and warning; Causes, Elements at risk, Indian landslides, Hazards zones, Typical effects, Mitigation strategies and community based mitigation.

UNIT-V: DISASTER MANAGEMENT **(08 Periods)**

Disaster management organization and methodology, Disaster management cycle, Disaster management in India – Typical cases; Cost–benefit analysis with respect to various disaster management programs implemented by NGOs and Government of India.

Total Periods: 45

TEXT BOOKS:

1. V. K. Sharma, *Disaster Management, Medtech Publishing,* 2ndEdition, 2013.
2. Anand S. Arya, AnupKaranth, and AnkushAgarwal, *Hazards, Disasters and Your Community: A Primer for Parliamentarians*, GOI–UNDP Disaster Risk Management Programme, Government of India, National Disaster Management Division, Ministry of Home Affairs, New Delhi, Version 1.0, 2005.

REFERENCE BOOKS:

1. Donald Hyndman and David Hyndman, *Natural Hazardsand Disasters*, Cengage Learning, 3rdEdition, 2011.
2. *Disaster Management in India,*AStatus Report, Ministry of Home Affairs, Govt. of India, May, 2011.

3. Rajendra Kumar Bhandari, *Disaster Education and Management: A Joyride for Students, Teachers, and Disaster Managers*, Springer India, 2014.
4. R. B. Singh, *Natural Hazards and Disaster Management*, Rawat Publications, 2009.

IV B.Tech - I Semester

(16BT60115) ENVIRONMENTAL POLLUTION AND CONTROL

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION:

Fundamentals ofair pollution;Dispersion of pollutants; Effects and control of air pollution; Water pollution;Soil pollution and control; Municipal solid waste management.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrateknowledge on air, water, soil pollution and their control and solid waste management.
CO2. Analyze causes and effects of air, water and soilpollution and their remedial measures.
CO3. Recommend suitable solutionsto complex environmental pollution problems.
CO4. Use appropriate remedial technique to solve environmental pollution problems.
CO5. Understand the effects of environmental pollutionon human health and vegetation.
CO6. Encourage sustainable development through implementation of pollution control measures.
CO7. Maintain IS Codes for environmental quality control.

DETAILED SYLLABUS:

UNIT-I: AIR AND NOISE POLLUTION (08 Periods)

Air Pollution: Scope, Significance, Classification, Sources – Line, Area, Stationary, Mobile; Effects of air pollutants on man, material and vegetation; Global effects of air pollution; Air pollution meteorology - Lapse rate, Inversion, Plume pattern;Dispersion of air pollutants - Dispersion models and applications; Ambient air quality standards.

Noise Pollution: Sound pressure, Power and intensity,Impacts of noise, permissible limits of noise pollution, measurement of noise.

UNIT-II: AIR AND NOISE POLLUTIONCONTROL (10 Periods)

Self-cleansing properties of the environment,Dilution method, Control at source, Process changes and equipment modifications, Control of particulates–Types of equipment, Design and operation – Settlingchambers,Centrifugal separators, Bag house filters, Wet scrubbers, Electrostatic precipitators; Control of gaseouspollutants – Adsorption, Absorption, Condensation, Combustion; Control of air pollution from automobiles, Control of noise pollution.

UNIT-III: WATER POLLUTIONAND CONTROL (10 Periods)

Water pollution – Sources, Causes, Effects; Surface and groundwater quality – Physical, Chemical, Biological; Drinking water quality standards, Water purification – Processes, Engineered systems – Aeration, Solids separation, Settling operations, Coagulation, Softening, Filtration, Disinfection; Wastewater – Sources, Causes, Effects, Treatment and disposal – Primary, Secondary, Tertiary; Case studies.

UNIT-IV: SOIL POLLUTION AND CONTROL (08 Periods)

Soil pollutants, Sources of soil pollution, Causes, Effectsand control of soil pollution, Diseases caused by soil pollution, Methods to minimize soil pollution, Effective measures to control soil pollution, Case studies.

UNIT-V: MUNICIPAL SOLID WASTE MANAGEMENT (09 Periods)

Types of solid waste, Composition of solid waste, Collection and transportation of solid waste, Methods of disposal – Opendumping, Sanitary landfill, Composting, Incineration, Utilization - Recovery and recycling, Energy Recovery. **Total Periods: 45**

TEXT BOOKS:

1. Peavy, H. S, Rowe, D. R., and Tchobanoglous, G., *Environmental Engineering*, McGraw Hill Inc., 1985.
2. C.S.Rao, *Environmental Pollution Control Engineering*, New Age International Pvt. Ltd., 2ndEdition, 2007.
3. Ibrahim A. Mirsa, *Soil Pollution: Origin, Monitoring & Remediation*, Springer, UK, 2ndEdition, 2008.

REFERENCE BOOKS:

1. M.N. Rao and H.V.N. Rao, *Air Pollution,* Tata McGraw–Hill Education Pvt. Ltd., 19thEdition, 2010.
2. Daniel Vallero, *Fundamentals of Air Pollution,* Academic Press (Elsevier)*,* 5thEdition, 2014.
3. S.M.Khopkar,*Environmental Pollution Monitoring and Control,* New Age International Pvt. Ltd., 2ndEdition, 2007.

4. V. M. Domkundwar, Environmental Engineering, DhanpatRai& Co. Pvt. Ltd., New Delhi, 2014.

IV B.Tech - I Semester

(16BT60116) PLANNING FOR SUSTAINABLE DEVELOPMENT

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION:
Sustainable development;Environmental impact;Sustainable Policies; Governance; Theories and strategies; Media and education for sustainability.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate the knowledge on sustainable development, environmental impact, sustainable policies, governance, systems and strategies, media and education for sustainability.
CO2. Analyze theories, environmental impact, policies, systems and strategies for sustainable development.
CO3. Develop suitable methods and systems for sustainable development.
CO4. Use appropriate techniquesin solving issues related to sustainable development.
CO5. Provide solutions to problems associated with sustainable development considering society.
CO6. Consider environment while planning sustainable development.
CO7. Communicate effectively on sustainable development issues through media and education.
CO8. Consider economical issues while planning for sustainable development.

DETAILED SYLLABUS:

UNIT-I: SUSTAINABLE DEVELOPMENT (09 Periods)
Definition and concepts of sustainable development, Capitalization of sustainability - National and global context;Millennium development goals, Emergence and evolution of sustainability and sustainable development, Theories of sustainability, Case studies.

UNIT-II: ENVIRONMENTAL IMPACT (09 Periods)
Climate change – Science, Knowledge and sustainability; Unforeseen environmental impacts on development, Challenges of sustainable development, Centrality of resources in sustainable development, Case studies.

UNIT-III: SUSTAINABLE POLICIES AND GOVERNANCE (09 Periods)
Governance - Democracy and Eco–welfare; Global civil society and world civil politics, Civic environmentalism, Policy responses to sustainable development, Economics of sustainability, Social responsibility in sustainability, National action, ISO 14001: Environmental management system.

UNIT-IV: SUSTAINABLE SYSTEMS AND STRATAGIES (09 Periods)
Need for system innovation, Transition and co–evolution, Theories and methods for sustainable development, Strategies for eco–innovation, Ecological foot print analysis, Socio ecological indicators – Eco labels; Policy programmes for system innovation, Case studies.

UNIT-V: MEDIA AND EDUCATION FOR SUSTAINABILITY (09 Periods)
Role of emerging media, Remarkable design and communication art, Activism and the public interest, Education for sustainability, Participation in decision making, Critical thinking and reflection, Case studies.

Total Periods: 45

TEXT BOOKS:
1. John Blewitt, *Understanding Sustainable Development*, Earth Scan Publications Ltd., 2ndEdition, 2008.
2. Jennifer A. Elliot, *An Introduction to Sustainable Development*, Earth Scan Publications Ltd., 4thEdition, 2006.

REFERENCE BOOKS:
1. Peter Rogers, Kazi F Jalal and John A Boyd, *An Introduction to Sustainable Development*, Earth Scan Publications Ltd., 2006.
2. Simon Dresner, *The Principles of Sustainability*, Earth Scan Publications Ltd.,2ndEdition, 2008.
3. Peter Bartelmus, *Environment Growth and Development: The Concepts and Strategies of Sustainability*, Routledge, 3rdEdition, 2003.

4. Gabriel Moser, Enric Pol, Yvonne Bernard, MiriliaBonnes, Jose Antonio Corraliza and Maria Vittoria Giuliani, *People Places and Sustainability*, Hogrefe& Huber Publishers, 2ndEdition, 2003.

IV B.Tech. - I Semester

(16BT60117) **PROFESSIONAL ETHICS**

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —

COURSE DESCRIPTION:
Engineering ethics; Professional ideals and virtues; Engineering as social experimentation; Responsibilities and rights; Global issues.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate the principles of ethics, importance of professional values and social responsibility.
CO2. Analyze the problems in the implementation of moral autonomy and use ethical theories in resolving moral dilemmas.
CO3. Develop suitable strategies to resolve problems arise in practicing professional ethics.
CO4. Provide solutions to complex problems associated with professional ethics by proper analysis and interpretation.
CO5. Use appropriate theories in resolving issues pertain to professional ethics.
CO6. Understand the impact of professional ethics on society and address the limitations of codes of ethics.
CO7. Practice engineering with professionalism, accountability and ethics.
CO8. Function as a member, consultant, manager, advisor and leader in multi-disciplinary teams.
CO9. Write reports without bias and give instructions to follow ethics.

DETAILED SYLLABUS:

UNIT-I: ENGINEERING ETHICS (09 Periods)
Scope and aim of engineering ethics, Senses of engineering ethics, Variety of moral issues, Types of inquiry, Moral dilemmas, Moral autonomy-Kohlberg's theory, Gilligan's theory, Consensus and controversy.

UNIT-II:PROFESSIONAL IDEALS AND VIRTUES (08 Periods)
Theories about virtues, Professions, Professionalism, Characteristics, Expectations, Professional responsibility, Integrity, Self-respect, Sense of responsibility, Self-interest, Customs and religion, Self-interest and ethical egoism, Customs and ethical relativism, Religion and divine command ethics, Use of ethical theories, Resolving moral dilemmas and moral leadership.

UNIT-III:ENGINEERING AS SOCIAL EXPERIMENTATION (10 Periods)
Engineering as experimentation, Similarities to standard experiments, Learning from the past and knowledge gained, Engineers as responsible experimenters, Conscientiousness, Moral autonomy and accountability, The challenger case, Codes of ethics and limitations, Industrial standards, Problems with the law of engineering.

UNIT-IV: RESPONSIBILITIES AND RIGHTS (09 Periods)
Collegiality and loyalty, Respect for authority, Collective bargaining, Confidentiality, Conflict of interests, Occupational crime, Rights of engineers, Professional rights, Whistle-blowing, The BART case, Employee rights and discrimination.

UNIT-V: GLOBAL ISSUES (09 Periods)
Multinational corporations, Professional ethics, Environmental ethics, Computer ethics, Engineers as consultants, Witnesses, Advisors and Leaders, Engineers as Managers, Managerial ethics applied to Engineering Profession, moral leadership.

Total Periods: 45

TEXT BOOKS:

1. Mike W. Martin and Roland Schinzinger, *Ethics in Engineering*, Tata McGraw-Hill, 3rdEdition, 2007.
2. Govindarajan, M., NataGovindarajan, M., Natarajan, S. and Senthilkumar, V. S., *Engineering Ethics*, Prentice Hall of India, 2004.

REFERENCE BOOKS:

1. S. Kannan and K. Srilakshmi, *Human Values and Professional Ethics*, Taxmann Allied Services Pvt Ltd., 2009.
2. Edmund G. Seebauer and Robert L. Barry, *Fundamental of Ethics for Scientists and Engineers*, Oxford University Press, 2001.

3. Charles F. Fledderman, *Engineering Ethics*, Pearson Education, 2ndEdition, 2004.R. Subramanaian, *Professional Ethics*, Oxford Higher Education, 2013.

IV B.Tech. - I Semester

(16BT60118) RURAL TECHNOLOGY

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION:
Rural technology; Non conventionalenergy; Community development; IT in rural development.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate the knowledge on technologies for rural development.
CO2. Analyze various technologies available which are appropriate for rural development.
CO3. Carryout feasibility study on the public and private partnership for rural development.
CO4. Develop and use latest technologies for rural development.
CO5. Address health and safety issues while choosing technologies for rural development.
CO6. Educate the rural populace on the positive impacts of bio-fertilisers and usage of agro machinery in agriculture.

DETAILED SYLLABUS:

UNIT-I:RURAL TECHNOLOGY (09 Periods)
India - Technology and rural development, Pre and post-independence period,Rural India Life, Indian farmer, Role of science and technology in rural development, Rural technology and poverty eradication, Rural business hubs, Technology in improving rural infrastructure,Various organizations related to innovation, Issues of technology transfer - CAPART, NABARD, CSIR, NIF.

UNIT-II: NON CONVENTIONAL ENERGY (09 Periods)
Definition of energy, Types of alternative sources of energy, Sources of non-conventional energy – Solar energy: Solar cooker,Solar heater; Biogas, Recycling and management,Wastes conservation, Assessment and production of biomass products and their utilization.

UNIT-III: TECHNOLOGIES FOR RURAL DEVELOPMENT (09 Periods)
Food and agro based technologies, Tissue culture, Nursery,Building and construction technologies, Cultivation and processing of economic plants, Cottage and social industries.

UNIT-IV: COMMUNITY DEVELOPMENT (09 Periods)
Water conservation, Rain water Harvesting, Drinking water, Environment and Sanitation, Bio fertilizers, Medical and aromatic plants, Employment generating technologies–Apiculture, Pisciculture and Aquaculture.

UNIT-V:IT IN RURAL DEVELOPMENT (09 Periods)
Role of information technology (IT) in rural areas, Impact of IT in rural development, Need and necessity of technology, Corporate social responsibilities, Private sector participation (Activities in different spheres: Employment, Education, Health, Agriculture and service sectors) and SaansadAdarsh Gram Yojana (SAGY), Village adoptionschemes.

Total Periods: 45

TEXT BOOKS:
1. M.S.Virdi, *Sustainable Rural Technologies*, Daya Publishing House, 2009.
2. S.V. Prabhathand, P. Ch. Sita Devi, *Technology and Rural India*, Serials Publications, 2012.

REFERENCE BOOKS:
1. R. Chakravarthy and P.R.S. Murthy, *Information Technology and Rural Development,*Pacific Book International, 2012.
2. Shivakanth Singh, *Rural Development Policies and Programmes,* Northern Book Centre, 2002.
3. L.M.Prasad, *Principles and Practice of Management*, S. Chand & Sons, 8th edition, 2014.

4. Venkata Reddy, K., *Agriculture and Rural Development -Gandhian Perspective*,Himalaya Publishing House, 2001.

IV B.Tech - I Semester

(16BT60308) **GLOBAL STRATEGY AND TECHNOLOGY**

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —

COURSE DESCRIPTION:
Introduction to strategic management; Strategic management process; Principles of good strategy; Globalization strategies; Research and Development strategies; Technology Management and Transfer; Elements of Transfer Process; Corporate Governance in the Indian scenario.

COURSE OUTCOMES:
On successful completion of the course, students will be able to
- CO1. Demonstrate the knowledge on Strategic management, Research & development strategies, Technology management and transfer, Globalization and Corporate governance.
- CO2. Identify and analyze crucial problems in strategic management to improve performance of the organizations.
- CO3. Develop the products and production process by using research and development strategies.
- CO4. Conduct investigations on the impact of globalization in current scenario in the context of corporate governance.
- CO5. Appraise the resources and capabilities of the firm in terms of their ability to confer sustainable development.
- CO6. Apply ethics in strategic decision making.

DETAILED SYLLABUS:

UNIT-I: STRATEGIC MANAGEMENT (09 Periods)
Introduction, Classes of decisions, Levels of strategy, Core competence, Strategic intent and stretch, Approaches to strategy making, Roles of different strategists, Strategic management- Process, Benefits, Limitations; Ethics in strategic decision making, Principles of good strategy, Strategic Management in India.

UNIT-II: RESEARCH & DEVELOPMENT STRATEGIES (09 Periods)
Concept, Evolution of R&D Management, R&D as a business, R&D as competitive advantage, Elements of R & D strategies, Integration of R & D, Selection and implementation of R & D strategies, R & D trends.

UNIT-III: TECHNOLOGY MANAGEMENT AND TRANSFER (09 Periods)
Technology Management: Introduction, Technology - Definition, Components, Classification Features; Technology Management- Concept, Nature; Drivers of Management of Technology- Significance, Scope, Responding to technology challenges.
Technology Transfer: Introduction, Definition, Classification, Significance, Elements of process, Types of Technology Transfer, Package, Modes of Transfer, Routes, Channels and Effectiveness of Technology Transfer.

UNIT-IV: GLOBALISATION (09 Periods)
Definition, Stages, Essential conditions for globalization, Globalization strategies, Competitive advantage of Nations, Factors affecting Globalization, Globalization of Indian business.

UNIT-V: CORPORATE GOVERNANCE: THE INDIAN SCENARIO (09 Periods)
Emergence of corporate governance in India- Landmarks, Models, Codes and status in India, Role and Responsibilities of Regulators, The Board of Directors; Corporate Governance- Specific issues in India, Family owned Business, Corporate Governance and the Indian ethos.

Total periods: 45

TEXT BOOKS:
1. Francis Cherunilam, *Strategic Management*, Himalaya Publishing House, 3rdEdition, 2002.
2. C.S.G.Krishnamacharyulu and Lalitha Ramakrishnan, *Management of Technology*, Himalaya Publishing House, 2ndEdition, 2012.

REFERENCE BOOKS:
1. White and Bruton, *The Management of Technology and Innovation: A Strategic Approach*, Cengage Learning, 1stEdition, 2007.
2. S.K.Mandak, *Ethics in Business and Corporate Governance*, TMH, 2ndEdition, 2012.

IV B.Tech - I Semester

(16BT60309) **INTELLECTUAL PROPERTY RIGHTS AND MANAGEMENT**

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —

COURSE DESCRIPTION:

Protection of ideas; innovation and artistic endeavors; Acts and procedure related to patents, trademarks, copy right, design registration, trade secrets and cyber laws; Infringement; Commercialization of intellectual property rights; Case studies in each.

COURSE OUTCOMES:

On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on intellectual property rights, patents, trademarks, copyrights, trade secrets and commercialization of intellectual property.

CO2. Analyse the commercial significance of discoveries and developments and to assist in bringing these into public use.

CO3. Investigate and ensure smooth transition from concept to final product by following National & International Laws of Intellectual Property.

CO4. Utilize the various policies and procedures related to patents, trademarks and copyrights relating to IPR.

CO5. Safeguard, review and manage the intellectual property so that it may receive adequate and appropriate legal protection against unauthorized use.

CO6. Follow ethical standards in capacity building and work as a platform for development, promotion, protection, compliance, and enforcement of intellectual property and knowledge.

CO7. Prepare documents and fill applications needed for filing a patent, design, copyright and trade mark.

DETAILED SYLLABUS:

UNIT-I: OVERVIEW OF INTELLECTUALPROPERTY RIGHTS (09 Periods)

Introduction, Intellectual Property vs. Conventional Property, and importance of intellectual property rights (IPRs), types of intellectual property, International Treaties for protection of IPR-Paris Convention, World Intellectual Property Organization (WIPO), World Trade Organization (WTO), Trade Related Aspects of Intellectual Property Rights (TRIP) Agreement, General Agreement on Tariffs and Trade(GATT).

UNIT-II: TRADEMARKS (09 Periods)

Introduction, Functions and kinds of trademarks, Trade Mark Registration Process, Post registration procedures, Trade Mark maintenance, Transfer of rights, Inter parties Proceedings, Infringement and Dilution of Ownership of Trade Mark, Trade Mark claims, International Trade Mark Law.

UNIT-III: PATENTS (09 Periods)

Introduction, Rights under Patent Law, Patent Application Process, Terms and Maintenance of Patents Requirements, Patent Ownership and Transfer, Licensing of Patent Rights, Sole and Joint Inventors, Disputes over Inventorship, Patent Infringement, International Patent Law, Patent Cooperation Treaty (PCT), Patent Law Treaty (PLT), Substantive Patent Law Treaty (SPLT).

UNIT-IV: COPY RIGHTS, TRADE SECRETS, CYBER LAWS (09 Periods)

Copy Rights: Introduction, nature and scope, subject matter, Rights afforded by copyright law, Copyrights ownership, transfers and duration, Copyright registration process.

Trade Secrets: Introduction, Determination of Trade Secret Status, Employer-Employee Relationships, Protection of submissions.

Cyber laws: E-commerce and cyber laws, cybercrime and legislation- need, objective and scope; IT Act 2000, Information Technology and Information Security.

UNIT-V: INDUSTRIAL DESIGN AND COMMERCIALIZATION OF INTELLECTUAL PROPERTY RIGHTS (09 Periods)

Industrial Design: Introduction, Indian Law related to registration of Industrial Designs, Essential requirements for registration of a design in India, International Agreements – Hague System; Conflicts related to registration of design.

Commercialization of Intellectual Property Rights: Competition and Confidentiality Issues, Antitrust Laws, Assignment of Intellectual Property Rights, Technology, Transfer Agreements, Intellectual Property Issues in the Sale of Business, Legal Auditing of Intellectual Property, Due Diligence of Intellectual Property Rights in a Corporate Transaction. **Total Periods: 45**

TEXT BOOKS:

1. Deborah E. Bouchoux, *Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets*, Cengage Learning, 4thEdition, 2016.
2. KompalBansal and ParikshitBansal, *Fundamentals of Intellectual Property for Engineers*, BS Publications, 1stEdition, 2013.

REFERENCE BOOKS:

1. PrabuddhaGanguli, *Intellectual Property Rights-Unleashing the Knowledge Economy*, McGraw Hill Education, 6th reprint, 2015.
2. P. Narayanan, *Intellectual Property Law*, Eastern Book Company, 3rdEdition, 2013.

3. R.Radha Krishnan, S. Balasubramanian, *Intellectual Property Rights: Text and Cases*, Excel Books, 1stEdition, 2008.

IV B.Tech. - I Semester

(16BT60310) MANAGING INNOVATION AND ENTREPRENEURSHIP

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION:

Evolution of entrepreneurship from economic theory Managerial and entrepreneurial competencies; Concepts of Shifting Composition of the Economy Purposeful Innovation & Sources of Innovative Opportunity; The Innovation Process; Innovative Strategies; Entrepreneurial Motivation; Entrepreneurs versus inventors; Ethics and International Entrepreneurship; Strategic Issues in International Entrepreneurship; Problem solving Innovation and Diversification.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate the principles of business innovation and entrepreneurship for establishing industrial ventures.

CO2. Analyze business plans for potential investors and stakeholders and effectively answer probabilistic questions on the substance of plan.

CO3. Develop a comprehensive and well planned business structure for a new venture.

CO4. Conduct investigation on complex problems, towards the development of Project.

CO5. Apply modern statistical and mathematical tools to design projects and subsequent work procedures.

CO6. Apply ethics in constructive innovation framework.

CO7. Exhibit professionalism by employing modern project management and financial tools.

DETAILED SYLLABUS:

UNIT-I: CREATIVITY AND INNOVATION (07 Periods)

Introduction, Levels of innovation, Purposeful innovation and the sources of innovative opportunity, The innovation process, Innovative strategies, Strategies that aim at introducing and innovation, Dynamics of ideation and creativity – Inbound, Outbound; Context and process of new product development, Theories of outsourcing.

UNIT-II: PARADIGMS OF INNOVATION (11Periods)

Systems approach to innovation, Innovation in the context of developed economies and Emerging economies, Examining reverse innovation and its application, Performance gap, Infrastructure gap, Sustainability gap, Regulatory gap, Preference gap, organizational factors effecting innovation at firm level.

UNIT-III: SOURCES OF FINANCE AND VENTURE CAPITAL (07 Periods)

Importance of finance, Comparison of venture capital with conventional development capital, Strategies of venture funding, Investment phases, Investment process, Advantages and disadvantages of venture capital, Venture capital developments in India.

UNIT-IV: INTELLECTUAL PROPERTY INNOVATION AND ENTREPRENEURSHIP (11 Periods)

Introduction to Entrepreneurship, Evolution of entrepreneurship from economic theory, Managerial and entrepreneurial competencies, Entrepreneurial growth and development, Concepts, Ethics and Nature of International Entrepreneurship, Intellectual property – forms of IP, Patents, Trademarks, Design registration, Copy rights, Geographical indications, Patent process in India.

UNIT-V: OPEN INNOVATION FRAMEWORK AND PROBLEM SOLVING (09 Periods)

Concept of open innovation approach, Difference between open innovations and Cloud innovation approaches, Limitations and Opportunities of open innovation framework, Global context of strategic alliance, Role of strategic alliance, Problem Identification and Problem Solving, Innovation and Diversification.

Total Periods: 45

TEXT BOOKS:

1. Vinnie Jauhari, SudhanshuBhushan, *Innovation Management*, Oxford University Press, 1stEdition, 2014.
2. Drucker, P. F., *Innovation and Entrepreneurship*, Taylor & Francis, 2ndEdition, 2007.

REFERENCE BOOKS:

1. Robert D Hisrich, Claudine Kearney, *Managing Innovation and Entrepreneurship,* Sage Publications, 1stEdition, 2014.

2. V.K.Narayanan, *Managing Technology and Innovation for Competitive Advantage*, Pearson India, 1stEdition, 2002.

IV B.Tech. - I Semester

(16BT60311) MATERIALS SCIENCE

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION:
Structure and Bonding in metals; Steels, Cast Irons and Non Ferrous alloys; Material Selection for conductors, Insulators and semiconductors; Strengthening mechanisms of metals; Plastics and Ceramics as Insulators; AC and DC properties of Insulators; Semiconductors and Magnetic materials; Composite materials in Electrical and Electronics engineering; Material Selection and manufacturing of Optical fibers.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate the knowledge on concepts of fundamental science and engineering principles relevant to materials.
CO2. Analyze the structures of various types of Ferrous, Non-ferrous alloys influencing various engineering applications.
CO3. Conduct investigations to select suitable materials with desired properties for engineering applications.
CO4. Use phase diagrams to interpret the data regarding microstructure of materials.
CO5. Consider health and safety issues while providing materials to real time applications.
CO6. Use composite materials that reduce material waste in design and manufacturing for sustainability.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO MATERIAL SCIENCE (07 Periods)
Structure of metals: Bonds in Solids, Crystallization of metals, Grain and grain boundaries, Effect of grain boundaries on the properties of metals / alloys, Determination of grain size measurement.
Constitution of alloys: Necessity of alloying, Types of solid solutions, Hume rothery rules, Intermediate alloy phases.

UNIT-II: CAST IRONS, STEELS AND NON-FERROUS METALS (12 Periods)
Structure and properties of Grey cast iron, Spheroidal cast iron, White Cast iron, Malleable Cast iron, Alloy cast irons, Classification of steels, structure and properties of plain carbon steels, Structure and properties of Copper and its alloys, Aluminum and its alloys.

UNIT-III: ELECTRIC CONDUCTORS AND INSULATORS (12 Periods)
Type of materials selected for conductors, Insulators and semiconductors, Introduction to ceramics - Bonding and microstructure, DC properties of ceramic materials, AC properties of ceramic materials, mechanical properties, Ceramics as Conductors, Insulators and capacitors; Introduction to Plastics - DC properties, AC properties, Mechanical properties.

UNIT-IV: SEMICONDUCTORS AND MAGNETIC MATERIALS (09 Periods)
Fabrication of Semiconductors, Producing a silicon wafer-Lithography and Deposition packaging of semiconductors materials; Types of magnetic materials, Measuring magnetic properties, Application of soft magnetic materials in Electromagnets and relays, AC transformers, Generators and motors.

UNIT-V: ADVANCED MATERIALS AND APPLICATIONS (05 Periods)
Composites - Fiber reinforced metal matrix, Ceramic matrix, Polymer matrix, Properties and applications of composites; Ceramics - Alumina, Zirconia, Silicon Carbide, SiAlONs, Reaction Bonded Silicon Nitride (RBSN); Glasses- properties and applications, manufacturing of optical fibers.

Total Periods: 45

TEXT BOOKS:

1. Kodgire V D, *Material Science and Metallurgy*, Everest Publishing House, Pune, 31stEdition, 2011.
2. Ian. P.Jones, *Material Science for Electrical and Electronic Engineers*, Oxford University Press, 1stEdition, 2000.

REFERENCE BOOKS:

1. V. Raghavan, *Physical Metallurgy: Principles and Practices*, PHI, New Delhi, 2nd Edition, 2006.

2. William. D. Callister, *Materials Science & Engineering-An Introduction*, John Wiley and Sons, New Delhi, 6th Edition, 2002.

IV B.Tech. - I Semester
(16BT70412) GREEN TECHNOLOGIES
(Open Elective)
(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —

COURSE DESCRIPTION:
Principles of green engineering; Green communications; Green energy; Green computing; Green construction; Green manufacturing.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Deploy conceptual knowledge in green technologies pertaining toengineering practice.
CO2. Analyze various green technologies for engineering practice.
CO3. Provide green solutions to engineering problems.
CO4. Apply various green techniques in the engineering practice.
CO5. Consider health and safety issues while providing green solutions to the society.
CO6. Understand issues related to environment sustainability.
CO7. Apply ethical standards for environmental sustainability in the engineering practice.

DETAILED SYLLABUS:

UNIT-I: PRINCIPLES OF GREEN ENGINEERING AND GREEN COMMUNICATIONS (11 Periods)

Principles of Green Engineering:
Introduction, Definition of green engineering, Principles of green engineering.

Green Communications:
Introduction, Origin of Green Communications, Energy Efficiency in Telecommunication systems, Telecommunication system model and energy Efficiency, Energy saving concepts, Quantifying energy efficiency in ICT, Energy efficiency metrics of green wireless networks, Embodied energy of communication devices- Introduction, The extended energy model, Embodied/Operating Energy of a BS in Cellular network- A Case study; Energy efficient standards for wireline communications.

UNIT-II: GREEN ENERGY (09 Periods)
Introduction, adverse impacts of carbon emission, control of carbon emission– methods, greenhouse gas reduction – methods, Energy sources and their availability, Green energy for sustainable development. Green energy sources – Solar energy, Wind energy, Fuel cells, Biofuels, Wave and Geothermal energy (Principle of generation only).

UNIT-III: GREEN IT (09 Periods)
The importance of Green Information technologies, Strategizing Green Initiatives, Implementation of Green IT, Information Assurance, Communication and Social Media, Regulating Green IT- Laws, Standards and Protocols; RoHS, REACh, WEEE, Legislating for GHG Emissions and Energy Use of IT Equipment, Non-regulatory Government Initiatives, Industry Associations and Standard Bodies, Green Building Standards, Green Data Centres, Social Movements and Greenpeace, Conclusions.

UNIT-IV: GREEN CONSTRUCTION (09 Periods)
Green Building: Definition, Typical features, Benefits, Requisites for green building construction, Sustainability, Concept of REDUCE, REUSE, RECYCLE, RETHINK, REPLENISH AND REFUSE (6 R's), Sustainable construction focus point – Site selection, Planning, Water, Energy, Material, Indoor air quality, Construction procedures.
Indian Green Building Council: Introduction to IGBC green homes, Benefits of IGBC, IGBC green home rating system, Introduction to USGBC, LEED rating system, Procedure to get IGBC certification, GRIHA Rating.

UNIT-V: GREEN MANUFACTURING (09 Periods)
Introduction, background, definition, motivation and barriers to green manufacturing, Impact of manufacturing in environmental ecology, Need for green manufacturing, Advantages and Limitations, green manufacturing strategies, Green manufacturing and sustainability, Sustainability tools; Waste stream mapping and application, Green manufacturing through clean energy supply, green lean manufacturing, green packaging and supply chain. **Total Periods: 47**

TEXT BOOKS:
1. KonstantinosSamdanis, Peter Rost, Andreas Maeder, MichelaMeo, Christos Verikoukis, *Green Communications: Principles, Concepts and Practice,*John Wiley & Sons, 2015.
2. Soli J. Arceivala, *Green Technologies for a better future,* McGraw Hill Education (India) Pvt. Ltd, 2014.
3. San Murugesan, G.R. Gangadharan, *Harnessing Green IT – Principles and Practices,* John Wiley & Sons Ltd., 2008.
4. Tom Woolley, Sam Kimmins, Paul Harrison and Rob Harrison, *Green Building Handbook*, *Volume 1*, E & FN Spon, an imprint of Thomson Science & Professional.
5. *IGBC Green Homes Rating System Version 1.0* – A bridged reference guide.
6. J Paulo Davim, Green Manufacturing: Processes and Systems, Springer, 2012.
7. David A Dornfeld, Green Manufacturing: Fundamentals and Applications, Springer, 2013.

REFERENCE BOOKS:
1. Athanasios V Alavanidis, ThomaisVlachogianni, *Green Chemistry and Green Engineering*, SynchronaThemata, 2012.

2. G.D. Rai, *Non-conventional Energy Sources*, Khanna Publishers, Delhi, 5thEdition,2011.
3. Marty Poniatowski, *Foundation of Green Information Technology, Prentice Hall, 2009.*
4. R. K. Gautham, *Green Homes*, BS publications, 2009.

IV B.Tech. - I Semester

(16BT70413) INTRODUCTION TO NANOSCIENCE AND NANOTECHNOLOGY

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION:

Introduction to the concept ofnano;Description of nanomaterial;Nanostructure characterization tools; Classification of nanomaterials;Fabrication of nanomaterial;Different applications of nanostructures and nanomaterials.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge in
- Nanoscale technology.
- Difference between micro and nanotechnology
- Classification of Nanostructure and Nanomaterial
- Fabrication of various nanomaterials and nanostructures.

CO2. Analyze numerical and analytical problems in
- Nanomaterial size by using Scanning Electron Microscope and X-Ray diffraction

CO3. Design and fabricate devices based on nanostructures like
- Nano solar cell
- Nano cantilever
- Nano bio-sensor

CO4. Synthesize nano particle of different materials to solve the problems related to fabrication of nanostructures.

CO5. Select appropriate technique for fabrication ofnanostructures and Nano composites.

CO6. Apply ethical standards and legal issues while using chemical substances infabrication of new nanostructures.

DETAILED SYLLABUS:

UNIT-I: FUNDAMENTALS OF NANOTECHNOLOGY (08 Periods)

Introduction – Scientific revolutions, Time and length scale in structures, Definition of a nanosystem; Dimensionality and size dependent phenomena - Surface to volume ratio Fraction of surface atoms, Surface energy and surface stress, surface defects, Properties at nanoscale (optical, mechanical, electronic, and magnetic).

UNIT-II:IDENTIFICATION AND CHARACTERIZATION TOOLS FOR NANOMATERIALS AND NANOSTRUCTURE (10 Periods)

Field Emission Scanning Electron Microscopy (FESEM), Environmental Scanning ElectronMicroscopy (ESEM) High Resolution, Transmission Electron Microscope (HRTEM), Scanning Tunneling Microscope(STM), Surface enhanced Raman spectroscopy (SERS), Secondary Ion Mass Spectroscopy, Focused Ion Beam Photoelectron Spectroscopy, X-ray Photoelectron Spectroscopy (XPS), Auger electron spectroscopy (AES), Rutherford backscattering spectroscopy (RBS), X-Ray Diffraction, Intensities in X-Ray Scattering Particle Size Effect.

UNIT-III:CLASSIFICATION OF NANOMATERIALS (10 Periods)

Classification based on dimensionality, Quantum Dots,Wells and Wires-III-V Nanoparticles, Electronic Structure of Nanosemiconductor, Carbon based nanomaterials (buckyballs, nanotubes, graphene), Metal based nano materials (nanogold, nanosilver and metal oxides), Nanocomposites, Nanopolymers, Nanoglasses, Nano ceramics, Biological nanomaterials, Fulrene-discovery and early years,.

UNIT-IV:SOME FABRICATION TECHNIQUES OF NANOMATERIALS AND NANOSTRUCTURES(09 Periods)

Chemical Methods: Metal Nanocrystals by Reduction, Solvothermal Synthesis, Photochemical Synthesis,Sonochemical Routes, Chemical Vapor Deposition (CVD), Metal Oxide Chemical Vapor Deposition (MOCVD), Plasma Enhanced Chemical Vapour Deposition Technique(PECVD), Hydrothermal Method, Sol-Gel.

PhysicalMethods: Ball Milling, Electrodeposition, Spray Pyrolysis, Flame Pyrolysis, DC/RF Magnetron Sputtering, Molecular Beam Epitaxy (MBE) Thermal Evaporation Method.

UNIT-V:APPLICATIONS (08 Periods)

Solar energy harvesting, Catalysis,Molecular electronics and printed electronics Nanoelectronics, Polymers with aspecial architecture, Liquid crystalline systems, Linear and nonlinear optical and electro-optical properties, Applications in displays and other devices, Nanomaterials for data storage, Photonics, Plasmonics, Chemical and biosensors, Nanomedicine and Nanobiotechnology, MESFET.

Total Periods: 45

TEXT BOOKS:

1. Pradeep T., *A Textbook of Nanoscience and Nanotechnology*, Tata McGraw Hill Education Pvt. Ltd., 2012.
2. Hari Singh Nalwa, *Nanostructured Materials and Nanotechnology*, Academic Press, 2002.

REFERENCE BOOKS:

1. Nabok A., *Organic and Inorganic Nanostructures*, Artech House, 2005.

2. Dupas C., Houdy P., Lahmani M, *Nanoscience: Nanotechnologies and Nanophysics*, Springer - Verlag Berlin Heidelberg, 2007.
3. S.M. Sze, Physics of Semiconductor Devices, 2ndEdition, 2001.

IV B.Tech. - I Semester

(16BT60505) ENGINEERING SYSTEM ANALYSIS AND DESIGN

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION:
Systems Process; Technologies for Systems; System Development Life Cycle; System Analysis and Modeling; Levels of Management; Project Management; Systems Implementation and Importance of UML Prototyping; Maintaining and Managing the Systems Output Process.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge in
- Systems Process and System Design
- Systems Analysis and Modeling
- System Development Life Cycle
- Design Management and Maintenance Tools.

CO2. Analyzesystem Process and estimate the given models by using case tools.
CO3. Design and develop a model to the organizational systems.
CO4. Solve complex problems related to engineering systems and produce accurate results
CO5. Apply object oriented techniques for modeling dynamic systems.
CO6. Contribute towards societal issues and responsibilities in designing, modeling and developing of organizational systems.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION (09 Periods)
Systems, Types of systems, Integrating technologies for systems, Need for system analysis and design, Role of the systems analyst, System development life cycle, CASE tools for analysis and design.

UNIT-II: ANALYSIS AND MODELING ORGANIZATIONAL SYSTEM (09 Periods)
Organization as system, System analysis, Depicting systems graphically, Use case modeling, Levels of management, Organizational culture.

UNIT-III: PROJECT MANAGEMENT (10 periods)
Project initiation, Problem in organization, Determining feasibilities, Ascertaining hardware and software needs, Identifying, Forecasting, Comparing costs and benefits, Activity planning and control, Managing the project.

UNIT-IV: OBJECT ORIENTED ANALYSIS AND DESIGN USING UML (08 Periods)
Introduction, Object modeling, Dynamic modeling, functional modeling, packages and other UML artifacts, the importance of using UML for modeling.

UNIT-V: DESIGNING EFFECTIVE OUTPUT (09 Periods)
Output design objectives, Relating output content to output method, Realizing how output bias affects users, Designing output for display, Case studies-Designing a web site management, Online exam management, Online portal design.

Total Periods:45

TEXT BOOK:
1. Kenneth E. Kendall and Julie E. Kendall,*System Analysis and Design*, Pearson Education, 9thEdition, 2011.

REFERENCE BOOKS:
1. Dennis, Wixom and Roth,*Systems Analysis and Design*, John Wiley, 5thEdition, 2012.
2. Shelly and Rosenblatt,*Systems Analysis and Design*, Cengage Learning, 9thEdition, 2012.

IV B.Tech.- I Semester

(16BT71011) MICRO-ELECTRO-MECHANICAL SYSTEMS

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:–

COURSE DESCRIPTION:
Overview of Micro Electro Mechanical Systems (MEMS); scaling laws; working principles of microsensors and microactuators; materials; microfabrication processes; packaging of Microsystems.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on MEMS devices, scaling laws, microsensors and microactuators

CO2. Analyze the properties of materials and identify its suitability for MEMS devices.

CO3. Design MEMS devices that meet desired specifications and requirements.

CO4. Analyze and synthesize the information to provide effective solution to engineering problems with MEMS devices.

CO5. Use modern techniques in micro manufacturing process.

CO6. Develop efficient and cost effective MEMS based products for society.

DETAILED SYLLABUS:

UNIT-I: OVERVIEW OF MEMS AND SCALING LAWS (09 periods)
MEMS and Microsystems, Microsystems and microelectronics, miniaturization, applications of MEMS in the automotive industry and in other industries.
Scaling laws of miniaturization: Introduction to scaling, scaling in: geometry, rigid- body dynamics, electrostatic forces, electromagnetic forces, Electricity, Fluid mechanics, Heat transfer.

UNIT-II: **WORKING PRINCIPLES OF MICROSYSTEMS (09 periods)**
Microsensors,acoustic wave sensors, biomedical and biosensors, chemical sensors, pressure sensors, thermal sensors. Microactuation: actuation using thermal forces, shape-memory alloys, piezoelectric crystals, electrostatic forces. MEMS with microactuators, microgrippers, micromotors, microvalves, micropumps.Microaccelerometers, microfludics.

UNIT-III:MATERIALS FOR MEMS AND MICROSYSTEMS (09 periods)
Substrate and wafers, silicon as a substrate material, silicon compounds, silicon piezoresistors, gallium arsenide, quartz, piezoelectric crystals, polymers, carbon nano tube (CNT), development of CNTs, application of CNTs.

UNIT-IV: MEMS FABRICATION PROCESS AND MICROMANUFACTURING (09 periods)
Photolithography, ion implantation, diffusion, oxidation, chemical vapor deposition, physical vapor deposition, deposition by epitaxy, etching, bulk micromanufacturing, surface micromanufacturing, LIGA process.

UNIT-V: MEMS PACKAGING (09 periods)
Introduction to microsystem packaging, objectives and general considerations in packaging design, three levels of microsystem packaging, interfaces in microsystem packaging, packaging technologies, three-dimensional packaging, selection of packaging materials, signal mapping and transduction, Design case: Pressure sensor packaging.

Total Periods: 45

TEXT BOOK:

1. Tai-Ran Hsu, *MEMS & Microsystems, Design and Manufacture*, McGraw Hill Education (India) Pvt. Ltd., 2002.

REFERENCES BOOKS:

1. G.K.Ananthasuresh, K.J.Vinoy,*Micro and Smart Systems*, Wiley India, 2010.
2. NitaigourPremchandMahalik, *MEMS*, McGraw Hill Education (India) Pvt. Ltd., 2007.

IV B.Tech. – I Semester

(16BT61205) CYBER SECURITY AND LAWS

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION:
Cyber Crimes and Indian IT Act; Cyber Offenses; Tools and Methods used in Cyber Crime; Phishing ad Identity Theft; Indian and Global Perspective on Cyber Crimes and Cyber Security; Organizational Implications on Cyber Security; IPR Issues; Cyber Crime and Terrorism; Cyber Crime Illustrations

COURSE OUTCOMES: On successful completion of the course, students will be able to

- CO1. Demonstrate knowledge in Cyber security, Cybercrimes and its related laws in Indian and Global Act.
- CO2. Analyze the legal perspectives and laws related to cybercrimes in Indian context.
- CO3. Apply security and privacy methods in development of modern applications and in organizations to protect people and to prevent cybercrimes.
- CO4. Solve Cyber security issues using privacy policies.
- CO5. Use antivirus tools to minimize the impact of cyber threats.
- CO6. Follow security standards for the implementation of Cyber Security and laws.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO CYBER CRIMES AND OFFENSES (09 Periods)

Cyber Crimes: Introduction, Definition, Origin, Cybercrime and information security, Cyber criminals, Classifications of cybercrimes, The legal perspectives and Indian perspective, Cybercrime and Indian ITA 2000, Global perspective on cybercrimes.

Cyber Offenses: Introduction, Criminals planning on attacks, Social engineering, Cyber stalking, Cyber cafe and crimes, Botnets.

UNIT-II: TOOLS AND METHODS USED IN CYBER CRIME AND PHISHING AND IDENTITY THEFT (09 Periods)

Introduction, Proxy servers and Anonymizers, Phishing, Password cracking, Key loggers and Spywares, Virus, Worms and Ransomware, Trojan horses and Backdoors, Steganography, DoS and DDoS attacks.

Phishing and Identity Theft: Introduction, Phishing, Identity Theft (ID Theft).

UNIT-III: CYBER CRIMES AND CYBER SECURITY-LEGAL PERSPECTIVES (08 Periods)

Introduction, Cyber laws in Indian context, The Indian IT act, Challenges to Indian law and Cybercrime scenario in India, Consequences of not addressing the weakness in IT act, Digital signatures and the Indian IT Act, Cyber Crime and Punishment, Cyber law, Technology and Students in India scenario.

UNIT-IV: CYBER SECURITY-ORGANIZATIONAL IMPLICATIONS (10 Periods)

Introduction, Web threats for organizations – evils and perils, Security and privacy implications from cloud computing, Social Media Marketing-Security risks and Perils for organizations, Social computing and associated challenges for organizations, Protecting people's privacy in organization, Organizational guidelines for internet usage, Safe computing and Usage policy, Incident handling and Best practices.

UNIT-V: CYBER CRIME AND TERRORISMAND ILLUSTRATIONS (09 Periods)

Cyber Crime & Terrorism: Introduction, Intellectual property in the cyber space, The ethical dimension of cybercrimes, The psychology, Mindset and skills of hackers and cyber criminals, Sociology of cyber criminals, Information warfare.

Cyber Crime Illustrations: Indian banks lose millions of rupees, Justice vs. Justice, Parliament attack, The Indian case of online gambling, Bank and credit card related frauds, Purchasing goods and services scam, Nigerian 419 scam.

Total Periods: 45

TEXT BOOK:

1. Nina Gobole and SunitBelapure, *Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives,* Wiley India, 2011.

REFERENCE BOOK:

1. Prashant Mali, *Cyber Law and Cyber Crimes,* Snow White Publications Pvt. Ltd., 2013.

IV B.Tech. - I Semester

(16BT61505) BIO-INFORMATICS

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION:
Introduction to Bioinformatics; Biology and Information; Sequence alignment and dynamic programming; Biological Database; Homology Modeling; Structure Prediction; Molecular Dynamics.

COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge on concepts of biological databases, Genome and proteome.
CO2. Analyze biological sequences for Homology Modeling.
CO3. Apply clustering methods for Phylogenetic trees.
CO4. Solve bio sequencing problems using dynamic programming.
CO5. Select and apply appropriate techniques and tools to structure Prediction.

DETAILED SYLLABUS:

UNIT-I: NUCLEIC ACIDS, PROTEINS AND AMINO ACIDS (08 periods)
Bioinformatics - Definition, Nucleic acid structure, Protein structure, the central dogma, Physico-chemical properties of the amino acids and their importance in protein folding, Polymerase chain reaction (PCR)

UNIT-II: INFORMATION RESOURCES FOR GENES AND PROTEIN (10 periods)
Database file formats, Nucleic acid sequence databases, Protein sequence databases.
Sequence Alignment Algorithm
Pair wise sequence alignment – The problem, Pair wise sequence alignment – Dynamic programming methods, The effect of scoring parameters on the alignment, Multiple sequence alignment.

UNIT-III: PREDICTION OF THE THREE-DIMENSIONAL STRUCTURE OF A PROTEIN AND HOMOLOGY MODELING (09 Periods)
Secondary Structure Prediction, Basic Principles, The Steps of Comparative Modeling, Accuracy of Homology Models, Manual versus Automatic Models, SNPs, Motifs**.**

UNIT-IV: PHYLOGENETIC METHODS (10 periods)
Phylogenetic trees, choosing sequences, Distance matrices and clustering methods, Calculation of distances in the neighbor-joining method, Bootstrapping, Tree optimization criteria and tree search methods, The maximum-likelihood criterion, Calculating the likelihood of the data on a given tree, The parsimony criterion.

UNIT-V: NEW FOLD MODELING (08 periods)
Estimating the Energy of a Protein Conformation, Energy Minimization, Molecular Dynamics, The "Omics" Universe-Transcriptomics, Proteomics, Interactomics, Structural Genomics, Pharmacogenomics.

TEXTBOOKS:

1. Paul G. Higgs and Teresa K. Attwood, *Bioinformatics and Molecular Evolution* Blackwell Publishing, 2005.
2. Anna Tramontano, *Introduction to Bioinformatics* Chapman and Hall/CRC, 2006.

REFERENCE BOOKS:

1. Hooman H. Rashidi and Lukas K. Buehler, *Bioinformatics Basics, Applications in Biological Science and Medicine*, CRC Press, Taylor & Francis Group, 2ndEdition, 2005.
2. Rastogi S. C., NamitaMendiratta and ParagRastogi, *Bioinformatics: Methodsand Applications: Genomics, Proteomics and Drug Discovery*, PHI Learning Pvt. Ltd., 3rdEdition, 2011.

IV B.Tech. - I semester
(16BT70431) **ANTENNAS AND MICROWAVE ENGINEERING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Courses on EM theory, Antennas and Microwave Engineering.

COURSE DESCRIPTION:
Design and verification of various antennas; Study of Microwave components' characteristics; Power supplies.

COURSE OUTCOMES: On successful completion of the course, students will be able to:
CO1. Apply the knowledge of antennas and microwaves to understand the working of various devices.
CO2. Analyze the characteristics of different microwave components like
- Attenuators
- Directional Couplers
- Horn antennas etc.,

CO3. Design various antennas for different communication needs.
CO4. Solve problems using different antenna designs and microwave devices.
CO5. Apply appropriate tools to design and analyze various antennas.
CO6. Understand the working of various antennas and microwave components and provide engineering solutions for societal use.
CO7. Commit to ethical principles in the design of antennas and microwave components.
CO8. Work individually or in a group in the field of antennas and microwaves.
CO9. Communicate effectively in verbal and written form in the area of antennas and microwaves.

List of Exercises:

PART – A: (Antennas)
(Minimum of **six experiments** to be conducted)

1. Design of Monopole and Half Wave Dipole antenna
2. Design of Folded dipole antenna
3. Design of End fire and Broadside antenna array
4. Design of Yagi-Uda (minimum of 5 elements) antenna
5. Design of Helical antenna
6. Design of Horn antenna
7. Design of Microstrip patch antenna (strip and probe feeding)
8. Design of Parabolic antenna

Note: Verification for couple of antennas may be demonstrated.

PART – B: (Microwave Engineering)
(Minimum of **six experiments** to be conducted)

1. Reflex Klystron Characteristics
2. Gunn Diode Characteristics
3. Attenuation Measurement
4. Directional Coupler Characteristics
5. VSWR Measurement
6. Impedance Measurement
7. Waveguide parameters measurement
8. Scattering parameters of circulator.

IV B.Tech. - I semester

(16BT70432) **EMBEDDED SYSTEMS LAB**

(Common to EEE, ECE & CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Courses on Embedded systems, C Programming.

COURSE DESCRIPTION:
IDE for Embedded System Design using MSP430; Interfacing Switch & LED; Timers-WDT, Configuring, Programming; ADC-usage; Power down modes; DAC; PWM Generator; Networking – SPI, Wi-Fi.

COURSE OUTCOMES:
On successful completion of the course,students will be able to:

CO1. Demonstrate knowledge in designing complex energy efficient embedded systems.
CO2. Analyze usage of various on-chip resources like GPIO, Timers, Interrupts, ADC, DAC,Comparator, SPI.
CO3. Design embedded systems to suit market requirements.
CO4. Solve engineering problems by proposing potential solutions using industry choice advanced Microcontrollers.
CO5. Apply appropriate techniques, resources, and CCSV6 based IDE for modeling embedded systems with understanding of limitations.
CO6. Provide embedded system solutions for societal needs.
CO7. Work individually and in a group to develop embedded systems.
CO8. Communicate effectively in oral and written form in the field of embedded systems.

LIST OF EXCERSISES:

1. Introduction to MSP430 launch pad and Programming Environment.
2. Read input from switch and Automatic control/flash LED (software delay).
3. Interrupts programming example using GPIO.
4. Configure watchdog timer in watchdog & interval mode.
5. Configure timer block for signal generation (with given frequency).
6. Read Temperature of MSP430 with the help of ADC.
7. Test various Power Down modes in MSP430.
8. PWM Generator.
9. Use Comparator to compare the signal threshold level.
10. Speed Control of DC Motor
11. Master slave communication between MSPs using SPI.
12. Networking MSPs using Wi-Fi.

Tool Requirement:

Code Composer Studio Version 6, MSP430 based launch pads, Wi-Fi booster pack.

REFERENCE BOOKS:

1. John H Davies, *MSP430 Microcontrollers Basics*, Newnes Publishers, 1st Edition, 2008.
2. C P Ravikumar, *MSP430 Microcontrollers in Embedded System Projects*, Elite Publishing House, 1st Edition, 2012.

IV B.Tech. - I semester
(16BT70433) **COMPREHENSIVE ASSESSMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
	100	100	-	-	-	2

PREREQUISITES: All the courses of the program.

COURSE DESCRIPTION:
Assessment of student learning outcomes in the courses of the program.

COURSE OUTCOMES:

Comprehensive Assessment enables a successful student to demonstrate:

CO1. Knowledge in the courses of the program.

CO2. Analytical ability in the courses of the program.

CO3. Design skills in the courses of the program.

CO4. Ability to investigate and solve complex engineering problems in the courses of the program.

CO5. Ability to apply tools and techniques to complex engineering activities with anunderstanding of limitations in the courses of the program.

CO6. Ability to provide solutions as per societal needs with consideration to health, safety, legal and cultural issues in the courses of the program.

CO7. Understanding of the impact of the professional engineering solutions in environmental context and need for sustainable development in the courses of the program.

CO8. Ability to apply ethics and norms of the engineering practice in the courses of the program.

CO9. Ability to function effectively as an individual in the courses of the program.

CO10. Ability to present views cogently and precisely in the courses of the program.

CO11. Ability to engage in life-long leaning in the courses of the program.

IV B.Tech. - II semester
(16BT80431) **PROJECT WORK**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
100	100	200	-	-	-	12

PREREQUISITES: All the courses of the program.

COURSE DESCRIPTION:
Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Preparation of thesis and presentation.

COURSE OUTCOMES:

Completion of the project work enables a successful student to demonstrate:

CO1. Knowledge on the project topic.

CO2. Analytical ability exercised in the project work.

CO3. Design skills applied on the project topic.

CO4. Ability to investigate and solve complex engineering problems faced during theproject work.

CO5. Ability to apply tools and techniques to complex engineering activities with anunderstanding of limitations in the project work.

CO6. Ability to provide solutions as per societal needs with consideration to health, safety, legal and cultural issues considered in the project work.

CO7. Understanding of the impact of the professional engineering solutions in environmental context and need for sustainable development experienced duringthe project work.

CO8. Ability to apply ethics and norms of the engineering practice as applied in theproject work.

CO9. Ability to function effectively as an individual as experienced during the project work.

CO10. Ability to present views cogently and precisely on the project work.

CO11. Project management skills as applied in the project work.

CO11. Ability to engage in life-long leaning as experience during the project work.

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(Autonomous)

COURSE STRUCTURE (2016-2017)

ELECTRICAL AND ELECTRONICS ENGINEERING

I B.Tech. (I Semester)

S. No.	Course	Course Title	Contact Periods/ Week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
I Year - I Semester										
1	16BT1BS02	Engineering Physics	3	1	--	4	3	30	70	100
2	16BT1BS03	Matrices and Numerical Methods	3	1	--	4	3	30	70	100
3	16BT1BS04	Multi-variable calculus and Differential equations	3	1	--	4	3	30	70	100
4	16BT10201	Electric Circuits	4	1	--	5	4	30	70	100
5	16BT10501	Programming in C	3	1	--	4	3	30	70	100
6	16BT1BS32	Engineering Physics Lab	--	--	3	3	2	50	50	100
7	16BT10231	Electric Circuits Lab	--	--	3	3	2	50	50	100
8	16BT10232	Electrical and Electronics Workshop Practice	--	--	3	3	2	50	50	100
9	16BT10531	Programming in C Lab	--	--	3	3	2	50	50	100
		Total	**16**	**5**	**12**	**33**	**24**	**350**	**550**	**900**

I B.Tech. (II Semester)

S. No.	Course	Course Title	Contact Periods/ Week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
I Year - II Semester										
1	16BT1HS01	Technical English	3	1	--	4	3	30	70	100
2	16BT1BS01	Engineering Chemistry	3	1	--	4	3	30	70	100
3	16BT2BS01	Transformation Techniques and Partial Differential Equations	3	1	--	4	3	30	70	100
4	16BT20401	Electronic Devices and Circuits	3	1	--	4	3	30	70	100
5	16BT20541	Foundations of Data Structures	3	1	--	4	3	30	70	100
6	16BT1HS31	English Language Lab	--	--	3	3	2	50	50	100
7	16BT1BS31	Engineering Chemistry Lab	--	--	3	3	2	50	50	100
8	16BT10331	Computer Aided Engineering Drawing	--	1	6	7	3	50	50	100
9	16BT20551	Foundations of Data Structures Lab	--	--	3	3	2	50	50	100
		Total	**15**	**6**	**15**	**36**	**24**	**350**	**550**	**900**

II B.Tech. (I Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
II Year - I Semester										
1	16BT3HS01	Environmental Studies	3	--	--	3	3	30	70	100
2	16BT3BS02	Special Functions and Complex Analysis	3	1	--	4	3	30	70	100
3	16BT30201	DC Machines	3	1	--	4	3	30	70	100
4	16BT30202	Electromagnetic Fields	3	1	--	4	3	30	70	100
5	16BT30203	Signals, Systems and Networks	3	1	--	4	3	30	70	100
6	16BT30441	Analog Electronic Circuits	3	1	--	4	3	30	70	100
7	16BT30231	DC Machines Lab	--	--	3	3	2	50	50	100
8	16BT30232	Signals and Networks Lab	--	--	3	3	2	50	50	100
9	16BT30451	Analog Electronic Circuits Lab	--	--	3	3	2	50	50	100
		TOTAL	**18**	**5**	**9**	**32**	**24**	**330**	**570**	**900**

II B.Tech. (II Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
II Year - II Semester										
1	16BT40201	Electrical Measurements	3	1	--	4	3	30	70	100
2	16BT40202	Generation of Electric Power	3	1	--	4	3	30	70	100
3	16BT40203	Transformers and Induction Machines	3	1	--	4	3	30	70	100
4	16BT41002	Linear and Digital ICs	3	1	--	4	3	30	70	100
5	16BT30403	Switching Theory and Logic Design	3	1	--	4	3	30	70	100
6	16BT41041	Computer Architecture and Organization	3	1	--	4	3	30	70	100
7	16BT40231	Electrical Measurements Lab	--	--	3	3	2	50	50	100
8	16BT40232	Transformers and Induction Machines Lab	--	--	3	3	2	50	50	100
9	16BT41033	Linear and Digital ICs lab	--	--	3	3	2	50	50	100
		Total	**18**	**6**	**9**	**33**	**24**	**330**	**570**	**900**

III B.Tech. (I Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
III Year - I Semester										
1	16BT3HS02	Managerial Economics and Principles of Accountancy	3	1	--	4	3	30	70	100
2	16BT50201	Control Systems	3	1	--	4	3	30	70	100
3	16BT50202	Power Electronics	3	1	--	4	3	30	70	100
4	16BT50203	Synchronous Machines	3	1	--	4	3	30	70	100
5	16BT50204	Transmission and Distribution	3	1	--	4	3	30	70	100
Interdisciplinary Elective-1										
6	16BT40502	Database Management Systems	3	1	--	4	3	30	70	100
	16BT51003	Principles of Communications								
	16BT51041	Sensors and Signal Conditioning								
	16BT31501	Operating Systems								
7	16BT50231	Control Systems Lab	--	--	3	3	2	50	50	100
8	16BT50232	Synchronous Machines Lab	--	--	3	3	2	50	50	100
9	16BT4HS31	Soft Skills Lab	--	--	3	3	2	50	50	100
		Total	**18**	**6**	**9**	**33**	**24**	**330**	**570**	**900**

III B.Tech. (II Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
III Year - II Semester										
1	16BT5HS01	Management Science	3	1	--	4	3	30	70	100
2	16BT60201	Power Semiconductor Drives	3	1	--	4	3	30	70	100
3	16BT60202	Power System Analysis	3	1	--	4	3	30	70	100
Interdisciplinary Elective-2										
4	16BT50501	Computer Networks	3	1	--	4	3	30	70	100
	16BT61001	ARM Processors and PIC Microcontrollers								
	16BT61041	Programmable Logic Controllers								
	16BT51241	Object Oriented Programming								
Program Elective-1										
5	16BT60203	Design and Estimation of Electrical Systems	3	1	--	4	3	30	70	100
	16BT60204	Digital Signal Processing for Electrical Engineers								
	16BT60205	Electrical Machine Design								
	16BT60206	HVDC Transmission								
Program Elective-2										
6	16BT60207	Advanced Control Systems	3	1	--	4	3	30	70	100
	16BT60208	High Voltage Engineering								
	16BT60209	Instrumentation								
	16BT60210	Special Electrical Machines								
7	16BT60231	Power Electronics and Drives Lab	--	--	3	3	2	50	50	100
8	16BT60232	Power System – I Lab	--	--	3	3	2	50	50	100
9	16BT60233	Seminar	--	--	--	--	2	--	100	100
10	16BT6MOOC	MOOC	--	--	--	--	--	--	--	--

	Total	**18**	**6**	**6**	**30**	**24**	**280**	**620**	**900**

IV B.Tech. (I Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
IV Year - I Semester										
1	16BT70201	Power System Operation and Control	3	1	--	4	3	30	70	100
2	16BT70402	Embedded Systems	3	1	--	4	3	30	70	100
3	16BT70202	Switchgear and Protection	3	1	--	4	3	30	70	100
4	**Program Elective-3**		3	1	--	4	3	30	70	100
	16BT70203	Energy Conservation and Management								
	16BT70204	Flexible AC Transmission systems								
	16BT70205	Power System Automation								
	16BT70206	Power System Reliability								
5	**Program Elective-4**		3	1	--	4	3	30	70	100
	16BT70207	Analysis of Power Electronic Converters								
	16BT70208	Power Quality								
	16BT70209	Smart Grid Technology								
	16BT70210	Soft Computing Techniques								
6	**Open Elective**		3	1	--	4	3	30	70	100
7	16BT70231	Power System – II Lab	--	--	3	3	2	50	50	100
8	16BT70432	Embedded Systems Lab	--	--	3	3	2	50	50	100
9	16BT70232	Comprehensive Assessment	--	--	--	--	2	--	100	100
		Total	**18**	**6**	**6**	**30**	**24**	**280**	**620**	**900**

Sl. No.	Course Code	Open Elective Course Title
1	16BT6HS01	Banking and Insurance
2	16BT6HS02	Business Communication and Career Skills
3	16BT6HS03	Cost Accounting and Financial Management
4	16BT6HS04	Entrepreneurship for Micro, Small and Medium Enterprises
5	16BT6HS05	French Language
6	16BT6HS06	German Language
7	16BT6HS07	Indian Constitution
8	16BT6HS08	Indian Economy
9	16BT6HS09	Indian Heritage and Culture
10	16BT6HS10	Indian History
11	16BT6HS11	Personality Development
12	16BT6HS12	Philosophy of Education
13	16BT6HS13	Public Administration
14	16BT60112	Building Maintenance and Repair
15	16BT60113	Contract Laws and Regulations
16	16BT60114	Disaster Mitigation and Management
17	16BT60115	Environmental Pollution and Control
18	16BT60116	Planning for Sustainable Development
19	16BT60117	Professional Ethics
20	16BT60118	Rural Technology
21	16BT60308	Global Strategy and Technology
22	16BT60309	Intellectual Property Rights and Management
23	16BT60310	Managing Innovation and Entrepreneurship
24	16BT60311	Materials Science
25	16BT70412	Green Technologies
26	16BT70413	Introduction to Nanoscience and Technology
27	16BT60505	Engineering System Analysis and Design
28	16BT71011	Micro-Electro-Mechanical Systems
29	16BT61205	Cyber Security and Laws
30	16BT61505	Bio-informatics

IV B.Tech. (II Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
IV Year - II Semester										
1	16BT80231	Project Work *	--	--	--	--	12	100	100	200
		Total	--	--	--	--	**12**	**100**	**100**	**200**

*Full-time project work

I B. Tech. - I Semester

(16BT1BS02) **ENGINEERING PHYSICS**

(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate / senior secondary Physics

COURSE DESCRIPTION:

Lasers; optical fibers; principles of quantum mechanics; band theory of solids; semiconductors; dielectric properties of materials; acoustics of buildings; superconductors; crystallography and nanomaterials.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. demonstrate basic knowledge of lasers, optical fibers, quantum mechanics, dielectrics, semiconductors,and superconductors, acoustic of buildings, crystallography and nanomaterials.

CO2. analyze the construction and working of various laser systems, semiconductor devices, various types of optical fibers and its communication system and nano materials properties.

CO3. demonstrate skills in designing lasers, optical fiber cable, semiconductor devices, acoustically good halls and nanomaterials.

CO4. develop problem solving skills in engineering context.

CO5. use relevant techniques for assessing ball milling, pulsed laser deposition, p-n junction and Laser

DETAILED SYLLABUS:

UNIT-I: LASERS AND FIBER OPTICS (11 periods)

Lasers: Introduction, characteristics of lasers, spontaneous and stimulated emission of radiation, Einstein's coefficients - condition for amplification, population inversion, Nd:YAG laser, Helium-Neon laser, semiconductor laser and applications of lasers.

Fiber optics: Introduction, principle of optical fiber, acceptance angle, acceptance cone and numerical aperture, classification of optical fibers, optical fiber communication system and applications of optical fibers.

UNIT-II: PRINCIPLES OF QUANTUM MECHANICS AND BAND THEORY OF SOLIDS (07 periods)

Principles of Quantum Mechanics: Introduction, de-Broglie's hypothesis, Schrödinger's one dimensional wave equation (time independent), significance of wave function, particle in a one dimensional potential box, Fermi-Dirac distribution and effect of temperature (qualitative treatment).

Band Theory of Solids: Electron in a periodic potential, Kronig-Penney model (qualitative treatment), origin of energy bands formation in solids, distinction between conductors, semiconductors and insulators based on band theory.

UNIT-III: SEMICONDUCTORS AND DIELECTRIC PROPERTIES OF MATERIALS (13 periods)

Semiconductors: Introduction, types of semiconductors, intrinsic carrier concentration, electrical conductivity in semiconductors, drift and diffusion currents, Einstein's relation, Hall effect and its applications, direct and indirect band gap semiconductors, p-n junction, energy band diagram of p-n diode, LED, photo diode and Solar cell.

Dielectric Properties of Materials: Introduction, dielectric constant, electronic, ionic and orientation polarizations (qualitative treatment), local field, frequency dependence of polarizability (qualitative treatment), ferroelectricity.

UNIT-IV:ACOUSTICS OF BUILDINGS AND SUPERCONDUCTIVITY (07 periods)

Acoustics of Buildings: Introduction, basic requirement of acoustically good hall, reverberation and time of reverberation, Sabine's formula for reverberation time (qualitative treatment), absorption coefficient of sound and its measurement, factors affecting the architectural acoustics and their remedies.

Superconductivity: Introduction, General properties - Meissner effect, penetration depth, Type-I and Type-II superconductors, flux quantization, Josephson effects, BCS theory (qualitative treatment), applications of superconductors.

UNIT-V:CRYSTALLOGRAPHY AND NANOMATERIALS (07 p*eriods*)

Crystallography: Introduction, crystal planes, crystal directions and Miller indices, separation between successive (hkl) planes, X-ray diffraction by crystal planes, Bragg's law-powder method.

Nanomaterials: Introduction, principles of nanomaterials, properties of nanomaterials, synthesis of nanomaterials by ball milling and pulsed laser deposition and applications of nanomaterials.

Total Periods: 45

TEXT BOOK:

1. P. K. Palaniswamy, *Engineering Physics*, Scitech Publications India Private Limited, 2nd edition, 2009.

REFERENCE BOOKS:

1. Dr. S. Mani Naidu, *Engineering Physics*, Pearson Education, 1st edition, 2013.
2. M.N. Avadhanulu, P.G.Kshirsagar, *A textbook of Engineering Physics*, S.Chand & Company Ltd. Revised edition 2014.
3. K. Thyagarajan, *Engineering Physics-I*, McGraw-Hill Education (India) Pvt. Ltd. 2015.

I B. Tech. – I Semester

(16BT1BS03) MATRICES AND NUMERICAL METHODS

(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Intermediate /Senior secondary mathematics

COURSE DESCRIPTION: Fundamentals of matrix theory; numerical solutions of equations, curve fitting; interpolation; numerical differentiation and integration; numerical solutions of ordinary differential equations.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. demonstrate basic knowledge in
- Finding the rank of matrices and analyzing them.
- Solving algebraic and transcendental equations by various numerical methods.
- Fitting of various types of curves to the experimental data.
- Estimating the missing data through interpolation methods.
- Identification of errors in the experimental data
- Finding the values of derivatives and integrals through various numerical methods.
- Solving differential equations numerically when analytical methods fail.

CO2. develop skills in analyzing the
- methods of interpolating a given data
- properties of interpolating polynomials and derive conclusions
- properties of curves of best fit to the given data
- algebraic and transcendental equations through their solutions
- properties of functions through numerical differentiation and integration
- properties of numerical solutions of differential equations

CO3. develop skills in designing mathematical models for
- Fitting geometrical curves to the given data
- Solving differential equations
- Constructing polynomials to the given data and drawing inferences.

CO4. develop numerical skills in solving the problems involving
- Systems of linear equations
- Fitting of polynomials and different types of equations to the experimental data
- Derivatives and integrals
- Ordinary differential equations

CO5. use relevant numerical techniques for
- Diagonalising the matrices of quadratic forms
- Interpolation of data and fitting interpolation polynomials
- Fitting of different types of curves to experimental data
- obtaining derivatives of required order for given experimental data
- Expressing the functions as sum of partial fractions

DETAILED SYLLABUS:

UNIT–I: MATRICES (11 periods)

Rank of a matrix, echelon form, normal form, inverse of a matrix by elementary row operations. Solutions of linear system of equations. Eigen values, Eigen vectors and properties (without proof), Diagonalization. Quadratic form (QF), reductions to canonical form using orthogonal transformation and nature of QF.

UNIT-II: NUMERICAL SOLUTIONS OF EQUATIONS AND CURVE FITTING (08 periods)

Solutions of Algebraic and Transcendental equations by bisection method, Regula-Falsi method, Newton – Raphson's method. Curve fitting by the principle of least squares, fitting of a straight line, parabola and exponential curves.

UNIT- III: INTERPOLATION (08 periods)

Interpolation, difference operators and their relationships, Newton's forward and backward formulae, Lagrange's interpolation formula. Partial fractions using Lagrange's interpolation formula.

UNIT-IV: NUMERICAL DIFFERENTIATION AND INTEGRATION (08 periods)

Numerical differentiation using Newton's forward and backward formulae. Numerical integration using Trapezoidal rule, Simpson's $1/3^{rd}$ rule and $3/8^{th}$ rule.

UNIT-V: NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS (10 periods)

Numerical solutions of first order Initial value problems using Taylor series method, Euler's method , modified Euler's method, Runge – Kutta method (4^{th}order only) and Milne's predictor – corrector method.

Total no. of periods: 45

TEXT BOOK:

1. T.K.V. Iyenger, B. Krishna Gandhi, S.Ranganadham and M.V.S.S.N.Prasad, *Mathematical Methods,* S.Chand and Company, 8^{th} edition, 2013

REFERENCE BOOKS:

1. B.S. Grewal, *Higher engineering mathematics*, Khanna Publishers, 42^{nd} edition, 2012

2. S.S.Sastry, *Introductory methods of Numerical Analysis*, Prentice Hall of India, 5th edition, 2013.

I B. Tech. - I Semester

(16BT1BS04) **MULTI - VARIABLE CALCULUS AND DIFFERENTIAL EQUATIONS**

(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate /Senior secondary mathematics

COURSE DESCRIPTION: First order differential equations; higher order linear differential equations; functions of several variables; applications of integration; multiple integrals; vector calculus.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. demonstrate knowledge in
- Higher order Differential equations
- Maximum and minimum values for the functions of several variables
- Double and triple integrals
- Differentiation and integration of vector functions.
- Line and surface volume transforming integrals from three dimensional surfaces and volumes on to plane surfaces

CO2. develop skills in analyzing the
- methods for differential equation for obtaining appropriate solutions,
- Properties of oscillatory electrical circuits and heat transfer in engineering systems
- The variations in the properties of functions near their stationary values
- Flow patterns of fluids, electrical and magnetic flux and related aspects

CO3. develop skills in designing mathematical models for
- R-C and L-R-C oscillatory electrical circuits
- Heat transfer and Newton's law of cooling
- Engineering concepts involving lengths of curves and areas of planes, Flux across surfaces

CO4. develop analytical skills in solving the problems involving
- Newton's law of cooling
- non homogeneous linear differential equations
- maximum and minimum values for the functions
- lengths of curves, areas of surfaces and volumes of solids in engineering
- transformation of integrals from three dimensional surfaces and volumes on to plane surfaces

CO5. use relevant mathematical techniques for evaluating
- various types of particular integrals in differential equations
- stationary values for multi variable functions
- multiple integrals in change of variables
- integrations of vector functions.

DETAILED SYLLABUS:

UNIT-I: FIRST ORDER DIFFERENTIAL EQUATIONS (06 periods)

Linear and Bernoulli type, exact equations and reducible to exact. Orthogonal trajectories (Both Cartesian and polar forms). Newton's law of cooling.

UNIT II: HIGHER ORDER LINEAR DIFFERENTIAL EQUATIONS (09 periods)

Method for solution of linear equations- Differential operator *D*, Solution of second order linear homogeneous equations with constant coefficients, Solution of Higher order homogeneous linear equations with constant coefficients, **Solution of Non homogeneous linear equations**-Operator methods for finding particular integrals- for cases – e^{ax}, sin ax, cos ax, x^n, $e^{ax}V(x)$, xV(x). Method of Variation of parameters. Applications to oscillatory electrical circuits.

UNIT-III: FUNCTIONS OF SEVERAL VARIABLES (08 periods)

Functions of Two Variables: Limits, Continuity; **Partial Derivatives**: Total Differential and Derivatives, Jacobian, Functional dependence, Taylor's Theorem, maxima and minima of functions of two variables with and without constraints – Lagrange's method of undetermined multipliers.

UNIT-IV: APPLICATIONS OF INTEGRATION AND MULTIPLE INTEGRALS (10 periods)

Applications of integration to – lengths of curves, areas of surfaces of revolution, Double and Triple integrals – change of order of integration, change of variables in integrals. Area enclosed by plane curves, volumes of solids.

UNIT-V: VECTOR CALCULUS (12 periods)

Vector differentiation: Gradient of a scalar field and Directional Derivative, Divergence and Curl of a Vector field

Line integrals: Line integrals independent of path – work done.

Surface area and Surface Integrals: Surface Area, Surface Integrals, Flux across a surface.

Green's Theorem: Green's Theorem (without proof)-verification- applications

Gauss Divergence Theorem and Stoke's Theorem: Gauss Divergence theorem (without proof), Stokes's Theorem (without proof) –verifications and applications. **Total no. of periods: 45**

TEXT BOOK:

1. T.K.V. Iyengar, B. Krishna Gandhi, S.Ranganatham and M.V.S.S.N. Prasad, *Engineering Mathematics, Vol-1*, S. Chand & Company, 13th edition, 2014.

REFERENCE BOOKS:

1. Grewal, B.S., *Higher Engineering Mathematics*, Khanna publishers, Delhi, 42^{nd} edition, 2012.
2. Kreyszig, E., *Advanced Engineering Mathematics*, John Wiley and Sons, Inc., 9^{th} edition, 2012.

I B. Tech. - I Semester
(16BT10201) ELECTRIC CIRCUITS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	4	1	-	4

PREREQUISITES: Physics at Intermediate Level

COURSE DESCRIPTION:

Fundamentals of electric circuit parameters; nodal and mesh analysis; analysis of single phase and polyphase systems; analysis of coupled circuits; network theorems.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. demonstrate knowledge on

- voltage and current relationships for various electric elements
- network reduction techniques
- concepts of 1-phase and 3-phase electric circuits
- concepts of magnetically coupled circuits
- various circuit theorems

CO2. analyze electric and coupled circuits with conventional concepts and theorems

CO3. design resonant circuits to meet the required specifications

CO4. evaluate electric and magnetically coupled circuits parameters using conventional techniques and theorems.

DETAILED SYLLABUS:

UNIT-I: FUNDAMENTALS OF ELECTRICAL CIRCUITS (13 periods)

Concepts of charge, current, voltage, power and energy; Basic definitions of network, circuit, node, branch and loop; circuit elements – classifications; Ohm's law, Kirchhoff's laws; network reduction techniques-series, parallel, series-parallel circuits, source transformation, wye-to-delta and delta-to-wye transformations; current division and voltage division rules; nodal analysis and super node concept, mesh analysis and super mesh concept – problems.

UNIT-II: SINGLE PHASE AC CIRCUITS (13 periods)

Fundamentals of AC quantities; average and effective values of periodic waveforms; representation of electrical quantities in sinusoids and phasors, phasor relationships for circuit elements; impedance and admittance, impedance triangle; instantaneous and average power, power triangle; Sinusoidal response of R, L and C elements with different combinations; current locus; Resonance, bandwidth and quality factor for series and parallel networks – problems.

UNIT-III: CIRCUIT THEOREMS (10 periods)

Superposition, Thevenin's, Norton's, Maximum power transfer, Millmann's, Reciprocity and Compensation, Tellegen's theorems for DC & AC Excitations (without proof) – problems. Concept of dual and duality.

UNIT-IV: THREE PHASE AC CIRCUITS (11 periods)

Introduction to polyphase system and its advantages; phase sequence; analysis of three phase balanced and unbalanced systems; measurement of active and reactive power in balanced and unbalanced systems – problems.

UNIT-V: MAGNETICALLY COUPLED CIRCUITS (08 periods)

Coupled circuits-self and mutual inductance, coefficient of coupling, DOT convention; series and parallel connection of coupled coils, equivalent circuits of coupled coils; energy in coupled circuit; analogy between electrical and magnetic circuits – problems. **Total Periods: 55**

TEXT BOOKS:

1. Charles K. Alexander, Mathew N O Sadiku, *Fundamentals of Electric Circuits*, McGraw hill education(India) Pvt. Ltd, New Delhi, 5th edition, 2013.
2. A. Sudhakar, Shyammohan S Palli, Circuits and Networks Analysis and Synthesis, Mc Graw Hill company, New Delhi 5th edition, 2015.

REFERENCE BOOKS:

1. J.A.Edminister, M.D.Nahvi, *Theory and Problems of Electric Circuits*, Schaum's outline series, Tata McGraw Hill Company, New Delhi, 4th edition, 2004.
2. W H Hayt, J E Kemmerly, S M Durbin, *Engineering Circuit Analysis*, Tata Mc Graw Hill publishing company Ltd., New Delhi, 6th edition, 2008.

I B. Tech. - I Semester

(16BT10501) PROGRAMMING IN C

(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: --

COURSE DESCRIPTION:

Program design; Operators and Expressions; Data Input and Output; Control Statements; Functions; Arrays; Strings; Pointers; Structures & Unions and File handling Techniques;

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1. demonstrate knowledge in:
- Elements of C Language
- Selection and Repetition statements.
- Arrays, Strings and Functional statements.
- Derived data types, Files and Pointers

CO2. analyze complex engineering problems to develop suitable solutions

CO3. design algorithms for specified engineering problems

CO4. use appropriate 'C' language constructs for solving engineering problems

CO5. write programs using 'C' language to implement algorithms

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO C PROGRAMMING, OPERATORS & EXPRESSIONS (08 periods)

Introduction to C Programming: The C Character set, Writing First Program of C, Identifiers and Keywords, Data types, Constants, Variables and Arrays, Declarations, Expressions, Statements and Symbolic Constants.

Operators and Expressions: Arithmetic Operators, Unary Operators, Relational and Logical Operators, Assignment Operators, the Conditional Operators.

UNIT-II: DATA INPUT AND OUTPUT & CONTROL STATEMENTS (08 periods)

Data Input and Output: Single Character Input and Output, Input Data & Output data, The gets and puts Function.

Control Statements: Branching: The if-else Statement, Looping: The while Statement, More Looping: The do-while Statement, Still More Looping: The for Statement, Nested Control Statement, The switch Statement, The break & continue Statements, The goto Statement.

UNIT-III: FUNCTIONS, PROGRAM STRUCTURES & ARRAYS (11 p*eriods*)

Functions: A Brief Overview, Defining a Function, Accessing a Function, Function Prototypes, Parsing Argument to a Function, Recursion.

Program Structure: Storage Classes, Automatic Variables, External (Global) Variables, Static Variables, Multi file Programs,

Arrays: Defining an Array, Processing an Array, Processing Array to function, Multidimensional Arrays. Linear search, Binary search, Fibonacci search, Bubble sort and Insertion sort

UNIT-IV: STRINGS & POINTERS (09 periods)

Strings: Defining a String, NULL Character, Initialization of Strings, Reading and Writing a String, Processing a Strings, Character Arithmetic, Searching and Sorting of Strings, Library Functions for Strings.

Pointers: Pointer Declaration, Passing Pointers to a Function, Pointers and One-dimensional Arrays, Dynamic Memory Allocation, Operations on Pointers, Pointers and Multidimensional Arrays, Arrays of Pointers.

UNIT-V: STRUCTURES AND UNIONS & FILE HANDLING (09 periods)

Structures and Unions: Defining a Structure, Processing a Structure, User-Defined Data types (typedef), Structures and Pointers, Passing Structures to Function, Self –Referential Structures, Unions

File Handling: Files introduction, Opening and Closing a Data File, Reading and Writing a Data File, Processing a Data File, Unformatted Data File, Concept of Binary Files, Accessing the File Randomly.

Total Periods: *45*

TEXT BOOK:

1. Byron Gottfried and Jitender Kumar C *Programming with C*, Third Edition, McGraw Hill Education (India) Pvt, Ltd, New Delhi, 2016.

REFERENCE BOOKS:

1. Pradip Dey and Manas Ghosh, *Programming in C,* Second Edition, Oxford University Press, NewDelhi, 2007.
2. E. Balagurusamy, *Programming in C,* Seventh Edition, Mc Graw Hill Education (India) Pvt, Ltd, New Delhi, 2014.

I B. Tech. - I Semester

(16BT1BS32) **ENGINEERING PHYSICS LAB**

(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Intermediate / senior secondary Physics.

COURSE DESCRIPTION:

Characteristics of p-n junction diode, Photodiode, LED, and semiconductor laser diode. Experimental determination of carrier concentration and energy gap of a semiconductor material, wave length of a laser source, size of fine particle, numerical aperture and acceptance angle of optical fiber. Determination of frequency of electrically vibrating tuning fork and A.C source using A.C sonometer, magnetic field along axial line of a current carrying coil and rigidity modulus of material of a wire using torsional pendulum.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. demonstrate basic knowledge about semiconductor materials, magnetic materials and lasers.

CO2. demonstrate analytical skills in the estimation of carrier concentration of semiconductor materials and characterization of p-n junction.

CO3.develop skills in designing electronic circuits using semiconductor components.

CO4. use instrumental techniques in A.C sonometer and Melde's experiment.

CO5.apply diffraction techniques for determination of size of tiny particles and wave length of lasers.

ENGINEERING PHYSICS LAB

Conduct a minimum of any **Ten** of the following experiments.

1. Determination of wavelength of a laser source using Diffraction Grating.
2. Determination of particle size by using a laser source.
3. Determination of Numerical aperture and acceptance angle of an optical fiber.
4. Melde's experiment - transverse & longitudinal modes.
5. Magnetic field along the axis of a current carrying coil- Stewart and Gee's method.
6. Calculation of A.C frequency using sonometer.
7. I-V Characteristics of a p-n Junction diode.
8. Energy gap of a material of a p-n Junction.
9. Characteristics of LED source.
10. Characteristics of Photo diode.
11. Hall Effect.
12. Determination of rigidity modulus of the material of the wire using torsional pendulum.

I B. Tech. - I Semester

(16BT10231) **ELECTRIC CIRCUITS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: -

COURSE DESCRIPTION:

Verification of Ohm's law, KVL, KCL and network theorems; analysis of AC and DC circuits; determination of resonant frequency in series and parallel RLC circuits; determination of self and mutual inductances in coupled circuits;

COURSE OUTCOMES:

After successful completion of the course, student will be able to:

CO1. demonstrate knowledge on
- identification of various circuit elements and their values.
- concepts of electrical and magnetic circuits.

CO2. analyze and relate physical observations and measurements in electric circuits to theoretical principles and theorems.

CO3. design circuit parameters to meet the required specifications

CO4. demonstrate skills in
- obtaining the current locus diagrams.
- determining the parameters of magnetically coupled circuits.
- measuring of active and reactive powers.

CO5. function effectively as an individual and as a member in a team

CO6. communicate effectively both oral and prepare laboratory reports.

DETAILED SYLLABUS:

LIST OF EXPERIMENTS:

1. Verification of Ohm's Law and Kirchhoff's Laws
2. Variation of Resistance of Conductor with temperature
3. Phasor analysis of RL, RC and RLC circuits
4. Analyzing the series RL, RC and RLC circuits for various excitation systems
5. Current locus diagram of RL and RC series circuits
6. Series and Parallel resonance
7. Verification of Superposition and Reciprocity theorems
8. Verification of Thevenin's and Norton's theorem
9. Verification of Millmann's and Compensation theorems
10. Verification of Maximum Power transfer theorem for DC & AC excitations
11. Measurement of active and reactive power in three phase circuits
12. Determination of self and mutual inductance and coefficient of coupling
13. Determination of equivalent inductance for aiding and opposing fluxes.

I B. Tech. - I Semester

(16BT10232) **ELECTRICAL AND ELECTRONICS WORKSHOP PRACTICE**

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: --

COURSE DESCRIPTION: Identification and specifications of various Electric and Electronic devices; analysis of various series, parallel and series-parallel electrical circuits; develop various electrical circuits for domestic and industrial applications.

COURSE OUTCOMES: After successful completion of the course, student will be able to

CO1. demonstrate knowledge on various Electrical and Electronic Devices.

CO2. analyze various series and parallel electrical circuits.

CO3. design and develop various electrical circuits for domestic and industrial applications.

CO4. function effectively as individual and as a member in a team.

CO5. communicate effectively both oral and written forms

DETAILED SYLLABUS:

PART A: (Demonstration)

1. Identification and Specifications of R, L, C Components (Colour Codes), Potentiometers, Switches (SPST, DPST and DPI), Gang Condensers, Relays, Bread Boards, PCBs, Fuses, MCBs, Earthing and Electrical Wiring accessories.

2. Identification and Specifications of Active Devices: Diodes, BJTs, Low-power JFETs, MOSFETs, Power Transistors, LEDs, LCDs, Optoelectronic Devices, SCR, UJT, DIACs, TRIACs, Linear and Digital ICs.

3. Study the operation of
   - Multimeter (Analog and Digital)
   - Function Generator
   - Regulated Power Supplies
   - CRO.

PART-B:

1. Measurement of Electrical Quantities (AC & DC) using: Voltmeter, Ammeter and Wattmeter.
2. Measurement of Resistivity of a conducting wire.
3. Circuit with one lamp controlled by one switch and provision of 2-pin or 3-pin socket PVC surface conduit system.
4. Circuit with two lamps controlled by two switches with PVC surface conduit system.
5. Circuit for Stair case wiring and Godown wiring.
6. Circuit connection for a Fluorescent tube
7. Solder simple electronic circuits.
8. B-H curve of a Magnetic material
9. I-V and P-V characteristics of a Solar panel
10. Design and Fabrication of a single-phase transformer
11. PCB preparation and design of a circuit on a PCB

I B. Tech. - I Semester
(16BT10531) **PROGRAMMING IN C LAB**
(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES:-
A course on Programming in C
COURSE DESCRIPTION:
Hands on practice in developing and executing simple programs using C Programming constructs–Conditional statements, Loops, Arrays, Strings, Functions, Structures, Pointers and Functions.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. demonstrate practical knowledge of using C language constructs:
- Selection and Repetition statements.
- Arrays, Strings and Functional statements.
- Derived data types, Files and Pointers

CO2. analyze problems to develop suitable algorithmic solutions
CO3. design Solutions for specified engineering problems
CO4. use appropriate 'C' language constructs for solving engineering problems
CO5. implement and execute programs using 'C' language
CO6. document programs and communicate effectively while conducting Professional transactions.
List of Exercises:
1. a. Let a and b are two integer variables whose values are 10 and 13 respectively. Write a program to evaluate the following arithmetic expressions.
   i) a + b ii) a–b iii) a * b iv) a/b v) a % b
   b. Write a program to evaluate the following algebraic expressions after reading necessary values from keyword.
   i) $(ax + b)/(ax - b)$ ii) $2.5 \log x + \cos 32^0 + | x^2 + y^2|$
   iii) $x^5 + 10 x^4 + 8$ and $x^3 + 4 x + 2$ iv) ae^{kt}
2. a. Mr. Gupta deposited Rs.1000 in a bank. The bank gives simple interest at the rate of 15% per annum. Write a program to determine the amount in Mr. Gupta's account at the end of 5 years. (Use the formula I = P T R / 100)
   b. A cashier has currency notes of denominations Rs.10, Rs. 50 and Rs. 100. If the amount to be withdrawn is input in hundreds, find the total number of notes of each denomination the cashier will have to give to the withdrawer.
   c. In a town, the percentage of men is 52. The percentage of total literacy is 48.If total percentage of literate men is 35 of the total population; write a program to find the total number of illiterate men and women if the population of the town is 8000.
3. a. Write a program that prints the given 3 integers in ascending order using if - else.
   b. Write a program to calculate commission for the input value of sales amount.
   Commission is calculated as per the following rules:
   i) Commission is NIL for sales amount Rs. 5000.
   ii) Commission is 2% for sales when sales amount is >Rs. 5000 and <= Rs. 10000.
   iii) Commission is 5% for sales amount >Rs. 10000.
   c. A character is entered through keyboard. Write a program to determine whether the character entered is a capital letter, a small case letter, a digit or a special symbol. The following table shows the range of ASCII values for various characters.

Characters	**ASCII values**
A - Z	65 - 90
a - z	97- 122
0 - 9	48 - 57
Special Symbols	0 - 47, 58 - 64, 91- 96, 123 - 127

4. a. If cost price and selling price of an item is input through the keyboard, write program to determine whether the seller has made profit or incurred loss. Also determine how much profit or loss he incurred in percentage.
   b. An insurance company calculates premium as follows:
   i. If a person's health is excellent and the person is between 25 and 35 years of age and lives in a city and is a male then premium is Rs.4 per thousand and the policy amount cannot exceed Rs.2 lakhs.
   ii. If a person satisfies all the above conditions and is female then the premium is Rs.3 per thousand and the policy amount cannot exceed Rs.1 lakh.
   iii. If a person's health is poor and the person is between 25 and 35 years of age and lives in a village and is a male then premium is Rs.6 per thousand and the policy cannot exceed Rs. 10000.
   iv. In all other cases the person is not insured.
   Write a program to determine whether the person should be insured or not, his/her premium rate and maximum amount for which he/she can be insured.

5. a. Write a program, which takes two integer operands and one operator as input from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, %. Use switch statement)
   b. Write a program to find the grace marks for a student using switch. The user should enter the class obtained by the student and the number of subjects he has failed in. Use the following rules:
   i. If the student gets first class and the number of subjects failed is >3, then no grace marks are awarded. If the number of subjects failed is less than or equal to '3' then the grace is 5 marks per subject.
   ii. If the student gets second class and the number of subjects failed in is >2, then no grace marks are awarded. If the number of subjects failed in less than or equal to '3' then the grace is 4 marks per subject.
   iii. If the student gets third class and the number of subjects failed in is >1, then no grace marks are awarded. If the number of subjects failed in is equal to '1' then the grace is 5 marks per subject.
6. a. Write a program to find the sum of individual digits of a positive integer.
   b. A Fibonacci sequence is defined as follows:
   The first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a program to generate the first N terms of the sequence.
   Write a program to generate all the prime numbers between 1 and N, where N is a value supplied by the user.
7. a. Write a program to find the largest and smallest number in a given list of integers.
   b. Write a program to perform the following:
   i. Addition of two matrices.
   ii. Multiplication of two matrices.
8. a. Write a program that uses functions to perform the following operations:
   i. To insert a sub-string in main string at a specified position.
   ii. To delete N characters from a given string from a specified position.
   b. Write a program to determine whether the given string is palindrome or not.
   c. Write a program to display the position or index in the main string S where the sub string T begins. Display -1 if S does not contain T.
   d. Write a program to count the number of lines, words and characters in a given text.
9. a. Write a program to read list of student names and perform the following operations using functions.
   i. to print list of names
   ii. to sort them in ascending order
   iii. to print the list after sorting.
   b. Write a menu driven program to read list of student names and perform the following operations using array of character pointers.
   i. to insert a student name
   ii. to delete a name
   iii. to print the name
10. Write a program that uses functions to perform the following operations:
   i. Reading a complex number
   ii. Writing a complex number
   iii. Addition of two complex numbers
   iv. Multiplication of two complex numbers
   (**Note:** Represent complex number using a structure.)
11. a. Write a program to accept the elements of the structure as:
   Employee-name,Basic pay Display the same structure along with the DA, CCA and Gross salary for 5 employees.
   Note: DA=51% of Basic pay, CCA=Rs.100.consolidated.
   b. Define a structure to store employee's data with the following specifications:
   Employee-Number, Employee-Name, Basic pay, Date of Joining
   i. Write a function to store 10 employee details.
   ii. Write a function to implement the following rules while revising the basic pay.
   If Basic pay<=Rs.5000 then increase it by 15%.
   If Basic pay> Rs.5000 and <=Rs.25000 then it increase by 10%.
   If Basic pay>Rs.25000 then there is no change in basic pay.
   Write a function to print the details of employees who have completed 20 years of service from the date of joining.
12. a. Write a program which copies one 'text file' to another 'text file'.
   b.Write a program to reverse the first N characters of a given text file.

Note: The file name and N are specified through command line.

13. Write a program to print the output by giving the Customer_ID as an input.

REFERENCE BOOKS:

1. Byron Gottfried and Jitender Kumar C, *Programming with C*, 3rd edition, McGraw Hill Education(India) Pvt. ltd, New Delhi, 2016.
2. Pradip Dey and Manas Ghosh, *Programming in C*, 2nd edition, Oxford University Press, New Delhi, 2007.

I B. Tech. - II Semester
(16BT1HS01) **Technical English**
(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: English at Intermediate level

COURSE DESCRIPTION: Introduction to Communication; Active Listening; Effective Speaking; Reading; and Writing.

COURSE OUTCOMES:
On successful completion of this course, the students will be able to:
CO1. demonstrate knowledge in
- Process of communication
- Modes of listening
- Paralinguistic features
- Skimming and Scanning
- Elements of style in writing

CO2. analyze the possibilities and limitations of language for understanding
- Barriers to Communication
- Barriers to Effective Listening
- Barriers to Speaking
- Formal and metaphorical language

CO3. design and develop functional skills for professional practice.
CO4. apply writing skills in preparing and presenting documents
CO5. function effectively as an individual and as a member in diverse teams.
CO6. communicate effectively with the engineering community and society in formal and informal situations.

DETAILED SYLLABUS:
UNIT-I: INTRODUCTION TO COMMUNICATION (09 periods)
Introduction -Language as a Tool of Communication - Communicative Skills (Listening, Speaking, Reading and Writing)
UNIT-II: ACTIVE LISTENING (09 periods)
Introduction - Reasons for poor Listening - Traits of a Good Listener - Listening Modes - Types of Listening - Barriers to Effective Listening - Listening for General Content and Specific Information.
UNIT-III: EFFECTIVE SPEAKING (09 periods)
Introduction - Achieving Confidence, Clarity and Fluency - Paralinguistic Features - Barriers to Speaking - Types of Speaking - Persuasive Speaking.
UNIT-IV: READING (09 periods)
Introduction and Reading Rates - Reading and Interpretation - Intensive and Extensive Reading - Critical Reading - Reading for Different Purposes - SQ3R Reading Technique -Study Skills.
UNIT-V: WRITING (09 periods)
Introduction - Language - Elements of Style - Techniques for Good Technical Writing - Referencing and Styling - Right Words and Phrases - Sentences.

Total Periods: 45

TEXT BOOKS:

1. Meenakshi Raman & Sangeetha Sharma, *Technical Communication*, Oxford University Press, New Delhi, 2012.

REFERENCE BOOKS:

1. Ashraf Rizvi, *Effective Technical Communication*, McGraw-Hill Education (India) Pvt.Ltd., New Delhi, 2015.
2. Sanjay Kumar & Pushp Lata, *Communication Skills*, Oxford University Press, New Delhi, 2013.
3. Teri Kwal Gamble and Michael Gamble, *Communication Works*, Tata Mc Graw-Hill, New Delhi, 2010.

4. Rajendra Pal and J.S. Korlahalli, *Essentials of Business Communication*, Sultan Chand and Sons (P) Ltd., New Delhi, 2010.

I B. Tech - II Semester

(16BT1BS01): **ENGINEERING CHEMISTRY**

(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Intermediate/Senior Secondary Chemistry

COURSE DESCRIPTION: Water technology, Chemistry of Engineering materials, Nanochemistry, Green Chemistry, Electro chemical cells, Sensors, Corrosion and Lubricants.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. acquire basic knowledge in water technology, engineering plastics, conducting polymers, composites, Electro chemical cells, Nano Chemistry, principles of Green Chemistry, corrosion phenomenon and lubricants.

CO2. develop analytical skills in:
- Determination of hardness of water.
- Determination of viscosity, flame and fire points, cloud and pour points.

CO3. develop designing skills in:
- Synthesis of engineering plastics.
- Chemical methods for the synthesis of Nano materials.

CO4. develop skills for providing solutions through:
- Mitigation of hardness of water.
- Newer Nanomaterials and engineering plastics for specific applications

CO5. acquire awareness to practice engineering in compliance to modern techniques such as:
- Nalgonda technique for defluoridation of water
- Electroplating technique for control of corrosion.

CO6. acquire awareness to societal issues on:
- Quality of water.
- Bio-diesel
- Chemical materials utility and their impact.

DETAILED SYLLABUS:

UNIT–I: WATER TECHNOLOGY (09 periods)

Introduction: Types of water, impurities in water and their consequences, types of hardness of water, units of hardness of water, disadvantages of hardness of water, estimation of hardness of water by EDTA method, Boiler troubles: Scales and Sludges, Caustic embrittlement, Boiler corrosion and Priming and Foaming.

Softening of water: Zeolite process and Ion exchange process, advantages and disadvantages. Desalination of brackish water by Reverse Osmosis, Numerical problems on estimation of hardness of water.

Fluorides in water: Effects on human health, defluoridation method-Nalgonda method; comparison of merits and demerits of various defluoridation methods (Nalgonda, Bone Charcoal, Activated Alumina, Contact precipitation, Brick, Reverse osmosis).

UNIT-II: CHEMISTRY OF ENGINEERING MATERIALS (09 periods)

Engineering Plastics: Definition, general properties, synthesis, properties and applications of PC, PTFE, and PMMA.

Conducting polymers: Definition, types of conducting polymers: Intrinsic and extrinsic conducting polymers with examples, engineering applications of conducting polymers.

Biodegradable polymers: Definition, properties, classification, mechanism of degradation of biodegradable polymers and their applications.

Composites – Introduction, types of composites: fiber reinforced particulate and layered composites with examples, advantages of composites and applications.

UNIT-III: NANOCHEMISTRY AND GREEN CHEMISTRY (09 periods)

Nanochemistry: Introduction, classification, properties and applications of Nano materials (nano particles, nano tubes, nano wires, nano composites, dendrimers); synthesis of Nano materials – Sol-gel process.

Green Chemistry: Introduction, principles of green chemistry, Tools of Green Chemistry with Examples, Applications of Green Chemistry in science and technology.

Biodiesel: Introduction, Synthesis (Trans esterification method), advantages, disadvantages and applications.

UNIT-IV: ELECTROCHEMICAL CELLS AND SENSORS (09 periods)

Electrochemical cell: Introduction, EMF of an electrochemical cell.

Batteries: Introduction, types of Batteries: primary and secondary batteries with examples, Ni-Cd batteries, Lithium-ion batteries, Lithium- Polymer batteries, Applications of batteries.

Fuel Cells: Definition, examples: $H_2 - O_2$ Fuel cell, solid oxide fuel cell, Bio-fuel cell and applications of fuel cells.

Sensors - Introduction, Types of Sensors, electrochemical sensor: construction and working principle of potentiometric sensor, and applications of electrochemical sensors.

UNIT-V: CORROSION AND LUBRICANTS (09 periods)

Corrosion: Introduction, Definition, types of corrosion (dry and wet corrosion), galvanic corrosion, concentration cell corrosion, Factors influencing corrosion, Corrosion control: cathodic protection; sacrificial anodic protection and impressed current cathodic protection; protective coatings: Galvanizing and Electroplating (Nickel).

Lubricants: Definition, functions of lubricants, mechanism of lubrication, classification of lubricants, properties of lubricants – viscosity, flash and fire points, cloud and pour points, Aniline points, neutralization number and mechanical strength. **Total periods: 45**

TEXT BOOKS:

1. P.C.Jain & Monika Jain, *Engineering Chemistry*, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 16th edition, 2013.
2. K.N. Jayaveera, G.V. Subba Reddy & C. Ramachandraiah *Engineering Chemistry,* Mc. Graw-Hill Higher Education, Hyderabad, 1st edition, 2015.

REFERENCE BOOKS:

1. A.K. Bandyopadhyay, *Nano Materials,* New Age international publishers, 2nd edition, 2014.
2. Paul T. Anastas and John C Warner, *Green Chemistry: Theory and practice,* Oxford University Press, 2000.

I B. Tech. - II Semester

(16BT2BS01) TRANSFORMATION TECHNIQUES AND PARTIAL DIFFERENTIAL EQUATIONS

(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Intermediate /Senior secondary Mathematics

COURSE DESCRIPTION: Fourier series; Fourier integrals and transforms; Laplace transforms; z –transforms; partial differential equations.

COURSE OUTCOMES:

On successful completion of this course, students will be able to

CO1. demonstrate basic knowledge in
- Fourier series and Fourier transforms
- Fourier integrals
- Laplace transforms and their applications
- z- transforms and their applications
- solving partial differential equations

CO2. analyze
- Properties of Fourier series for a given function
- Partial differential equations through different evaluation methods
- Difference equations through z – transforms
- Engineering systems and processes involving wave forms and heat transfer

CO3. design mathematical models for
- Problems involving heat transfer and wave forms
- Engineering concepts involving, Fourier transforms, Fourier integrals, Laplace transforms, z transforms and difference equations

CO4. solve problems involving
- Fourier series and Fourier transforms
- Laplace transforms
- Z-transforms and difference equations
- Heat transfer and wave motion

CO5. use relevant transformation techniques for
- Obtaining Fourier transforms for different types of functions
- Laplace transforms
- Z- transforms
- Partial differential equations

DETAILED SYLLABUS:

UNIT-I: FOURIER SERIES **(07 periods)**

Fourier series: Determination of Fourier coefficients, convergence of Fourier series (Dirichlet's conditions), Fourier series of even and odd functions, Half-range Fourier sine and cosine expansions.

UNIT-II: FOURIER INTEGRALS AND FOURIER TRANSFORMS **(08 periods)**

Fourier integral theorem (statement only), Fourier sine and cosine integrals, Fourier transform, Fourier sine and cosine transforms –properties, Inverse transform and finite Fourier transforms.

UNIT-III: LAPLACE TRANSFORMS **(12 periods)**

Laplace transforms of standard functions. Properties of Laplace transforms. First and second shifting Theorems. Laplace transforms of derivatives and integrals. Inverse transforms. Convolution theorem (without proof), inverse Laplace transforms by convolution theorem. Laplace transform of periodic functions, Applications of Laplace transforms to ordinary differential equations of first and second order with constant coefficients.

UNIT-IV: Z- TRANSFORMS **(09 periods)**

Z – transforms, inverse Z– transforms, damping rule, shifting rule, initial and final value theorems. Convolution theorem (without proof), solution of difference equations by Z– transforms.

UNIT-V: PARTIAL DIFFERENTIAL EQUATIONS **(09 periods)**

Formation of Partial differential equations – Solutions of first order linear equations by method of grouping. First and second order equations by method of separation of variables – Solutions of one dimensional Wave equation, Heat equation. **Total no. of periods: 45**

TEXT BOOKS:

1. T.K.V. Iyengar, B. Krishna Gandhi, S.Ranganadham and M.V.S.S.N. Prasad, *Engineering Mathematics, vol-1*, S. Chand & Company 13th edition, 2014.
2. T.K.V. Iyenger, B. Krishna Gandhi, S. Ranganadham and M.V.S.S.N.Prasad, *Mathematical Methods,* S. Chand and Company, 8th edition, 2013.

REFERENCE BOOKS:

1. Grewal, B.S., *Higher Engineering Mathematics*, Khanna publishers, Delhi, 42nd edition, 2012.
2. Kreyszig, E., *Advanced Engineering Mathematics*, John Wiley and Sons, Inc., 9th edition, 2013.

I B. Tech. - II Semester
(16BT20401) **ELECTRONIC DEVICES AND CIRCUITS**
(Common to ECE, EIE & EEE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: A Course on Engineering Physics.

COURSE DESCRIPTION:
Characteristics of general and special purpose electronic devices; Rectifiers; filters and regulators; Biasing and small signal analysis of BJT and FET.

COURSE OUTCOMES:
On successful completion of this course, students will be able to:

CO1. demonstrate knowledge in
- p-n junction diode and its characteristics
- Zener diode and its characteristics
- Rectifiers, Filters and Regulators
- Characteristics of BJT, FET, MOSFET and special purpose electronic devices.

CO2. analyze numerical and analytical problems in
- Rectifiers using Filters
- Regulated Power Supplies
- Transistor biasing circuits and stabilization
- Transistor amplifiers
- FET biasing circuits and amplifiers

CO3. design electronic circuits such as
- Rectifiers with and without filters
- Voltage regulators
- BJT and FET biasing circuits
- BJT and FET amplifiers

CO4. solve engineering problems and arrive at solutions pertaining to electronic circuits.

CO5. select appropriate technique for transistor modeling.

DETAILED SYLLABUS:

UNIT-I: P-N JUNCTION DIODE, RECTIFIERS AND REGULATORS (11 Periods)

P-N Junction Diode:
p-n Junction as a diode, *p-n* Junction diode equation, Volt-Ampere (V-I) characteristics, temperature dependence of *p-n* characteristics, diode resistance-static and dynamic resistances, transition and diffusion capacitances, break down mechanisms in semiconductor diodes, Zener diode characteristics.

Rectifiers and Regulators:
Half-Wave rectifier and Full-Wave rectifiers (Qualitative and quantitative analysis), Harmonic components in a rectifier circuit, Inductor filter, Capacitor filter, L - section filter, ð- section filter, comparison of various filter circuits in terms of ripple factors. Simple circuit of a regulator using Zener diode. Problems on rectifier circuits.

UNIT-II: BIPOLAR JUNCTION TRANSISTOR, BIASING AND STABILIZATION (10 Periods)
Transistor construction, BJT Operation, Transistor currents and their relations, Input and Output Characteristics of a Transistor in Common Emitter, Common Base and Common Collector Configurations, BJT specifications, Transistor Operating Point, DC and AC Load Lines, Importance of Biasing, Fixed Bias, Emitter Feedback Bias, Collector to Base Feedback Bias, Voltage Divider Bias, Bias Stability, Transistor as an amplifier, Thermal Runaway, Problems on biasing circuits.

UNIT-III: SMALL SIGNAL ANALYSIS OF BJT AMPLIFIERS (08 Periods)
BJT Modeling, Hybrid Modeling, Determination of h-Parameters from Transistor Characteristics, Measurement of h-Parameters, Miller's Theorem, Analysis of CE, CB and CC configurations using simplified Hybrid Model, Comparison of CB, CE and CC configurations.

UNIT-IV: FIELD EFFECT TRANSISTORS (10 Periods)
Construction, Principle of operation and characteristics of JFET and MOSFET (Enhancement & Depletion), Biasing of FET, Small Signal Model of JFET, Common Source and Common Drain Amplifiers using JFET, Generalized FET Amplifier, FET as Voltage Variable Resistor, Comparison of BJT and FET.

UNIT-V: SPECIAL PURPOSE ELECTRONIC DEVICES (06 Periods)
Principle of Operation and Characteristics of Tunnel Diode, Uni-Junction Transistor (UJT), Varactor Diode, Silicon Control Rectifier (SCR). Principle of operation of Schottky Barrier Diode.

Total Periods: *45*

TEXT BOOK:
1. J. Millman, Christos C. Halkias and SatyabrataJit, *Electronic Devices and Circuits,* TMH, 3rd edition, 2010.

REFERENCE BOOKS:
1. R.L. Boylestad and Louis Nashelsky, *Electronic Devices and Circuits,* PHI, 10th edition, 2009.
2. David A. Bell, *Electronic Devices and Circuits,* Oxford University press, 5th edition, 2014.

3. S. Salivahanan, N. Suresh Kumar, *Electronic Devices and Circuits*, Mc-Graw Hill, 3rd edition 2013.
4. Ben G. Streetman, Sanjay Banerjee, Solid State Electronic Devices, Pearson Prentice Hall, 2006.

I B. Tech. - II-Semester

(16BT20541) **Foundations of Data Structures**

(Common to ECE, EEE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: A course on Programming in C

COURSE DESCRIPTION:

Concepts of sorting: sorting by exchange, sorting by distribution, sorting by merging and data structures: stacks, queues, linked lists, trees, graphs, and hash table.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. demonstrate knowledge in Sorting techniques, Linear and Non-linear Data Structures. CO2. analyze the performance of sorting techniques and their relationship to Data Structures.

CO3. design appropriate hashing function for a given application and develop programs to implement Linear and Non-Linear data structures

CO4. apply appropriate data structure to provide solutions for real time problems using C Language.

DETAILED SYLLABUS:

UNIT-I: SORTING **(09 periods)**

SORTING - Sorting by Exchange-Shell Sort, Quick sort. Sorting By Distribution-Counting Sort, Bucket Sort, Radix Sort. Sorting By Merging-Merge Sort.

UNIT-II: STACKS AND QUEUES **(09 periods)**

STACKS -Introduction, Stack Operations, Applications.

QUEUES - Introduction, Operations on Queues, Circular Queues and Applications.

UNIT-III: LINKED LISTS **(09 periods)**

LINKED LISTS –Introduction, Single Linked List, Circular Linked List, Doubly Linked List, Multiply Linked List and Applications.

LINKED STACKS AND LINKED QUEUES - Introduction, Operations on Linked Stack and Linked Queues, Dynamic Memory Management and Linked Stacks.

UNIT-IV: TREES AND BINARY TREES **(09 periods)**

TREES– Introduction, Definition and Basic Terminologies, Representation of Trees.

BINARY TREES – Basic Terminologies and Types, Representation of Binary Trees, Binary Tree Traversals, Binary Search Trees: Definition and Operations and Applications.

UNIT-V: Graphs and Hashing **(09 periods)**

Graphs – Introduction, Definitions and Basic Terminologies, Representation of Graphs, Graph Traversals, Applications.

Hashing – Introduction, Hash Table Structure, Hash Functions, Linear Open Addressing, Chaining and Applications.

Total Periods: *45*

TEXT BOOK:

1. G.A.V. Pai, *Data Structures and Algorithms,* Tata McGraw Hill, Second Edition, 2009.

REFERENCE BOOK:

1. Debasis Samanta, *Classic Data Structures*, PHI Learning, Second Edition, 2009.

I B. Tech. - II Semester

(16BT1HS31) **ENGLISH LANGUAGE LAB**

(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: English at intermediate or equivalent level.

COURSE DESCRIPTION: Phonetics; Vocabulary Building; Functional Grammar; Just a Minute; Elocution/Impromptu; Giving Directions/Conversation Starters; Role Play; Public Speaking; Describing People, Places, Objects and Events; Reading Comprehension; Listening Comprehension; Information Transfer.

COURSE OUTCOMES:

On successful completion of this course the students will be able to:

CO1**.** demonstrate knowledge in
- Phonetics
- Information Transfer

CO2**.** analyze the situations in professional context by using
- Vocabulary
- Grammar

CO3**.** design and develop functional skills for professional practice.

CO4**.** apply the techniques of Listening and Reading skills to comprehend Listening and Reading comprehension.

CO5**.** function effectively as an individual and as a member in diverse teams through
- Extempore talk and
- Role Play

CO6**.** communicate effectively in public speaking in formal and informal situations.

CO7**.** recognize the need to engage in lifelong learning to upgrade competence of knowledge and communication.

LIST OF EXERCISES:

1. Phonetics
2. Vocabulary Building
3. Functional Grammar
4. Just a Minute
5. Elocution/Impromptu
6. Giving Directions/Conversation Starters
7. Role Play
8. Public Speaking
9. Describing People, Places, Objects and Events.
10. Reading Comprehension
11. Listening Comprehension
12. Information Transfer

Total Lab Slots: 10

TEXT BOOK:

1. Department Lab Manual

REFERENCE BOOKS:

1. D. Sudha Rani, *A Manual for English Language Laboratories*, Pearson Education.
2. D. Sudha Rani, *Advanced Communication Skills Laboratory Manual*, Pearson Education.
3. R. Manivannan and G. Immanuel, *Communication Skills Laboratory*, VK Publications, Sivakasi, 2013
4. Nira Kumar, *English Language Laboratories*, PHI Learning Pvt. Ltd., New Delhi, 2011.

SUGGESTED SOFTWARE:

1. ETNL Language Lab Software Version 4.0
2. GEMS - Globarena E- Mentoring System.
3. Speech Solutions.
4. English Pronunciation Dictionary by Daniel Jones.
5. Learn to Speak English 8.1, The Learning Company - 4 CDs.
6. Mastering English: Grammar, Punctuation and Composition.
7. English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
8. Dorling Kindersley Series - Grammar.
9. Language in Use 1, 2 & 3.
10. Cambridge Advanced Learner's Dictionary - 3rd Edition.
11. Centronix - Phonetics.
12. Let's Talk English, Regional Institute of English South India.
13. The Ultimate English Tutor.

SUGGESTED SOFTWARE:

S1. ETNL Language Lab Software Version 4.0
S2. GEMS - Globarena E- Mentoring System
S3. Speech Solutions
S4. English Pronunciation Dictionary by Daniel Jones
S5. Learning to Speak English 8.1, The Learning Company - 4 CDs.
S6. Mastering English: Grammar, Punctuation and Composition.
S7. English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
S8. Dorling Kindersley Series of Grammar.
S9. Language in Use 1, 2 & 3
S10. Cambridge Advanced Learner's Dictionary - 3rd Edition
S11. Centronix - Phonetics

S12.Let's Talk English, Regional Institute of English South India.
S13.The Ultimate English Tutor

I B. Tech- II Semester

(16BT1BS31): **ENGINEERING CHEMISTRY LAB**

(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Intermediate/Senior Secondary Chemistry

COURSE DESCRIPTION: Estimation of hardness, alkalinity, dissolved oxygen of water samples and estimation of Iron by volumetric methods, determination of effect of P^H on rate of corrosion, measurement of viscosity of lubricants; Instrumental methods like potentiometer, conductivity meter, P^H meter and colorimeter; synthesis of Polymers and Nano materials.

COURSE OUTCOMES:

After completion of the course, a successful student is able to:

CO1. Acquire basic Knowledge about the volumetric analysis and synthesis of materials used for engineering applications.

CO2. Acquire analytical skills in the estimation of hardness of water, alkalinity of water, dissolved oxygen in water and estimation of Iron through wet laboratory methods.

CO3. Develop designing skills for the synthesis of polymers and Nanomaterials.

CO4. Acquire skills to use instrumental techniques for the determination of Electrical conductance of electrolytes, EMF of a cell, PH of a solution, determination of viscosity of lubricants and estimation of iron in cement.

CO5. Provide solutions for environmental issues through determination of quality of water.

List of Experiments:

A minimum of any **Ten** experiments are to be conducted among the following:.

1. Estimation of Hardness of water by EDTA method.
2. Estimation of alkalinity of Water.
3. Estimation of Dissolved Oxygen in water.
4. Estimation of Ferrous Iron by Dichrometry.
5. Preparation of Novalac Resin.
6. Synthesis of Nano metal-oxide using sol– gel process.
7. Conductometric titration of strong acid Vs strong base
8. Estimation of Ferrous ion by Potentiometry.
9. Determination of amount of corrosion of metals in different medium
10. Measurement of viscosity of lubricants by Ostwald viscometer.
11. Determination of P^H of a given solution by P^H metry.
12. Estimation of Ferric iron in cement by Colorimetric method.

Total Time Slots: 12

I B. Tech. - II Semester

(16BT10331) **COMPUTER AIDED ENGINEERING DRAWING**

(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	1	6	3

PREREQUISITES: --

COURSE DESCRIPTION:

Engineering drawing conventions; importance of engineering drawing; fundamental concepts of sketching; computed aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.

COURSE OUTCOMES:

On Successful completion of this course, students will be able to:

CO1. understand, write and read the language of engineering drawing in industry through International System of Standards.

CO2. develop the imagination and mental visualization ability for interpreting the geometrical details of engineering objects.

CO3. produce different views and projection in drawing.

CO4. Use modern CAD software for design and drafting of drawings.

CO5. create multi-view drawings suitable for presentation to Engineering community.

CO6. introduce and communicate universally accepted conventions and symbols for their usage in technical drawing.

DETAILED SYLLABUS:

UNIT-I: BASICS OF ENGINEERING DRAWING PRACTICE, GEOMETRICAL CONSTRUCTIONS, CONICS AND SPECIAL CURVES (18 periods)

Introduction, drawing instruments and its uses, sheet layout, BIS conventions, lines, lettering and dimensioning practices. Geometrical constructions: Construction of regular polygons: Pentagon, Hexagon, Heptagon and Octagon. Conic sections**:** Introduction, construction of ellipse: rectangular method, eccentricity method. Construction of parabola: rectangular method, eccentricity method. Construction of hyperbola: eccentricity method. Special curves***:*** cycloid, involute.

UNIT-II: INTRODUCTION TO COMPUTER AIDED SKETCHING (18 periods)

Computer screen, layout of the software, creation of 2D/3D environment, selection of drawing size and scale, Standard tool bar/menus, Coordinate system, description of most commonly used toolbars, navigational tools: commands and creation of lines, Co-ordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination and perpendicularity.

UNIT-III: PROJECTION OF POINTS, STRAIGHT LINES AND PLANES (21 periods)

Introduction, method of projection, planes of projection, reference line and notations. Projection of points: Points in all the four quadrants. Projection of straight lines**:** lines inclined to HP / VP plane, inclined to both HP and VP planes (straight lines are assumed to be in first quadrant only)**.** Projection of planes**:** projection of triangle, square, rectangle, rhombus, pentagon, hexagon and circular plane for the condition inclined to HP / VP by change of position method.

UNIT-IV: PROJECTION OF SOLIDS AND SECTION OF SOLIDS (21 Periods)

Projections of Solids: Introduction, projection of solids: prisms, pyramids, cylinders and cones with axis perpendicular to VP/HP and axis inclined to VP/HP only. Sections of solids**:** Introduction, Cutting plane, sectional views of right regular solids resting with base on HP: prisms, pyramids, cylinder and cone and true shapes of the sections.

UNIT-V: ORTHOGRAPHIC AND ISOMETRIC PROJECTIONS AND DEVELOPMENT OF SURFACES (22 periods)

Orthographic projection: simple exercises. Isometric projection: Simple exercises.

Development of surfaces: prisms, pyramids, cylinders, cone and miscellaneous surfaces

Total Periods: *100*

Note: *Student shall practice Unit-I using sketch book only and remaining units using sketch book first and later CAD package.*

TEXT BOOKS:

1. D.M.Kulkarni, A.P.Rastogi, A.K.Sarkar, *Engineering Graphics with AutoCAD*, PHI Learning Private Limited, New Delhi, Revised Edition, 2010.
2. N D Bhat & V M Panchal, *Engineering Drawing*, Charotar Publishing House, Gujarat, 51st edition, 2013.

REFERENCE BOOKS:

1. Sham Tickoo, *AutoCAD 2013 for Engineers and Designers*, Dreamtech Press, 2013.
2. M.H.Annaiah & Rajashekar Patil, *Computer Aided Engineering Drawing*, New Age International Publishers, 4th edition, 2012.
3. T.Jeyapoovan, *Engineering Drawing and Graphics Using AutoCAD,* Vikas Publishing House, 3rd edition, 2010.
4. Jolhe, *Engineering Drawing,* Tata McGraw Hill Education Private Limited, 1st edition, 2007.

5. Basant Aggarwal, *Engineering Drawing,* Tata McGraw Hill Education Private Limited, 1st edition, 2008.

I B. Tech. - II Semester

(16BT20551) **FOUNDATIONS OF DATA STRUCTURES LAB**

(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: *A course on "Foundations of Data Structures"*

COURSE DESCRIPTION:

Hands on programming to implement data structures - Linked lists, Stacks, Queues, Trees, Search trees, Sorting, and Hashing in C Language.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. demonstrate practical knowledge on stacks, queues, trees, graphs and Hashing Techniques

CO2. identify suitable data structure to solve engineering problems.

CO3. design solutions for complex engineering problems using linear and non-linear data structures.

CO4. develop algorithms leading to multiple solutions by conducting investigations of complex problems.

CO5. apply 'C' language as a tool for implementing linear and non linear data structures

CO6. communicate effectively by writing Programs and document practical work.

LIST OF PRACTICAL EXERCISES:

1. Implement the following sorting techniques
   (a) Quick Sort (b) Radix Sort (c) Merge Sort
2. Implement the following data structures using arrays
   (a)Stack (b) Queue (c) Circular Queue
3. Implement the following operations on a single linked list.
   (a) Creation (b) Insertion (c) Deletion (d) Display
4. Implement the following operations on a double linked list.
   (a) Creation (b) Insertion (c) Deletion (d) Display
5. Implement the following operations on a circular linked list.
   (a) Creation (b) Insertion (c) Deletion (d) Display
6. Implement the following data structures using linked list.
   (a) Stack (b) Queue (c) Circular Queue
7. Implement the following tree traversals on a binary tree
   (a) Preorder (b) Inorder (c) Postorder
8. Implement the following operation on binary search tree
   (a) Creation (b) Insertion (c) Deletion (d) Inorder
9. Implement the following graph traversal techniques
   (a) Breadth First traversal (b) Depth First Traversal
10. Implement the following Hashing Techniques
   (a) Separate Chaining (b) Open addressing methods

REFERENCE BOOKS:

1. G.A.V. Pai, *Data Structures and Algorithms,* Tata McGraw Hill, Second Edition, 2009.
2. Debasis Samanta, *Classic Data Structures,* PHI Learning, Second Edition, 2009.

II B.Tech. - I semester
(16BT3HS01) **ENVIRONMENTAL STUDIES**
(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	0	-	3

PREREQUISITES: Course on Engineering Chemistry

COURSE DESCRIPTION:
Multidisciplinary nature of environment; Natural resources; Ecosystems; Biodiversity; Environment pollution and control; Social issues and environment; Human population and environment; Field studies.

COURSE OUTCOMES: On successful completion of this course, students will be able to

CO1. demonstrate knowledge on nature of environment, natural resources, ecosystems, biodiversity, environmental pollution and control, social issues and human population.
CO2. analyze natural resources, ecosystems, biodiversity, en vironmental pollution and control, social issues and human population.
CO3. develop strategies for environmental pollution control and natural resource management.
CO4. solve environmental problems through proper analysis and interpretation of environmental data.
CO5. choose appropriate techniques in environmental pollution control and natural resource management.
CO6. understand the impact of social issues and population on environment.
CO7. provide solutions to individuals, industries and government for environmental sustainable development.
CO8. follow environmental protection laws for sustainable de velopment.

DETAILED SYLLABUS:

UNIT-I: MULTIDISCIPLINARY NATURE OF ENVIRONMENT AND NATURAL RESOURCES (11 periods)

Multidisciplinary Nature of Environment: Multidisciplinary nature of environment, Segments of environment - Lithosphere, Hydrosphere, Atmosphere, Biosphere; Need for public awareness.

Natural Resources: Renewable and non-renewable resources and associated problems - (a) Forest resources: Use and over exploitation, Deforestation-causes, effects and remedies, Case studies, (b) Water resources: Use and over utilization of surface and groundwater, Conflicts over water, Benefits and problems of large dams, Case studies, (c) Mineral resources: Mining, Adverse effects, Case studies, (d) Food resources: World food problems, Changes caused by agriculture and overgrazing, Effects of modern agriculture, Water logging and salinity, Case studies, (e) Energy resources: Growing needs, Renewable energy resources - Solar, Wind, Hydropower, Hydrogen fuel; Non-renewable energy resources - Coal, Natural gas, Nuclear energy, Role of an individual in conservation of natural resource and equitable use of resources for sustainable lifestyles.

UNIT-II: ECOSYSTEMS AND BIODIVERSITY (10 periods)

Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem - Producers, Consumers, Decomposers; Food chains, Food webs, Ecological pyramids - Types; Characteristic features, Structure and functions of forest ecosystem, Desert ecosystem, Aquatic ecosystem, Energy flow in the ecosystem, Ecological succession.

Biodiversity: Concept and value of biodiversity, Role of biodiversity in addressing new millennium challenges, Hot spots of biodiversity, Threats to biodiversity, Man-wild life conflicts, Endemic, Endangered and extinct species of India, Conservation of biodiversity - In-situ and ex-situ.

UNIT-III: ENVIRONMETAL POLLUTION AND CONTROL (08 periods)

Causes, Adverse effects and control measures of pollution - Air pollution, Water pollution, Soil pollution, Noise pollution, Thermal pollution, Nuclear pollution; Solid waste management - Causes, Effects and control measures of urban and industrial wastes; Hazards and disaster management - Floods, Earthquakes, Tsunamis, Case studies.

UNIT-IV: SOCIAL ISSUES AND THE ENVIRONMENT (08 periods)

Sustainable development, Urban problems related to energy, Environmental ethics -Issues, Solutions; Global warming, Acid rain, Ozone layer depletion, Nuclear accidents and case studies, Wasteland reclamation, Consumerism and waste products, Concept of green technologies, Environment protection act, Air act, Water act, Wildlife protection act, Forest conservation act, Issues involved in enforcement of environmental legislation, Public environmental awareness.

UNIT-V: HUMAN POPULATION AND THE ENVIRONMENT (08 periods)

Population growth, Population characteristics and variation among nations, Population explosion, Family welfare programme, Environment and human health, Human rights, Value education, HIV/AIDS, Women and child welfare, Role of information technology in environment and human health, Case studies, Field Work/Assignment/Seminar: Environmental assets - Pond/Forest/Grassland/Hill/Mountain/Environment impact assessment procedures for local environmental issues.

Total periods: 45

TEXT BOOKS:

1. A. Kaushik and C. P. Kaushik, *Environmental Studies*, New Age International (P) Ltd Publications, 4th edition, 2014.
2. Erach Barucha, E*nvironmental Studies*, Orient Blackswan, 2nd edition, 2013.

REFERENCE BOOKS:

1. R. Rajagopalan, *Environmental Studies*, Oxford University Press, 2nd edition, 2011.

2. Benny Joseph, *Environmental Studies,* Tata McGraw-Hill, 2nd edition, 2009.
3. B. S. Chauhan, *Environmental Studies*, University Science Press, 2008.
4. M. Anji Reddy, *Text Book of Environmental Sciences and Technology*, BS Publications, 2007.

II B.Tech. - I Semester

(16BT3BS02) SPECIAL FUNCTIONS AND COMPLEX ANALYSIS

(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Intermediate/senior secondary Mathematics

COURSE DESCRIPTION: Beta, Gamma functions and their properties; Limits continuity and analyticity of complex functions; Integration, power series, singularities, residues; conformal mapping.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1.demonstrate knowledge in
- Beta and Gamma functions
- Expressing complex functions in power series
- Differentiation and integration of complex functions
- Conformal mappings and bilinear transformations
- Expressing complex functions in terms of graphs and power series

CO2.develop skills in analyzing the
- the properties exhibited by complex functions in Argand plane
- properties of real integrals through complex variable techniques
- the properties of improper integrals through residue theory
- conformal transformations of complex valued functions for inferences
- the properties of complex functions by expressing them in power series and graphs

CO3.develop skills in designing mathematical models involving
- Integrals of complex variable functions
- Improper integrals using beta and gamma functions
- Residue theory of complex functions
- Power series expansions of complex variable functions
- Transformations of complex variable functions
- Fluid flow patterns and flux functions.

CO4.develop analytical skills in providing solutions for problems involving
- Fluid, Electrical and Magnetic Potential functions
- Integration of complex functions
- Improper real integrals

CO5.(i) use relevant Complex variable techniques for
- Residues and integrals of complex functions.
- Improper real integrals through complex functions

(ii) techniques of Beta and Gamma functions to improper integrals

DETAILED SYLLABUS

UNIT-I: SPECIAL FUNCTIONS (09 periods)

Beta and Gamma functions - Properties - Relationship between Beta and Gamma functions- Evaluation of improper integrals using Beta and Gamma functions. Bessel function -Generating function (without proof)- Recurrence relations.

UNIT-II: ANALYTIC FUNCTIONS (09 periods)

Function of a Complex Variable - Limits and Continuity of functions, uniform continuity, Differentiability and Analyticity - Cauchy Riemann equations (both Cartesian and polar) - Conjugate and harmonic conjugate functions - Milne Thomson method-Potential functions.

UNIT-III: COMPLEX INTEGRATION AND POWER SERIES (09 periods)

Line integral - Evaluation of line integrals along curves and closed contours - Cauchy's Integral theorem - Cauchy's integral formula - Generalized integral formula- Evaluation of integrals using integral formula. Taylor's theorem (without proof) - Laurent's theorem (without proof) - Power series expansion of complex functions.

UNIT-IV: RESIDUE THEOREM (09 periods)

Zeros, Singularities - Types of singularities- poles - Residues - Evaluation of residues at simple poles and poles of order m - Residue theorem - Evaluation of integrals using residue theorem - Evaluation of improper and real integrals of the type:

i) $\int_0^{2\pi} f(\cos\theta, \sin\theta)d\theta$ ii) $\int_{-\infty}^{\infty} f(x)dx$ iii) $\int_{-\infty}^{\infty} e^{imx} f(x)dx$

UNIT-V: CONFORMAL MAPPING (09 periods)

Conformal mappings, Translation, Rotation, Inversion. Special transformations: Bilinear transformation - Properties - Fixed points - Cross ratio - Invariance of circles under bilinear transformation - Determination of bilinear transformation using three given points. **Total periods: 45**

TEXT BOOK:

1. T.K.V. Iyengar, B. Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad, *Text book of Engineering Mathematics*, Vol-III, S. Chand & Company, 9th edition, 2012.

REFERENCE BOOKS:

1.Grewal, B.S, *Higher Engineering Mathematics*, Khanna Publishers, Delhi, 42nd edition, 2012.
2.Shahnaz Bathul, *Special Functions and Complex Variables*, PHI Learning, 2nd edition, 2010.

II B.Tech. - I Semester
(16BT30201) **DC MACHINES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Electric Circuits and Engineering Physics.

COURSE DESCRIPTION:
Construction, operation, types and applications of DC machines; Performance evaluation of various DC machines.

COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on
- construction and operation of various types of DC machines
- armature reaction and commutation
- characteristics of DC machines
- parallel operation of DC generators
- starting, braking and speed control of DC motors
- testing of DC machines

CO2.analyze the performance of DC machine for various operating conditions
CO3. design suitable accessories / controllers for desired operation of DC Machines
CO4. solve engineering problems pertaining to DC machines and provide feasible solutions
CO5. apply the conceptual knowledge of DC machines in relevance to societal needs

DETAILED SYLLABUS:

UNIT-I: DC GENERATORS (08 periods)
Principle, operation and constructional details of generator. EMF equation and methods of excitation. Losses - constant, variable and minimization of losses. Calculation of efficiency - condition for maximum efficiency.

UNIT-II: ARMATURE REACTION AND COMMUTATION (08 periods)
Armature reaction - cross magnetizing and de-magnetizing AT/pole, compensating winding. Commutation - reactance voltage, methods of improving commutation.

UNIT-III: CHARACTERISTICS OF DC GENERATORS (10 periods)
OCC of Separately excited DC generator. Build-up of EMF in a self-excited DC generator, critical field resistance and critical speed, causes for failure of self-excitation and remedial measures. Internal and external characteristics of shunt, series and compound generators - applications.

Parallel operation of DC generators - conditions for parallel operation, use of equalizer bars and cross connection of field windings, load sharing.

UNIT-IV: DC MOTORS (11 periods)
Principle of operation of DC motor, Back EMF, speed and torque equation. Characteristics and applications of shunt, series and compound motors. Speed control of DC shunt and series motor. Ward-Leonard system. Electric braking. Starters for DC Motors (2-, 3- and 4-point).

UNIT-V: TESTING OF DC MACHINES (08 periods)
Brake test, Swinburne's test, Hopkinson's test, Field's test, Retardation test, separation of stray losses test.

Total Periods: 45

TEXT BOOKS:

1. JB Gupta, *Theory and performance of Electrical Machines (DC machines, Poly phase Circuits & AC machines) in SI Units*, S.K. Kataria& Sons, New Delhi, 15th edition, 2015.
2. R.K. Rajput, *Electrical Machines in S.I. Units*, Laxmi Publications (P) Ltd, 6th edition, New Delhi, 2017.

REFERENCE BOOKS:

1. P.S. Bimbhra, *Electrical Machinery,* Khanna Publishers, 7th edition, Delhi, 2011.

2. B.L. Theraja and A.K. Theraja, *A Text Book of Electrica Technology in S. I. Units,* Vol.2, S. Chand & Company Ltd, Multicolour illustrative edition, New Delhi, 2014.

II B.Tech. - I Semester
(16BT30202) **ELECTROMAGNETIC FIELDS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:
Courses on Multi-Variable Calculus & Differential Equations and Engineering Physics.

COURSE DESCRIPTION: Static electric fields; Gauss's law and its applications; Potential and Potential Gradient; steady magnetic fields; Ampere's circuital law and its applications; Force in magnetic fields; behavior of various materials in electric and magnetic fields; Inductance and capacitance calculations; Maxwell's equations for time variant and time invariant fields.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on:
- static electric fields due to electric charges
- static magnetic fields due to steady currents
- time varying electric and magnetic fields

CO2. analyze Maxwell's equations for both time variant and time invariant electric and magnetic fields.

CO3. solve problems using laws of electromagnetics to provide feasible solutions in electric and magnetic circuits.

CO4. select and apply appropriate law of electromagnetics to determine electric and magnetic fields around various charge distributions and current carrying conductors.

CO5. apply various principles and laws of electromagnetics to industrial applications.

DETAILED SYLLABUS:

UNIT-I: ELECTROSTATICS - I (13 periods)
Introduction to electrostatic fields, coulomb's law in vector form, electric field intensity (EFI), EFI due to various charge distributions, electric flux density, Gauss's law, application of Gauss's law - symmetrical charge distributions, differential volume element, Maxwell's first equation in point and integral form. Energy expended in moving a point charge in an electric field, electric potential, potential for different charge distributions, potential gradient, Maxwell's second equation in point and integral form.

UNIT-II: ELECTROSTATICS - II (10 periods)
Electric Dipole, dipole moment, Potential and EFI due to an electric dipole. Current density, conduction and convection current density, Ohm's law in point form, current continuity equation, conductors and dielectric materials, properties, boundary conditions between conductor and dielectric material, two perfect dielectric materials, law of refraction, polarization, Capacitance - Capacitance of a parallel plate capacitor (with and without composite dielectric), energy density in electrostatic field.

UNIT-III: MAGNETOSTATICS (09 periods)
Introduction to Magnetic fields, relation between magnetic flux density and magnetic Field Intensity (MFI), Biot-Savart's law, MFI due to various current carrying elements, Ampere's Circuital law, Maxwell's third equation in point and integral form, applications of Ampere's Circuital law - infinite line current, infinite sheet of current, infinitely long co-axial transmission line, solenoid and toroid. Maxwell's fourth equation in point and integral form. Scalar magnetic potential and vector magnetic potential.

UNIT-IV: FORCE IN MAGNETIC FIELDS (08 periods)
Force due to magnetic fields, Lorentz force equation, force on a straight and long current carrying conductor in a magnetic field, force between two straight long and parallel current carrying conductors. Magnetic dipole and dipole moment, torque on a current loop placed in a magnetic field, magnetization, magnetic materials, magnetic boundary conditions between different magnetic materials. Self-inductance of a solenoid, toroid, co-axial cable and two wire transmission line, energy density in magnetic field.

UNIT-V: TIME VARYING FIELDS (05 periods)
Introduction to time varying fields, Faraday's laws of electromagnetic induction, statically and dynamically induced EMF, concept of displacement current, modifications of Maxwell's equations for time varying fields, Poynting theorem. **Total Periods: 45**

TEXT BOOKS:
1. William H. Hayt and John A. Buck, *Engineering Electromagnetic*, McGraw Hill Education (India) Pvt. Ltd., 8th edition, 2014.
2. Matthew N.O. Sadiku, *Principles of Electromagnetics*, Oxford University Press, New Delhi, 4th edition, 2007.

REFERENCE BOOK:

1. Joseph A. Edminister, *Theory and Problems of Electromagnetics,* Schaum's Outline Series, Tata McGraw Hill Inc., New Delhi, 2009.

II B.Tech. - I Semester

(16BT30203) SIGNALS, SYSTEMS AND NETWORKS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:
Courses on Multi-variable calculus and Differential equations, Transformation Techniques & Partial Differential Equations and Electric circuits.

COURSE DESCRIPTION:
Signals and systems in continuous-time domain; Transformations on signals; Transient analysis of DC and AC circuits; Two Port networks; Filters.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- signals and systems
- transformation of signals in time and frequency domain
- transient behavior of various circuits
- two port network parameters
- various filters

CO2. analyze
- continuous signals and linear time invariant systems
- signals transformed in time and frequency domain
- transient response for various circuits
- network parameters for various networks
- various filter circuits

CO3. Design
- different types of filters based on frequency and impedance.
- Two-port network for the given parameters.

CO4. evaluate the response of various LTI systems & signal transformations, transient response and different parameters of two port networks & filters to provide viable solutions.

CO5. apply appropriate transformation techniques for analyzing the signals and networks in time and frequency domains.

CO6. apply the conceptual knowledge of signals, transients, filters and two port network models in relevance to industry and society.

DETAILED SYLLABUS:

UNIT-I: CONTINUOUS TIME SIGNALS AND SYSTEMS (08 periods)
Signals: Definition, test signals - Unit step, ramp, parabolic, unit impulse and exponential signals. Basic operation on signals, odd and even components, Energy and power signals.
Systems: Definition, classification, linearity, time variance, causality and stability. Response of LTI systems. Convolution of LTI systems.

UNIT-II: TRANSFORMATION OF SIGNALS (12 Periods)
Fourier transforms: Review of Fourier series, properties of Fourier series. Fourier transforms - definition, properties of Fourier transforms. Fourier transform of periodic signals, inverse Fourier transform. Applications - Circuit analysis.
Laplace transforms: Review of Laplace transform, properties of the Laplace transform, Inverse Laplace transform, theorems - initial and final value (without proof). Laplace transform of periodic signals. Applications - Circuit analysis. Comparison between Fourier and Laplace transforms.

UNIT-III: TRANSIENT ANALYSIS (10 periods)
DC Transients: Transient response of RL, RC and RLC circuits, initial conditions, solution methods using differential equation and Laplace transforms.
AC Transients: Transient response of RL, RC and RLC circuits, initial conditions, solution methods using differential equation and Laplace transforms.

UNIT-IV: TWO PORT NETWORKS (08 periods)
Network Functions - Driving point and transfer functions. Z-parameters, Y-parameters, ABCD parameters and h-parameters. Symmetry and reciprocity property in two port network. Inter-relationships of different parameters. Inter-connection of two port networks.

UNIT-V: FILTERS (07 periods)
Classification of filters, filter networks, analysis of prototype filter networks - attenuation, phase shift, characteristic impedance in pass band and stop band, constant K low pass & high pass filters, m-derived filters, band pass & band elimination filters. Design of prototype filters. **Total Periods: 45**

REFERENCE BOOKS:

1. Matthew N Sadiku, and Warsame Hassan Ali, *Signals and Systems: A Primer with MATLAB,* CRC Press, 2016.

2. A Chakrabarthi, *Network Analysis and Synthesis,* Dhanpat Rai & Co., New Delhi, 2nd revised edition, 2016.

II B.Tech. - I Semester

(16BT30441) **ANALOG ELECTRONIC CIRCUITS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:
Courses on Electronic Devices and Circuits and Electric Circuits.

COURSE DESCRIPTION:
BJT frequency response; Feedback amplifiers and Oscillators; Power amplifiers; Wave-shaping circuits; Multivibrators.

COURSE OUTCOMES: On successful completion of this course, students will be able to

CO1. apply the knowledge in
- BJT Frequency Response
- Feedback Amplifiers
- Oscillators
- Power Amplifiers
- Wave-shaping circuits
- Multi-vibrators

CO2. analyze BJT frequency response, amplifiers, oscillators and pulse circuits.

CO3. design and develop different types of amplifiers, oscillators and pulse circuits.

CO4. solve engineering problems pertaining to analog electronic circuits to provide valid conclusions.

CO5. apply appropriate techniques to obtain optimum solution in the field of analog electronic circuits.

CO6. provide real time solutions for societal needs in the area of analog electronic circuits.

DETAILED SYLLABUS:

UNIT-I: BJT FREQUENCY RESPONSE (10 periods)
Review of BJT simplified hybrid model, analysis of CE amplifier with emitter resistance, emitter follower, Different coupled Schemes -RC coupled amplifier, transformer coupled amplifier, Direct coupled amplifier. Frequency response of BJT amplifier, analysis at low and high frequencies, effect of coupling and bypass capacitors, The hybrid-pi common-emitter transistor model, CE short circuit current gain, current gain with resistive load, gain-bandwidth product.

UNIT-II: FEEDBACK AMPLIFIERS AND OSCILLATORS (09 periods)
The feedback concept, The transfer gain with feedback, feedback amplifier topologies, general characteristics of negative
feedback amplifiers, effect of feedback on input resistance and output resistance-voltage series, voltage shunt, current series and current shunt feedback configuration.

Oscillators: Conditions for oscillations, Hartley, Colpitts, RC phase shift oscillator using FET and Wein bridge oscillators using Transistor, crystal oscillator.

UNIT-III: LARGE SIGNAL AMPLIFIERS (09 periods)
Class A amplifiers- series-fed, transformer coupled, efficiency. Second harmonic distortion, higher-order harmonic generation.Class B amplifier, Push pull amplifiers- class B push-pull and class B complementary symmetry push-pull amplifier, efficiency, Phase inverters,Distortion in power Amplifier.

UNIT-IV: WAVE SHAPING CIRCUITS (08 periods)
High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square and ramp inputs. Diode clippers, clipping at two independent levels, clamping operation, clamping circuits taking source and diode resistances into account, practical clamping circuit.

UNIT-V: MULTIVIBRATORS (09 periods)
Bistablemultivibrator- Stable states of a bistablemultivibrator, fixed bias transistor bistablemultivibrator, unsymmetrical triggering, symmetrical triggering. MonostableMultivibrator- collector coupled monostable multivibrator, triggering of the monostablemultivibrator. Astablemultivibrator- Astable collector coupled multivibrator, Schmitt trigger.

Total Periods: 45

TEXT BOOKS:
1. Jacob Milliman, Christors C Halkias, *Integrated Electronics*, Tata McGraw-Hill, 1991.
2. J.Millman and H.Taub, Pulse, *Digital and Switching Wave forms*, McGraw-Hill, 2000.

REFERENCE BOOKS:
1. S.Salivahana, N.Suresh Kumar, *Electronic Devices and Circuits*, Tata McGraw-Hill, 3rd edition, 2012.
2. A. Anand Kumar, *Pulse and Digital Circuits*, Prentice Hall India, 2nd edition, 2008.

II B.Tech. - I Semester
(16BT30231) **DC MACHINES LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES:
Courses on Electric Circuits and Electric Circuits Lab

COURSE DESCRIPTION:
Construction, operation, types and applications of DC machines; Performance evaluation of various DC machines.

COURSEOUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- construction and working of various types of DC ma-chines.
- starting, braking and speed control of DC motors.
- testing of DC machines.
- parallel operation of DC generators.
- characteristics of DC machines.

CO2. analyze the performance of DC machines for various operating conditions.

CO3. design the circuit with suitable accessories / controllers for desired operating conditions of DC machines.

CO4. interpret and synthesize the data obtained from experi mentation on DC machines and provide valid conclusions.

CO5. select and apply appropriate technique for testing and control of DC machines used in industry.

CO6. apply the conceptual knowledge of DC machines in relevance to industry and society.

CO7. commit to ethical principles and standards while exercising the practical investigations on DC machines.

CO8. work individually or in a group while exercising practical investigations in the field of DC machines.

CO9. communicate effectively in verbal and written form in relevance to DC machines.

DETAILED SYLLABUS:

PART-A:

1. Construction of DC machine and DC motor starters.
2. Armature windings - lap and wave, simplex and multiplex, single layer and multi-layer, equalizer rings and dummy coils.

PART-B: Any EIGHT experiments are to be conducted from the following

1. Magnetization characteristic of DC shunt generator.
2. Load test on DC shunt generator.
3. Load test on DC series generator.
4. Load test on DC compound generator (cumulative and differential connections).
5. Parallel operation of DC generator
6. Speed control of DC shunt motor.
7. Brake test on DC compound motor.
8. Brake test on DC shunt motor.
9. Brake test on DC series motor.
10. Swinburne's test.
11. Hopkinson's test.
12. Field's test.
13. Separation of losses in DC shunt machine.
14. Electric braking of DC motor

II B.Tech. - I Semester

16BT30232: **SIGNALS AND NETWORKS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES:
Courses on Multi-variable calculus & Differential equations, Transformation Techniques & Partial Differential Equations, Electric circuits and Electric Circuits Lab.

COURSE DESCRIPTION:
Experimentation on Signals and systems; Transient analysis; Twoport network parameters and passive filters.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on signals, transients, two port networks & filters and their experimental implementation.
CO2. analyze and relate the experimental observations & mea surements for validation.
CO3. design a suitable experimental/simulation procedure for practical investigations on signals, systems and net works.
CO4. demonstrate skills in evaluating various parameters and interpret the observations to provide feasible solutions.
CO5. select appropriate technique for experimental investigations, analysis and interpretation of signals and net works.
CO6. apply the conceptual knowledge of signals, transients, filters and twoport network models in relevance to industry and society.
CO7. commit to ethical principles and standards while exercising the practical investigations on signals and net works.
CO8. work individually or in a group in the field of signals and networks.
CO9. communicate effectively in verbal and written form in signals and networks domain.

LIST OF EXPERIMENTS:

Conduct any **TEN** experiments using appropriate Software Tools / Hardware

1. Generation of continuous time signals.
2. Basic operations on the signals.
3. Systems and their properties.
4. Convolution of signals.
5. Transformation of signals into time and frequency do mains.
6. Transient response of RL circuit and applications.
7. Transient response of RC circuit and applications.
8. Transient response of RLC circuit and applications.
9. Determination of Open circuit and Short circuit parameters in isolated and interconnected networks.
10. Determination of ABCD and Hybrid parameters in isolated and interconnected networks.
11. Design, analysis and application of Low pass and High pass filters.
12. Design, analysis and application of Band Pass and Band stop filters.

II B.Tech. - I Semester
(16BT30451) ANALOG ELECTRONIC CIRCUITS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES:
Courses on Electronic Devices and Circuits andAnalog Electronic Circuits.

COURSE DESCRIPTION:
Diode characteristics; Rectifiers; BJT and FET characteristics; UJT and SCR characteristics; BJT Amplifiers; Non-linear AND Linear Wave shaping circuits; Feed Back Amplifiers; Design of Multi-vibrator circuits; Power Amplifiers.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. apply the knowledge in
- Diodes-PN Junction Diodes, Zener Diodes, SCR
- Transistors-BJT,FET,UJT
- Feedback amplifiers and oscillators
- Clipping and Clamping Circuits
- RC High Pass and Low Pass Circuits
- Multi-vibrators

CO2. analyze different types amplifier, oscillator and pulse cir cuits.
CO3. design different types of Electronic circuits like feedback amplifiers, Oscillators, Multi-vibrators, Schmitt Trigger.
CO4. provide solutions through the design and conduct of experiments, analysis and synthesis.
CO5. apply biasing technique for design of amplifiers.
CO6. function effectively as an individual and as a member in a group in the area of analog electronic circuits.
CO7. communicate effectively in oral and written form in the area of analog electronic circuits.

LIST OF EXERCISES: (Minimum of **ten experiments** to be conducted)

PART - A
ELECTRONIC DEVICES AND CIRCUITS (Minimum five experiments to be conducted)

1. PN Junction and Zener diodes characteristics.
2. Ripple Factor and Load Regulations of Rectifier with and without filters of Half wave Rectifiers.
3. Ripple Factor and Load Regulations of Rectifier with and without filters of Full wave Rectifiers.
4. Input and Output characteristics of Transistor in CE configuration.
5. Drain and Transfer Characteristics of JFET.
6. Gain and Frequency response of CE Amplifier.
7. UJT characteristics.
8. SCR characteristics.

PART B
ANALOG ELECTRONIC CIRCUITS (Minimum **five experiments** to be conducted)

1. Voltage series Feedback Amplifier
2. Current shunt Feedback Amplifier
3. Class A Power Amplifier (with transformer load).
4. Hartley and Colpitt's Oscillators.
5. Linear wave shaping- RC High Pass and Low Pass.
6. Non Linear wave shaping - Clippers and Clampers.
7. Astable Multivibrator
8. Schmitt Trigger

II B.Tech. - II Semester
(16BT40201) **ELECTRICAL MEASUREMENTS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Transformation Techniques &Partial Differential Equations and Signal, Systems & Networks.

COURSE DESCRIPTION:
Measurement of electrical quantities; construction, working, design and applications of various electrical measuring instruments; Performance evaluation of various electrical measuring instruments.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- construction, working and testing of various measuring instruments
- various errors and compensation
- measurement of various electrical parameters and quantities

CO2. analyze
- errors and compensations in instruments
- instrument performance
- measuring circuits

CO3. design appropriate arrangement for extension of range in measuring instruments.

CO4. estimate various electrical quantities using suitable instruments and techniques to provide viable solutions.

CO5. select& use appropriate technique and instrument for the measurement of electrical quantities in domestic and industrial applications.

CO6. apply the conceptual knowledge of electrical measuring instruments and testing in relevance to industry and society.

DETAILED SYLLABUS:

UNIT-I: MEASUREMENT OF VOLTAGE AND CURRENT (12 periods)
Measurement and methods of measurements.Static characteristics, limiting and relative limiting errors, combination of quantities with limiting errors, types of errors. Classification of analog instruments, essential operating forces and systems; PMMC and MI instruments - construction, working, torque equation, extensions, errors, compensations and advantages & disadvantages.

UNIT-II: MEASUREMENT OF POWER AND ENERGY (09 periods)
Measurement of power: Power measurements in DC and AC circuits. EDM wattmeter - construction, working, torque equation, shape of scale, errors & compensations and LPF wattmeter.Measurement of three phase active and reactive power for balanced and unbalanced loads.
Measurement of energy: Single phase induction type energy meter - construction, working, driving and braking torques, lag adjustment devices, errors & compensations. Three phase energy meter.

UNIT-III: INSTRUMENT TRANSFORMERS AND POWER FACTOR METERS (07 periods)
Current and Potential transformers - construction, working, phasor diagram, errors, characteristics. Measurement of power using instrument transformers, Testing of current transformer by Silsbee's method. Power Factor meters - single phase and three phase electrodynamometer type.

UNIT-IV: DC AND AC BRIDGES (06 periods)
Measurement of resistance - Wheatstone bridge, Kelvin's double bridge and loss of charge method.
Measurement of inductance & quality factor - Maxwell's inductance bridge, Hay's bridge, Anderson's bridge and Owens's bridge.
M**easurement of capacitance & loss angle** - De-sauty's bridge, Schering bridge and modified Schering bridge.
Measurement of frequency - Wien's bridge.

UNIT-V: POTENTIOMETERS, DIGITAL METERS AND CRO (11 periods)
DC Potentiometers: Basic slide wire potentiometer circuit, DC Crompton's potentiometer - principle, operation, standardization and applications.
AC Potentiometers: Principle & operation of polar and coordinate type potentiometers, standardization and applications.
Digital meters and CRO: Digital voltmeters and types(ramp, integrating, successive approximation), Digital Energy meter.
Cathode ray oscilloscope: Introduction, cathode ray tube, time base generator, horizontal and vertical amplifiers, measurement of phase & frequency and lissajous patterns. **Total Periods: 45**

TEXT BOOKS:

1. A.K. Sawhney, A course on *Electrical and Electronics Measurements & Instrumentation*, DhanpatRai and Co. Publishers, 19th edition, 2015.
2. J.B. Gupta, A course on *Electrical and Electronics Measurements & Instrumentation*, S.K. Kataria publishers, 14th edition, 2014.

REFERENCE BOOKS:

1. U.A. Bakshi, A. V. Bakshi, *Electrical measurements and Instrumentation*, Technical publications, 1st edition, 2009.

2. E. W. Golding & F.C. Widdis, *Electrical Measurements and Measuring Instruments*, Wheeler Publishers, 5th edition, 1997.
3. H S Kalsi, *Electronic Instrumentation*, Tata McGraw-Hill, 3rd edition, 2010.

II B.Tech - II Semester

(16BT40202) GENERATION OF ELECTRIC POWER

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:
Courses on EngineeringPhysics, EngineeringChemistry, Electronic Devices and Circuits.

COURSE DESCRIPTION:
Generation of electric power using hydro, thermal, nuclear, gas and renewable energy sources;Cogeneration;Economic aspects of power generation and power factor improvement.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- layout of various power plants and their operation.
- different types of turbines and their applications in power generating stations.
- non-conventional energy sources.
- aspects of cogeneration.
- economic aspects of power generation.
- power factor improvement methods.

CO2. analyze
- load factor, loss factor and their relations.
- power factor improvement methods and economic as pects of power generation.

CO3. design capacitors for most economic power factor.
CO4. evaluate various parameters and economic aspects of power generation to provide aviablesolution.
CO5. select feasible geographical sites for erecting different power plants.
CO6. apply the conceptual knowledge of electric power generation through conventional and non-conventional sources to substantiate the societal needs.
CO7. realizeconstraints and impacts of conventional & non-conventional power generation technology on environment and society.
CO8. adhere environmental regulations for eco-friendly operation of power plants.

DETAILED SYLLABUS:

UNIT-I: HYDRO POWER STATIONS AND STEAM POWER STATIONS (09 periods)
Hierarchy of power system.Environmental regulations on power plants.
Hydro power plant: Selection of site for hydroelectric power station, layout and classification of hydroelectric power station, concept of pumped storage plants, available hydro power and mass curve.
Steam power plant: Layout of steam power plant -fuel handling, combustion equipment for steam boilers, fluidized bed combustion, ash handling, dust collectors, boilers, condenser, chimney and cooling towers.
Turbines: Classification, description and working principle of various turbines- impulse and reaction turbines, comparison between impulse and reaction turbine, Pelton wheel, Francis turbine and Kaplan turbine.

UNIT-II:NUCLEAR AND PEAK LOAD POWER PLANTS (09 periods)
Nuclear power stations: Nuclear fission, chain reaction, site selection, layout of nuclear power station, nuclear reactors-classification, components, PWR, BWR and breeder reactor.
Peak load plants:
Diesel engine power plant: Introduction, applications, site selection, classification of internal combustion engines,essential components and operationof dieselpowerplant.**Gas turbine power plant:**Gas turbines, site selection, simple gas turbine plant, energy cycle, layout and essential components of gas turbine power plant.

UNIT-III:RENEWABLE ENERGY RESOURCES (08 periods)
Introduction to micro grid, applications of renewable sources as distributed generation.Siteselection - solar and wind. **Solar power** - performance of PV cell by single diode model, PV module, terminology and applications. **Wind Power**-Wind power extracted by turbine, horizontal and vertical axis windmills. **Fuel cells**-working, Performance characteristics, types-Phosphoric and alkaline fuel cells only. **Biogas**-Biogas generation from Biomass.Impacts of renewable energy generation on environment.

UNIT-IV:ECONOMIC ASPECTS OF POWER GENERATION AND TARIFF (09 periods)
Introduction, terms and definitions - connected load, maximum demand, load factor, demandfactor, diversityfactor, plant capacityfactor, utilization factor, Plant use factor, loss factor, coincidence factor and contribution factor. Relation between loss factor and load factor. Cost analysis - initial cost, interest and methods of depreciation. Tariffs -simple, flat rate, block rate, maximum demand, two-part, three-part and power factor tariffs.

UNIT-V:COGENERATION AND POWER FACTOR CORRECTION (10 periods)
Cogeneration- Electricity generating systems, Economic benefits, Environmental benefits. Operation modes of cogeneration systems, Factors to consider, project risks, cogeneration usage in different places, Practical aspects of installing a cogeneration plant.
Power factor correction: Causes of low power factor, methods of improving power factor -power capacitors, series and shunt capacitors for power factor correction. Most economical power factor.

TEXT BOOKS: **Total Periods: 45**

1. S.N.Singh, *Electrical Power Generation, Transmission and Distribution*, PHI learning private limited, 2nd edition, 2015.
2. S. K. Dubey, Dr. S. K. Bhargava, *Non-Conventional Energy Resources*, Dhanpathrai & Co., 2011.

REFERENCE BOOKS:

1. R.K.Rajput, A textbook of *power system engineering*, Laxmi Publications (P) Ltd, 2006.
2. A S Pabla, *Electric Power Distribution*, McGraw Hill Education, 6th edition, 2014.

3. V.K.Mehta and Rohith Mehta, *Principles of Power Systems*, S Chand & Company Ltd, New Delhi, 4th Multi-color illustrative edition, 2006.
4. David Flin, Cogeneration: A User's Guide. *Renewable energy series*, Vol. 11. IET, 2010.
5. TuranGonen, *Electric Power Distribution System Engineering*, Mc Graw-Hill Book Company, 2nd edition, 2007.

II B.Tech. - II Semester
(16BT40203) **TRANSFORMERS AND INDUCTION MACHINES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Course on DC Machines, Electromagnetic Fields.

COURSE DESCRIPTION:
Constructional details, principle of operation, equivalent circuit, testing, performance and applications of transformers and three phase induction motors.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- construction, operation of various types of transformers and induction machines.
- characteristics of transformers and induction machines.
- parallel operation of transformers.
- starting, braking and speed control of induction machines.
- testing of transformers and induction machines.

CO2. analyze the operation and performance of transformers and induction machines for various operating conditions.
CO3. design suitable accessories / controllers for machines to meet the desired specifications.
CO4. solve engineering problems pertaining for transformers and induction machines to provide viable solutions.
CO5. select appropriate techniques and tools for desired operation of transformers and induction machines in domestic, agriculture and industrial applications.
CO6. apply the conceptual knowledge of Transformers and Induction Machines in relevance to industry and society.

DETAILED SYLLABUS:

UNIT-I: SINGLE PHASE TRANSFORMERS (10 periods)
Single phase transformers - working principle, constructional details, types, ideal transformer, EMF equation, operation on no-load and on-load, phasor diagrams, losses, equivalent circuit, OC and SC tests, separation of losses test, efficiency and regulation. Effects of variation of frequency and supply voltage on iron losses.

UNIT-II: TRANSFORMER TESTING AND AUTOTRANSFORMER (08 periods)
Polarity test, Sumpner's test, all day efficiency.Parallel operation with equal and unequal voltage ratios. Auto transformers - equivalent circuit, comparison with two winding transformers.

UNIT-III: THREE PHASE TRANSFORMERS (08 periods)
Introduction to three-phase transformers. Three-phase transformer connections Scott connections. Three winding transformers -tertiary windings, determination of Z_p, Z_s and Z_t. OFF-load and ON-load tap changing.

UNIT-IV: THREE PHASE INDUCTION MOTORS (09 periods)
Three phase induction motors -construction details of cage and wound rotor machines, production of rotating magnetic field, principle of operation, rotor EMF and rotor frequency, rotor reactance, rotor current and power factor at standstill and during operation, torque equation - expressions for maximum torque and starting torque, torque-slip characteristics, rotor power input, rotor copper loss and mechanical power developed and their inter relation. Double-cage and deep bar rotors. Equivalent circuit and phasor diagram.

UNIT-V: CIRCLE DIAGRAM, STARTING AND SPEED CONTROL METHODS (10 periods)
No-load and blocked rotor tests, stator resistance test, circle diagram, predetermination of performance. Methods of starting - starting current and torque calculations. Crawling and cogging. Speed control - change of frequency, change of poles, cascade connection, injection of emf into rotor circuit (qualitative treatment only). Induction generator - principle of operation.

Total Periods: 45

TEXT BOOKS:
1. JB Gupta, Theory and performance of *Electrical Machines (DC machines, Poly phase circuits & AC machines) in SI Units*, S.K. Kataria & Sons, New Delhi,15th edition, 2015.
2. P.S. Bimbhra, *Electrical Machinery*, Khanna Publishers, New Delhi, 7th edition, 2011.

REFERENCE BOOKS:

1. A.E. Fitzgerald, C.Kingsley and S.Umans, *Electric Machinery*, Mc Graw-Hill, New Delhi, 6th edition, 2008.
2. B.L. Theraja and A.K. Theraja, A Text Book of *Electrical Technology in S. I. Units*, Vol.2, S.Chand Company Ltd, Multicolour edition, New Delhi, 2014.

II B.Tech - II Semester
(16BT41002) **LINEAR AND DIGITAL ICs**
(Common to EEE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Electronic Devices and Circuits& Analog Electronic Circuits.

COURSE DESCRIPTION:
Differential Amplifier; Characteristics of Operational Amplifiers; Linear & Non-Linear Applications of Op-Amp; IC 555 timer and phase locked loops; Application of PLL; A-D & D-A Converters; CMOS and Bipolar Logic Interfacing; HDL with combinational and sequential logic design.

COURSE OUTCOMES: On successful completion of the course,students will be able to

CO1. demonstrate knowledge in
- Op-amp operation and applications.
- Timer & PLL circuits.
- A-D & D-A Converters
- CMOS and Bipolar logic Interfacing.
- HDL design and programming.

CO2. analyze
- Op-amp based circuits.
- Timers for various circuits.
- Different logic families.

CO3. design
- Circuits using Op-amps.
- Logic gates using CMOS.
- Combinational and sequential circuits.

CO4. solve problems in
- Evaluating parameters of Op-amp based circuits.
- Programming of various combinational and sequential logic design.

CO5. apply appropriate modeling technique to suit IC Design.

CO6. understand the impact of design and use of Linear and Digital ICs on the development of efficient and cost effective products.

DETAILED SYLLABUS:

UNIT-I: OPERATIONAL AMPLIFIER (11 periods)
Op-amp internal circuit - Differential Amplifier, Transfer Characteristics, Level Translator, Output stage; Basic information of Op-Amp, Ideal & Practical operational Amplifier-Inverting, non-Inverting & Differential Amplifier, Voltage follower, DC Characteristics- Input Bias Current, Input Offset Current, Input Offset Voltage, Total Output Offset Voltage, CMRR, PSRR, Thermal Drift. AC Characteristics-Frequency Response, Frequency Compensation, Slew Rate, Features and characteristics of 741 op-Amp.

UNIT-II: LINEAR & NON LINEAR APPLICATIONS, FILTERS (10 Periods)
Linear Applications - Integrator and differentiator, Instrumentation amplifier, AC amplifier, Non - Linear Applications - Comparators & its applications, Multivibrators: monostable and astable, RC phase shift oscillator, Log and Antilog amplifiers.
Filters: First - order LPF, HPF, Butterworth Filters, Second order LPF, HPF.

UNIT-III: IC 555 TIMER, PLL & CONVERTERS (08 Periods)
Introduction to 555 timer, functional diagram, monostable and astable operations and applications. PLL - Introduction, block schematic, principles and description of individual blocks, Voltage Controlled Oscillator (IC 566).
D-A Converters: R-2R ladder & Inverted R-2R ladder, A-D converters: Sample and hold circuit, Flash type, Successive Approximation type and Dual slope ADC.

UNIT-IV: CMOS LOGIC & HDL Programming (08 Periods)
CMOS logic, CMOS steady state electrical behavior, CMOS dynamic electrical behavior. Introduction to Verilog: HDL based design flow, program structure, language elements, operators, User defined primitives, data flow modeling, behavioral modeling, structural modeling.

UNIT-V: MODELING & DESIGN OF DIGITAL CIRCUITS USING VERILOG (08 Periods)
Introduction to 74x283 adder, 74x151 multiplexer, 74x541, 74x245 three state devices, 74x138 decoder, 74x148 encoder, Flip-flops- SR & JK, 74x163 Counter. Design and programming of Digital IC applications using the above components. **Total Periods: 45**

TEXTBOOKS:
1. D. Roy Chowdhury, *Linear Integrated Circuits*, New Age International Pvt. Ltd., 4th edition, 2010.
2.John F. Wakerly, Digital Design Principles & Practices, Pearson Education, 4th edition, 2009.

REFERENCE BOOKS:

1.Ramakanth A. Gayakwad, Op-Amps & Linear ICs, PHI, 3rd edition, 1987.
2. J. Bhasker, *VERILOG Primer,* BS Publications, 2nd edition, 2001.
3.Stephen Brown, ZvonkoVranesic, *Fundamentals of Digital Logic* with VERILOG Design, TMH, 2nd edition, 2007.
4. T.R. Padmanabhan, B. Bala Tripura Sundari, *Design through Verilog HDL*, Wiley India, 2004.

II B.Tech - II Semester

(16BT30403) SWITCHING THEORY AND LOGIC DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:--

COURSE DESCRIPTION:

Number system and Boolean algebra; Minimization; Analysis and synthesis of digital circuits; Asynchronous Sequential Logic & Programmable Memories.

COURSE OUTCOMES: On successful completion of the course, students willbe able to

CO1. demonstrate the knowledge in

- Conversion of number systems, Binary Codes.
- Basic theorems, properties and postulates of Boolean algebra.
- Minimization of switching functions using Map method and Tabular method.
- Combinational and sequential circuits.
- Realization of Boolean functions using PLDs.

CO2. analyse combinational and sequential circuits.

CO3. design and develop various combinational, sequential circuits and PLDs.

CO4. solve problems and arrive at solutions pertaining to Digital Electronics.

CO5. apply minimization techniques to asynchronous and syn chronous designs and suggest appropriate design for engineering solutions.

CO6. apply appropriate logic functions to obtain optimized designs useful for the society.

DETAILED SYLLABUS:

UNIT-I:NUMBER SYSTEM & BOOLEAN ALGEBRA (10 periods)

Introduction, Binary Numbers, Number base conversions, Complements of numbers, Signed binary numbers, Binary codes, Error detection and correction codes. Boolean Algebra-Basic definition, Basic theorems and properties, Boolean Functions, Canonical & Standard forms, logic operations & Logic gates.

UNIT-II: GATE LEVEL MINIMIZATION (08 periods)

Introduction, the map method, four variable, Five variable K-map, POS & SOP Simplification, Don't care conditions, NAND & NOR Implementation, Other two level Implementation, Ex-or Function, Quine-McCluskey Technique-simplification of Boolean function using tabulation Method.

UNIT-III: ANALYSIS AND SYNTHESIS OF COMBINATIONAL CIRCUITS (10 periods)

Combinational circuits, Analysis & Design procedure, Binary Adder-subtractor, Decimal Adder, Binary Multiplier, Magnitude comparator, Decoder, Encoders, Multiplexers,Demultiplexers-1-Line to 4-Line and 1-Line to 8-LineDemultiplexers.

UNIT-IV: ANALYSIS AND SYNTHESIS OF SEQUENTIAL CIRCUITS (10 periods)

Sequential Circuits, Latches, Flip-Flops, Analysis of Clocked sequential circuits, State Reduction & Assignment, Design procedure, Registers-Shift Registers, Counters- Synchronous counters and Asynchronous counters.

UNIT-V: ASYNCHRONOUS SEQUENTIAL LOGIC& PROGRAMMABLE MEMORIES (07 periods)

Introduction, Analysis procedure, Design Procedure, Reduction of State and flow tables, Hazards,Programmable Memories-ROM,PLA, PAL. **Total Periods: 45**

TEXT BOOK:

1. M. Morris Mano, *Digital Design*, Pearson education, 5th edition, 2013.

REFERENCE BOOKS:

1. Anand Kumar, *Switching Theory and Logic Design*, PHI, 2008.
2. ZviKohavi and NirahK.Jha, *Switching theory and Finite Automata Theory*, Tata McGraw-Hill, 2nd edition, 1978.

3. Charles H. Roth, *Fundamentals of Logic Design*, Thomson Publications, 5th edition, 2004.

II B.Tech - II Semester

(16BT41041) COMPUTER ARCHITECTURE AND ORGANIZATION

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: --

COURSE DESCRIPTION:
Basic structure of computers; computer arithmetic operations; register transfer and organization; 8085 architecture, programming and interfacing of 8085 microprocessor; Concepts of micro programmed control, pipelining and memory system.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- Internal organization of a computer.
- Various memories and hierarchy in a computer.
- Architecture, instruction set and addressing modes of 8085 microprocessor.

CO2. analyze the performance of a computer.

CO3. design microprocessor based systems for real time applications.

CO4. solve engineering problems and arrive at solutions by developing embedded products.

CO5. choose appropriate hardware, algorithm and program using suitable IDE.

CO6. practice professional engineering to deliver efficient and cost effective embedded based products for society.

DETAILED SYLLABUS:

UNIT-I: STRUCTURE OF COMPUTERS AND MEMORY SYSTEMS (07 periods)

Structure of Computers: Computer Types, Functional Units, Basic Operational concepts, Bus Structures, Software and Performance.

Memory System: Internal organization of memory chips - SRAM, DRAM, ROM, Flash memory and cache memory, Memory hierarchy - speed, size and cost. Auxiliary memory - Magnetic disk and tape.

UNIT-II: 8085 ARCHITECTURE (11 periods)

Microprocessor evolution and types, introduction to 8085 architecture, Pin description, Register Organization, Timing Diagram, Instruction Set: Data transfer, arithmetic and logic, branch control, I/O and machine control instructions.

UNIT-III: 8085 PROGRAMMING & INTERFACING (09 Periods)

Addressing modes, Interrupts of 8085, Simple programs, Interfacing - Memory, I/O devices - memory mapped I/O and I/O mapped I/O.

UNIT-IV: REGISTER TRANSFER AND MICROOPERATIONS (10 periods)

Register Transfer, Bus and memory transfers, Arithmetic microoperations, 4-bit arithmetic circuit, Logical microoperations, Shift Microoperations, Arithmetic logic shift unit, Computer registers, Computer Instructions, RISC Vs CISC processors, Timing and control and Instruction cycle.

UNIT-V: COMPUTER ARITHMETIC, MICROPROGRAMMED CONTROL ANDPIPELINING (08 periods)

Computer Arithmetic: Addition and Subtraction, Multiplication and Division Algorithms.

Microprogrammed Control: Control memory, address sequencing, design of control unit.

Pipelining: Basic concepts, Data Hazards, Instruction Hazards, Out of order execution.

Total Periods: 45

TEXT BOOKS:
1. M. Moris Mano, *Computer System Architecture*, Pearson/ PHI, 3rd edition, 2008.
2. Ramesh S Gaonkar, *Microprocessor - Architecture, Programming and Applications with the 8085*, Penram International Publishing Private Limited, 5th edition, 2007.

REFERENCE BOOKS:
1. Carl Hamacher, ZvonksVranesic, SafeaZaky, *Computer Orga*

nization, Mc Graw Hill, 5^{th} edition, 2002.
2. William Stallings, *Computer Organization and Architecture,* Pearson/PHI, 6^{th} edition, 2003.

II B.Tech. - II Semester
(16BT40231)**ELECTRICAL MEASUREMENTS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES:
Courses on Signal, Systems and Networks,Electric Circuits Lab and DC Machines Lab.

COURSE DESCRIPTION:
Measurement of electrical quantities; Testing of single phase energy meter and current transformer.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- measurement of electrical quantities
- measuring instruments and their testing

CO2. analyze various electrical quantities, parameters and measuring instruments.
CO3. design the circuit with suitable accessories for desired measurement and testing.
CO4. interpret and synthesize the data obtained from experimentation on measurement of electrical quantities to provide valid conclusions.
CO5. select and use various measuring instruments in domestic and industrial applications.
CO6. apply the conceptual knowledge of instruments, measurement and testing techniques in relevance to industry and society.
CO7. commit to ethical principles and standards while exercising the practical investigations on measurement and testing techniques.
CO8. work individually or in a group in the field of electrical measurements and instrument testing.
CO9. communicate effectively in verbal and written form in relevance to electrical measurements and instrument testing.

DETAILED SYLLABUS: Conduct any **TEN** experiments from the following

1. Measurement of parameters of a choke coil using three volt meter and three ammeter methods.
2. Design of ammeter and voltmeter using shunt and multiplier.
3. Measurement of three phase active and reactive power.
4. Measurement of three phase power using one wattmeter with two no. of C.Ts
5. Calibration of LPF wattmeter by phantom loading
6. Calibration and testing of single phase energy meter
7. Calibration of dynamometer power factor meter
8. Kelvin's double Bridge and Wheatstone's bridge
9. Schering bridge& Anderson bridge.
10. Crompton D.C. Potentiometer - Calibration of PMMC ammeter and PMMC voltmeter
11. C.T testing by Silsbee's method.
12. Dielectric oil testing using HT testing kit
13. Measurement of earth and insulation resistance.
14. AC potentiometer - Calibration of AC voltmeter, parameters of choke.
15. Measurement of phase and frequency using CRO

II B.Tech. - II Semester
(16BT40232)**TRANSFORMERS AND INDUCTION MACHINES LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Course on DC Machines Lab

COURSE DESCRIPTION:
Construction, types, operation and applications of transformers and induction machines; Performance evaluation of transformers and induction machines.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- construction, operation of various types of transformers and induction machines.
- starting and speed control of induction machines.
- testing of transformers and induction machines.
- parallel operation of transformers.
- characteristics of transformers and induction machines.

CO2. analyze the performance of transformers and induction motors for various operating conditions.

CO3. design the circuit with suitable accessories / controllers for desired operation of Transformers and Induction motors.

CO4. interpret and synthesize the data obtained from experimentation on transformers & induction machines and provide valid conclusions.

CO5. select and apply appropriate technique for testing and control of transformers & induction machines used in domestic and industrial applications.

CO6. apply the conceptual knowledge of Transformers and Induction motors in relevance to industry and society.

CO7. commit to ethical principles and standards while exercising the practical investigations on Transformers and Induction motors.

CO8. work individually or in a group while exercising practical investigations in the field of Transformers and Induction motors.

CO9. communicate effectively in verbal and written form in relevance to Transformers and Induction motors.

DETAILED SYLLABUS:
PART-A:

1. Construction of transformers
2. Construction of three phase induction motors.

PART-B: Any **EIGHT** experiments are to be conducted from the following

1. OC and SC tests on single phase transformer.
2. Separation of core losses of a single phase transformer.
3. Load test on single phase transformer.
4. Sumpner's test on a pair of single phase transformers.
5. Conversion of single phase transformer into autotransformer.
6. Parallel operation of single phase transformers.
7. Scott connection of transformers.
8. Heat run test on a bank of single phase delta connected transformers.
9. Brake test on three phase induction motor.
10. Separation of no-load losses of three phase induction motor.
11. No-load and blocked rotor tests on three phase inductionmotor.
12. Speed control of induction motor.

II B.Tech.- II Semester
(16BT41033)**LINEAR AND DIGITAL ICs LAB**
(Common to EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: A course on Linear and Digital ICs.

COURSE DESCRIPTION:
Op-Amp characteristics; Applications of Op-Amp; 555 timer; PLL; Digital logic families and interfacing; Digital IC Applications; Programming of digital IC's in HDL.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. demonstrate knowledge on analog and digital circuits.
CO2. apply analytical skills to determine the op-amp parameters.
CO3. design of analog and digital circuits for Linear & Nonlinear applications.
CO4. provide valid conclusions through analysis and synthesis of analog and digital circuits.
CO5. apply appropriate simulation tools for programming of analog and digital circuits.
CO6. work individually and also in a group to develop applications using linear and digital ICs.
CO7. communicate effectively with engineering community to design analog circuits.

LIST OF EXPERIMENTS: (Minimum of **Ten** experiments to be conducted)

PART: A (Minimum of **Three** experiments to be done using any simulation software)

1. Design and Simulate an Active filter (LPF / HPF) for given cut off frequency.
2. Design and Simulate D-A converter (R-2R ladder) with required voltage levels.
3. Design and Simulate an Instrumentation Amplifier with required gain.
4. Design and Simulate Op-Amp applications - (integrator / Differentiator) for given cut off frequency.
5. Design and Simulate applications of 555 timer (Monostable / AstableMultivibrator) with given duty cycle and frequency.

PART - B: Linear IC's (Minimum of **Four** experiments to be done using hardware)

1. Design and Verify
   - Op-Amp based comparator with Given reference voltage.
   - Op-Amp based Schmitt Trigger with given Duty cycle and frequency.
2. Design and Verify the Applications of Op-Amp- (integrator / Differentiator) for given cut off frequency.
3. Design and Verify the Applications of 555 timer (Monostable/ AstableMultivibrator) with given Duty cycle and frequency.
4. Design and Verify and R-2R Ladder DAC circuit using op- amp-741.
5. Design and Verification of active filter (LPF / HPF) for given cut off frequency.
6. Design and Verify an Instrumentation Amplifier with required Gain.

PART: C (Minimum of **Three** experiments to be done using Verilog HDL)

1. Simulate the Model of Adder and Subtractor with different flow (Structural, Data and behavioral).
2. Simulate the Model of 3x8 using 2x4 Decoder & 8x3 using 4x2 Encoder.
3. Simulate the Model of 8x1 using 4x1 using 2x1 Multiplexer.
4. Simulate the Model of J-K, T, D Flip-flops using Logic gates.
5. Simulate the Model of 4-Bit Universal shift register.
6. Simulate the Model of Mod-8 Counter.

III B.Tech. - I Semester

(16BT3HS02) **MANAGERIAL ECONOMICS AND PRINCIPLES OF ACCOUNTANCY**

(Common to CE, EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:--

COURSE DESCRIPTION:

Managerial Economics; Demand and Elasticity of Demand; Production Functions; Markets and Pricing Policies; Basic concepts of Accounting (Journal, Ledger and Trial balance); Trading Account, Profit and Loss Account and Balance sheet with simple adjustments; Computerized Accounting.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate Knowledge in
- Tools and concepts of Micro Economics
- Basic Principles and concepts of Accountancy
- Financial Accounting
- Significance of Economics and Accountancy

CO2. apply skills in managerial decision making of an organization.
CO3. apply the economic theories i.e., Demand, Production, Cost, Markets and Price
CO4. demonstrate effective communication in Business and Accounting transactions
CO5. ascertain the profitability and soundness of an organization
CO6. practice financial accounting

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO MANAGERIAL ECONOMICS, DEMAND ANALYSIS (09 periods)

Definition, Nature and Scope of Managerial Economics.Demand: Determinants of demand – Demand function - Law of demand, assumptions and exceptions - Elasticity of demand - Types of elasticity of demand - Demand forecasting and methods of demand forecasting.

UNIT-II: THEORY OF PRODUCTION AND COST ANALYSIS (09 periods)

Production Function: Isoquants and Isocosts - Input-output relationship - Law of returns. Cost Concepts: Total, Average and Marginal Cost - Fixed Vs Variable costs - Opportunity Costs Vs Outlay Costs - Separable Costs Vs Joint Costs, Urgent Costs VsPostponable Costs- Avoidable Costs Vs Unavoidable Costs - Break Even Analysis (BEA) - Assumptions, Merits and demerits - Determination of Break Even Point (Simple problems).

UNIT-III: INTRODUCTION TO MARKETS AND PRICING (09 periods)

Market Structure: Types of Markets - Features of perfect competition - Monopoly and monopolistic competition - Price and Output determination in perfect competition, monopoly and monopolistic Markets.

Pricing :Objectives and policies of pricing - Sealed bid pricing - Marginal cost pricing - Cost plus pricing - Going rate pricing - penetration Pricing - skimming Pricing - Block pricing - Peak load pricing - Cross subsidization.

UNIT-IV: INTRODUCTION TO PRINCIPLES OF ACCOUNTING & CAPITAL (09 periods)

Accountancy: Introduction - Concepts - Conventions - Double Entry Book Keeping - Journal - Ledger - Trial Balance (Simple problems).

Capital: Significance - Types of capital - Sources of Capital.

UNIT-V: FINAL ACCOUNTS - COMPUTERIZATION OF ACCOUNTING SYSTEM (09 periods)

Introduction to Final Accounts - Trading account - Profit and Loss account and Balance Sheet with simple adjustments (Simple problems).

Computerization of Accounting System: Manual Accounting Vs Computerized Accounting - Advantages and Disadvantages of Computerized Accounting.

TEXT BOOKS:

1. A.R. Aryasri, *Managerial Economics and Financial Analysis*, Tata Mc- Graw Hill, New Delhi, 3rd edition, 2007.
2. R.Cauvery, U.K. Sudhanayak, M. Girija and R. Meenakshi, *Managerial Economics*, S. Chand and Company, New Delhi, 2nd edition, 2010.

REFERENCE BOOKS:

1. Varshaney and Maheswari, *Managerial Economics*, Sultan Chand and Sons, New Delhi, 19th edition, 2005.

2. Ms. Samba Lalita, *Computer Accouting Lab Work*, 1st edition, Kalyani Publishers, Ludhiana, 2009.
3. S.P. Jain and K.L. Narang, *Financial Accounting,* Kalyani Publishers, Ludhiana, 6th edition, 2002.

III B.Tech. - I Semester
(16BT50201) **CONTROL SYSTEMS**
(Common to EEE & ECE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Multivariable Calculus and Differential Equations, Transformation Techniques and Partial Differential Equations and DC Machines/Electrical Technology.

COURSE DESCRIPTION:
Concepts of control system, transfer function ofvarious physical systems, time response analysis, frequency responseanalysis, controller design, state space analysis.

COURSEOUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- the concepts of open and closed loop control systems.
- stability analysis in time and frequency domain.
- controllers and compensators to meet the desired speci fications.
- state variable techniques.

CO2. analyze
- time and frequency domain response of second order systems.
- stability analysis using root-locus, Bode and Nyquist plots.
- controllers and compensators to meet the desired response.
- state space representation from transfer function.

CO3. design a compensator to meet the design specifications of control system.

CO4. solve problems pertaining to control systems to provide feasible solutions inreal time environment.

CO5. selectappropriate techniques to solve control system problems in relevance to industry.

CO6. apply the conceptual knowledge of control systems in domestic and industrial applications.

DETAILED SYLLABUS:

UNIT-I: MATHEMATICAL MODELING OF SYSTEMS (11 periods)
Introduction to control systems. Basic elements of control system - open loop and closed loop systems. Effect of feedback.Modeling of physical systems - electrical systems, mechanical systems, analogous systems, armature control and field control of DC motor, DC servomotor. Transfer function - block diagram reduction techniques, signal flow graph.

UNIT-II: TIME RESPONSE AND STABILITY ANALYSIS (13 periods)
Various test signals and its importance. Time response of first and second order systems, Time-domain specifications, steady state response, steady state error and error constants, static and generalized error coefficients. Routh-Hurwitz stability criterion, Root locus technique- root locus diagram, rules to construct root loci, effect of pole zero additions on the root loci.

UNIT-III: FREQUENCY DOMAIN ANALYSIS (08 periods)
Performance specifications in the frequency domain. Stability analysis - Bode plot, Polar plot and Nyquist plot.

UNIT-IV: CONTROLLERS AND COMPENSATORS (06 periods)
Introduction to controllers, effect of P, PI and PID controllers. Compensators - lag, lead, lead-lag compensator design using Bode plot.

UNIT-V: STATE SPACE ANALYSIS (07 periods)
Transfer function vs state space representation. Concepts of state, state variables and state model.Modeling of physical system in state space. Transfer function to state model and vice-versa. State transition matrix and its properties. Controllability and observability using Kalman's test.

Total Periods: 45

TEXT BOOKS:

1. A. Anandkumar, *Control Systems*, PHI learning Pvt Ltd., 2nd edition, 2014.
2. Katsuhiko Ogata, *Modern Control Engineering,* Pearson Education Publishers, 5th edition, 2010.

REFERENCE BOOKS:

1. Nagrath I.J. and Gopal M, *Control Systems Engineering*, New Age International Publications, 5th edition, 2010.
2. Richard C. Dorf and Robert H. Bishop, *Modern Control Systems,* Prentice Hall, 12th edition, 2010.

3. Benjamin C.Kuo and FaridGolnaraghi, *Automatic Control Systems,* John Wiley & Sons Publications, 8th edition, 2002.
4. A.Nagoorkani, *Control Systems,* RBA Publications, 2nd edition, 2006.

III B.Tech. - I Semester
(16BT50202) **POWER ELECTRONICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Engineering Physics, Electrical Circuits and Electronic Devices & Circuits.

COURSE DESCRIPTION:
Power semiconductor devices; Silicon Controlled Rectifier - Turn-on methods, Triggering and commutation circuits for SCR; Single phase and three phase Rectifiers; AC voltage controllers; Cycloconverters; Choppers and Inverters.

COURSEOUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- •the characteristics of various power transistors.
- •operation, switching characteristics, ratings, protection and combinations of SCR.
- •various triggering methods and commutation techniques for SCR.
- •operation of line commutated converters and SCR based forced commutated converters.

CO2. analyze the performance of different power converters subjected to various loads.

CO3. design static and dynamic equalizing circuits, snubber circuits and commutating elements for protection and functionality of power electronic circuits.

CO4. investigate various configurations of power electronic circuits to provide feasible solutions.

CO5. select an appropriate power semiconductor device and/ or circuit for real time applications.

CO6. apply the conceptual knowledge of power semiconduc tor devices and/or circuitsin relevance to industry.

DETAILED SYLLABUS:

UNIT-I: POWER SEMICONDUCTOR DEVICES (11 periods)
Introduction, Power transistors - power BJT, power MOSFET, IGBT and their characteristics. Thyristor - basic theory and operation, static and dynamic characteristics, two transistor analogy, turn-on methods, UJT firing circuits, series and parallel operation, ratings, protection against dv/dt and di/dt, design of snubber circuit.

UNIT-II: PHASE CONTROLLED RECTIFIERS (11 periods)
Single phase controlled rectifiers: Introduction, half wave controlled rectifier, bridge connections - semi and fully controlled rectifiers with R and RL loads, derivation of average load volt age and current, effect of freewheeling diode, effect of source inductance. Three phase controlled rectifiers: Half and fully controlled rectifiers - midpoint connection with R load, Bridge connectionswith R and RL loads, derivation of average load voltage.

UNIT-III: DUAL CONVERTERS & AC VOLTAGE CONTROLLERS (07 periods)
Dual converters - circulating and non-circulating current modes of operation of single phase and three phase dual converters with R-Load. Single phase AC voltage controllers - two SCRs in anti-parallel with R and RL loads, derivation of rms load voltage and load current.
Cycloconverters - single phase midpoint and bridge type (step-up and step-down operations) with R and RL loads.

UNIT-IV: COMMUTATION CIRCUITS AND CHOPPERS (07 periods)
Thyristor forced commutation circuits. Chopper: step down and step up - operation,control strategies, derivation of load voltage and load currents with R and RL loads. Morgan's chopper, AC chopper.

UNIT-V: INVERTERS (09 periods)
Single phase inverters - basic operation, voltage source inverters, basic series and parallel inverters, current source inverter, voltage control by pulse width modulation techniques (single pulse, multiple pulse and sinusoidal). Three phase bridge Inverters - 180° and 120° conduction modes of operation.

Total Periods: 45

TEXT BOOKS:
1. Dr. P. S. Bimbhra, *Power Electronics*, Khanna Publishers, 4th edition, Delhi, 2008.
2. M. D. Singh & K. B. Kanchandhani, *Power Electronics,* Tata McGraw - Hill Publishing Company, 2013.

REFERENCE BOOKS:
1. K. L. Rao, Ch. Saibabu, *Theory of Power Electronics*, revised edition, S. Chand & Co. Ltd, New Delhi, 2009.
2. Mohan, Undeland, Robbins, *Power Electronics: Converters, Applications and Design*, 3rd edition, Wiley, 2007.

3. Muhammad H. Rashid, *Power Electronics Handbook*, 3rd edition, Butterworth-Heinemann, San Diego, 2010.

III B.Tech. - I Semester
(16BT50203) **SYNCHRONOUS MACHINES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Course onTransformers and Induction machines.

COURSE DESCRIPTION:
Construction, operation, characteristics, voltage regulation and parallel operation of alternators; operation and performance characteristics of synchronous motors; construction, operation, characteristics and applications of fractional kW motors.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- constructional details, working, characteristics and per formance of a three phase synchronous machine and fractional kilowatt motors.
- armature reaction, voltage regulation and synchronization of alternator.
- starting of a synchronous motor.
- parallel operation of alternators.

CO2. analyse the performance of synchronous and single phase machines for various operating conditions.

CO3. design suitable accessories/controllers for desired opera tion of synchronous machines.

CO4. solve problems pertaining to synchronous machines and fractional kWmotors to provide feasible solutions.

CO5. select appropriate techniques for control and operation of synchronous and fractional kW machines in relevance to industrial applications.

CO6. apply the conceptual knowledge of synchronous machines in relevance to industry.

DETAILED SYLLABUS:

UNIT-I: SYNCHRONOUS GENERATORS (11 periods)
Constructional details of synchronous machines. Armature windings- integral slot and fractional slot, distributed and concentrated, short pitch and full pitch, winding factors. EMF equation, harmonics in generated EMF, suppression of harmonics. Armature reaction and its effect for various operating power factors. Open circuit, short circuit and ZPF characteristics of synchronous machine - phasor diagrams.

UNIT-II: REGULATION OF SYNCHRONOUS GENERATOR (07 periods)
Voltage regulation - Synchronous impedance method, Ampere Turns method, ZPF method and new ASA method. Salient pole alternators - two-reaction theory, phasor diagrams, voltage regulation. Power flow equations in synchronous generator.

UNIT-III: PARALLEL OPERATION OF SYNCHRONOUS GENERATORS (11 periods)
Conditions for parallel operation, methods of synchronization. Synchronizing current, power and torque, rigidity factor. Effect of change of excitation and mechanical power input on parallel operation of two alternators, load sharing between two alternators, Synchronous machines on infinite bus bars. Short Circuit Ratio (SCR) and its significance, time period of oscillations.

UNIT-IV: THREE PHASE SYNCHRONOUS MOTORS (08 periods)
Principle of operation, starting methods - auxiliary-motor, damper winding, synchronous-induction motor. Phasor diagrams. Variation of current and power factor with excitation, synchronous condenser. Power flow equations in synchronous motor. Circle diagram - excitation and power circles. Hunting and its suppression.

UNIT-V: FRACTIONAL KILOWATT MOTORS (08 periods)
Single phase induction motor - constructional features, double revolving field theory. Principle, characteristics and applications of resistance split-phase motors, capacitor split phase motors, capacitor start & run split phase motors and shaded pole motor. Construction, principle, characteristics and applications of AC series motor, universal motor and reluctance motors.

Total Periods: 45

TEXT BOOKS:

1. P.S. Bimbhra, *Electrical Machinery*, Khanna Publishers, New Delhi, 7th edition, 2011.
2. JB Gupta, *Theory and performance of Electrical Machines (DC machines, Poly phase Circuits & AC machines) in SI Units,* S.K. Kataria & Sons, New Delhi, 15th edition, 2015.

REFERENCE BOOKS:

1. B.L. Theraja and A.K. Theraja, *A Text Book of Electrical Technology in S. I. Units*, Vol.2, S.Chand & Company Ltd, Multicolour edition, New Delhi, 2014.
2. P.S. Bimbhra, *Generalized Theory of Electrical Machines*, Khanna Publishers, Delhi, 7th edition, 2005.

III B.Tech.- I Semester
(16BT50204)**TRANSMISSION AND DISTRIBUTION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Generation of Electric Power, Electromagnetic Fields and Signals, Systems & Networks.

COURSE DESCRIPTION:
Parameters of overhead transmission lines and underground cables; Performance of transmission lines, travelling wave phenomenon; Types of insulators; Sag and corona; Distribution systems classification, analysis and its planning.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- classification of transmission and distribution systems
- parameters and configurations of transmission and distribution systems
- transients, corona and sag
- insulation system for cables and transmission lines

CO2. analyze
- the electrical and mechanical aspects of cables and transmission lines
- various distribution feeder configurations
- voltage drop and power loss in distribution system

CO3. design
- parameters for transmission lines and underground cables.
- substation feeders.

CO4. evaluate the parameters, performance& mechanical aspects of transmission lines, underground cables and distribution systems to provide feasible solutions.

CO5. select appropriate model for transmission and distribution systems while exercising modeling and planning of power system.

CO6. apply the conceptual knowledge of transmission and distribution systems in relevance to industry and society.

CO7. follow professional norms for voltage regulation in transmission and distribution systems.

DETAILED SYLLABUS:

UNIT-I: OVERHEAD TRANSMISSION LINE AND UNDERGROUND CABLES (10 periods)
TRANSMISSION LINES: Overhead line & underground cables and their types, Parameters resistance, inductance and capacitance calculations in single and three phase transmission lines, single and double circuits, symmetrical and unsymmetrical spacing, concepts of GMR and GMD, effect of earth on capacitance. Underground cables:Construction, types of insulating materials, classification of cables, laying of cables, insulation resistance, capacitance of single and 3-core belted cables.Grading of cables - capacitance and inter sheath grading.

UNIT-II: ANALYSIS OF TRANSMISSION LINES (10 periods)
Transmission lines:Classification - short line, medium line and long line.Equivalent circuits -end condenser, Nominal-T, Nominal-pie models. ABCD constants, voltage regulation and efficiency of transmission lines. Travelling waves on transmission lines:Travelling waves - open end line, short circuited line, line terminated through a resistor, line connected to a cable, T-junction.Beweley's Lattice diagram.

UNIT-III: MECHANICAL ASPECTS OF OVER HEAD LINE AND CORONA (09 periods)
Overhead transmission line: Line supports, overhead line insulators, types of insulators, string efficiency and methods for improvement. Sag in overhead line:Sag and tension calculations with equal and unequal heights of towers, effect of wind and ice on sag, stringing chart. Corona: Corona phenomenon - factors affecting corona, critical voltages and power loss, advantages and disadvantages.

UNIT-IV: DISTRIBUTIONSYSTEMS (08 periods)
Classification and Characteristics - residential, commercial, agricultural and industrial loads. Voltage drop calculations in DC distributors - radial DC distributor fed at one end, at both the ends (equal/unequal voltages)and ring main distributor.
Voltage drop calculations in AC distributors - power factors referred to receiving end voltage and respective load voltages.

UNIT-V: SUBSTATIONS AND DISTRIBUTION SYSTEM PLANNING (08 periods)
Classification of substations:Indoor and outdoor, gas and air insulated substations. Substation layout, different bus bar schemes, location of substations-rating of distribution substations, service area with 'n' primary feeders. Distribution System Planning:Factors affecting system planning, substation expansion, distribution system planning models, present distribution system planning techniques.

Total Periods: 45

TEXT BOOKS:
1. C.L.Wadhwa, *Electrical power systems*, New Age International Publishers, 6th edition, 2010.
2. TuranGonen, *Electric Power Distribution System Engineering*, McGraw Hill Book Company, 2nd edition, 2012.

REFERENCE BOOKS:

1. U.A.Bakshi and M.V.Bakshi, *Transmission and Distribution of Electrical Power*, 1st edition, Technical Publications, 2009.
2. B.Gupta, *A Course in Electrical Power,* S.K.Kataria & sons, New Delhi, 11th edition, 2009.
3. V.Kamaraju, *Electrical Power Distribution Systems*, McGraw Hill Education Private Limited, 1st edition, 2009.
4. V.K. Mehta and Rohith Mehta, *Principles of Power Systems*, S Chand & Company Ltd, New Delhi, 4th Multi colour illustrative edition, 2006.

III B.Tech.- I Semester

(16BT40502) DATABASE MANAGEMENT SYSTEMS

(Common to EEE & ME)

(Interdisciplinary Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:--

COURSE DESCRIPTION:

Database Systems; Database Design; Relational Model; SQL Queries, Constraints and Triggers; Schema Refinement and Normal Forms; Transaction Management; Concurrency Control; Overview of Storage and Indexing.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- Data models and Database Languages
- Database design
- Normal forms
- Storage and Indexing

CO2. analyze databases using normal forms to provide solutions for real time applications.

CO3. design solutions for database problems using database design, views design and framing queries.

CO4. use database techniques for designing databases, man aging databases and its security.

CO5. Select SQL, Hash based Indexing and Tree based Index ing to manage data in databases.

CO6. apply contextual knowledge to develop database applications related to societal applications like Information Retrieval Systems, Banking and Financial systems.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTIONTO DATABASE SYSTEMS AND DATABASE DESIGN (09 periods)

Database Systems: Database system applications, Purpose of database systems, View of data-Data abstraction, Instances and Schemas, Data models; Database languages - DDL,DML; Database architecture, Database users and administrators.

Database Design: ER diagrams, Beyond ER design, Entities, Attributes and entity sets, Relationships and relationship sets, Additional features of ER model, Conceptual design with ER model.

UNIT-II: THE RELATIONAL MODEL&RELATIONAL ALGEBRA AND CALCULUS (08 periods)

Relational Model: Integrity constraints over relations, Enforcing integrity constraints, Querying relational data, Logical database design, Introduction to views, Destroying/altering tables and views.

Relational Algebra and Calculus: Preliminaries, Relational Algebra operators; Relational Calculus - Tuple and Domain Relational Calculus; Expressive power of Algebra and calculus.

UNIT-III: SQL AND SCHEMA REFINEMENT (10 periods)

SQL: Form of basic SQL query- Examples of basic SQL queries; Nested queries- Introduction to nested queries, Correlated nested queries, Set-comparison operators; Aggregate operators, NULL values-Comparison using NULL values, Logical connectives AND, OR and NOT, Impact on SQL constructs, Outer joins, Disallowing NULL values; Complex integrity constraints in SQL ,Triggers and active databases.

Schema Refinement: Problems caused by redundancy, Decompositions, Problem related to decomposition, Functional dependencies, Reasoning about FDS, Normal forms - First, second and third normal forms, BCNF; Multi valued dependencies, Fourth normal form, Join dependencies, Fifth normal form.

UNIT-IV: TRANSACTIONS AND CONCURRENCY CONTROL (09 periods)

Transactions: Transaction concept, Transaction state, Implementation of atomicity and durability, Concurrent executions, Serializability, Recoverability, Implementation of isolation,Testing for serializability. Concurrency Control: Lock based protocols, Timestamp based protocols, Validation based protocols, Multiple granularity, Deadlock handling.

UNIT-V: STORAGE AND INDEXING (09 periods)

Storage and Indexing: Data on external storage, File organization and indexing - Clustered indexes, Primary and secondary indexes; Index data structures - Hash based indexing, Tree based indexing; Comparison of file organizations.

Tree Structured Indexing: Intuition for tree indexes, Indexed Sequential Access Method (ISAM), B+ Trees- A dynamic index structure; Search, Insert, Delete;B-Tree index files.

Total Periods: 45

TEXT BOOKS:

1. Raghu Ramakrishnan and Johannes Gehrke, *Database Management Systems,* Tata McGraw Hill, 3rd edition, 2014.
2. A.Silberschatz, H.F.Korth and S.Sudarshan, *Database System Concepts*, Tata McGraw hill, 5th edition, 2006.

REFERENCE BOOKS:

1. Ramez Elmasri and Shamkant B.Navathe, *Database Systems*, Pearson Education, 6th edition, 2013.
2. Peter Rob and Carlos Coronel, *Database Systems Design, Implementation and Management*, Cengage Learning, 7th edition, 2009.

III B.Tech.- I Semester

(16BT51003) **PRINCIPLES OF COMMUNICATIONS**

(Common to EEE and EIE)

(Interdisciplinary Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Course on Signals, Systems and Networks.

COURSE DESCRIPTION:
Fundamentals of Communications; Analog and digital communications - modulation and Demodulation Techniques; Information theory and coding.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate fundamental knowledge in
- •elements of communication systems.
- •amplitude, Frequency, and Phase Modulators and De modulators.
- •data transmission and detection of digital signals.
- •information theory and coding techniques.

CO2. perform analysis of different modulation techniques and calculate various performance parameters

CO3. design and develop modulators and demodulators for communication systems.

CO4. solve engineering problems for feasibility and provide optimal solutions in the area of Analog and Digital Communication Systems.

CO5. select the appropriate modulation and demodulation techniques for transmission and reception of signals.

CO6. follow standards while developing the communication systems.

DETAILED SYLLABUS:

UNIT-I: AMPLITUDE MODULATION **(10 periods)**
Block diagram of Electrical Communication System, Types of Communications, Need for Modulation, Types of Amplitude Modulation: AM, DSBSC, SSBSC, Power and BW requirements, generation of AM, DSBSC, SSBSC, Demodulation of AM: Diode detector, Product demodulation for DSBSC & SSBSC.

UNIT-II: ANGLE MODULATION **(09 periods)**
Frequency & Phase Modulations, Advantages of FM over AM, Bandwidth consideration, Narrowband and Wideband FM, generation and demodulation of FM, Comparison of FM & PM.

UNIT-III: PULSE MODULATION **(08 periods)**
Elements & Advantages of Digital communication systems, PAM, Regeneration of Base band Signal, PWM and PPM, Time Division Multiplexing, Frequency Division Multiplexing, Asynchronous Multiplexing.

UNIT-IV: DIGITAL TRANSMISSION **(10 periods)**
Pulse Code Modulation: Advantages, Block diagram of PCM, Quantization, effect of Quantization, Quantization error, DM, ADM and Comparison.

Digital Modulation: ASK, FSK, PSK, QPSK, DPSK, Modulation and Demodulation - Coherent and Non-coherent techniques.

UNIT-V: INFORMATION THEORY AND CODING **(08 periods)**
Concept of Information, Entropy and Rate of Information, Coding efficiency, Shannon-Fano and Huffman Coding, Error Control Coding, Error Detection and Correction Codes, Block Codes, Convolutional Codes.

Total Periods:45

TEXT BOOKS:

1. R.P. Singh and S D Sapre, *Communication Systems - Analog and Digital*, TMH, 2nd edition 2007.

2. Simon Haykin, *Communication Systems*, John Wiley, 2nd edition 2007.

REFERENCE BOOKS:

1. H. Taub and D. Schilling, *Principles of Communication Systems,* TMH, 2nd edition, 1991.
2. Sam Shanmugam, *Digital and Analog Communication Systems*, John Wiley, 2006.

III B.Tech. - I Semester

(16BT51041) SENSORS AND SIGNAL CONDITIONING

(Interdisciplinary Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses onElectrical Measurements and Linear & Digital ICs.

COURSE DESCRIPTION:
Principle of operation, construction, advantages, limitations and applications of resistive, inductive, capacitive, self-generating, digital and other sensors; Signal conditioning circuits and their operations.

COURSE OUTCOMES: On completion of the course, the students will be able to

CO1. demonstrate knowledge on
- various sensors.
- signal conditioning circuits.

CO2. analyze
- various sensors for measuring physical quantities.
- signal conditioning circuits.

CO3. design an appropriate instrumentation amplifiers for commercial applications.

CO4. evaluate physical quantities using sensors and signal conditioning circuits to provide feasible solutions.

CO5. select& use appropriate sensors for the measurement of physical quantities in domestic and industrial applications.

CO6. apply the conceptual knowledge of sensors and signal conditioning circuits in relevance to industry and society.

DETAILED SYLLABUS:

UNIT-I: RESISTIVE SENSORS (09 Periods)
Principle of transducers, classification, Factors influencing the choice of transducers. Potentiometers, Metal and semiconductor strain gauges-principle of operation, gauge factor, gauge sensitivity; Resistance temperature detectors, Thermistors, Light dependent resistors, resistive hygrometer.

UNIT-II: CAPACITIVE AND INDUCTIVE SENSORS (09 Periods)
Capacitor sensors: Variation in overlapping area, variation in dielectric constant, variation in distance between the plates of variable and differential capacitor. Frequency response of ca pacitive sensors.
Inductive sensors: Variable reluctance sensors, Eddy current sensors, Linear variable differential transformers, Synchros, Resolvers, Electromagnetic sensors based on Faraday's law, Hall effect sensors.

UNIT-III: SELF-GENERATING SENSORS (09 Periods)
Thermoelectric sensors: Thermoelectric effects, Thermocouple laws, Cold junction compensation, common thermocouples. Piezoelectric sensors-Piezoelectric effect, deformation modes, equivalent circuit, materials; Pyro electric Sensors-Pyro electric effect, materials; Photoelectric sensors-photovoltaic effect, materials; Magneto-strictive sensors.

UNIT-IV: DIGITAL AND OTHER SENSORS (09 Periods)
Digital transducers: Tachometer encoder, incremental encoder, absolute encoder. Semiconductor sensors- principle of operation and techniques; Film sensors-Thin film sensors, Thick film sensors; Fiber optic sensors-principle of operation, sensor technology; Ultrasonic sensors- principle of operation, sensing methods; Basics of SMART sensors.

UNIT-V: SIGNAL CONDITIONING (09 Periods)
Block diagram of signal conditioning, balance and deflection measurement in Wheatstone bridge, measurement of reactance; Push-pull bridge and Blumein bridge; Carrier amplifier, chopper amplifier, low drift amplifier and charge amplifier, Instrumentation amplifier.

Total Periods: 45

TEXT BOOKS:

1. Ramon Pallas-Areny and John G. Webster, *Sensors and Signal Conditioning*, John Wiley & Sons, Inc., 2nd edition, 2001.
2. A.K.Sawhney, *A Course in Electrical and Electronic Mea surements and Instrumentation*, Dhanpat Rai & Co., 19th edi tion,2015.

REFERENCE BOOKS:

1. D. V. S Murty, *Transducers and Instrumentation*, PHI Learning Private Limited, 2nd edition, 2010.
2. D. Patranabis, *Sensors and Transducers*, PHI Learning Pri vate Limited, 2nd edition, 2003.
3. John P. Bentley, *Principles of Measurement Systems*, Pearson Education, 4th edition, 2005.

III B.Tech. - I Semester
(16BT31501) **OPERATING SYSTEMS**
(Common EEE & EIE)
(Interdisciplinary Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: --

COURSE DESCRIPTION:
Operating systems operations, scheduling; Critical section problem, deadlocks; Paging, segmentation; File Concept, Disk scheduling; I/O interface; concepts of protection.

COURSE OUTCOMES: On Successful completion of the course, students will be able to

CO1. demonstrate knowledge on Operating system operations, services, file management, disk management, I/O management and protection.
CO2. identify the functionality involved in process management concepts like scheduling and synchronization.
CO3. design models for handling deadlock and perform memory management.
CO4. synthesize and apply programming API's to perform Pro cess management.
CO5. use appropriate protection tools to provide access con trol to Operating system users.

DETAILED SYLLABUS:

UNIT-I: OPERATING SYSTEMS OVERVIEW AND PROCESS MANAGEMENT (08 periods)

Operating systems, operations, Distributed systems, Special purpose systems, Operating systems services, Systems calls, Operating system structure.

Process Management: Process scheduling, Process Control Block, Inter process communication, Signals, Forks, Multithreading models, Threading issues, Scheduling criteria, Scheduling algorithms, Multilevel queue, Multilevel feedback queue.

UNIT-II: SYNCHRONIZATION AND DEADLOCKS (10 periods)

Synchronization: The critical-section problem, Peterson's Solution, Synchronization hardware, Semaphores, Classic problems of synchronization, Monitors.

Deadlocks: System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock detection, Deadlock avoidance, Deadlock recovery.

UNIT-III: MEMORY MANAGEMENT (09 periods)

Memory-Management Strategies: Swapping, Contiguous memory allocation, Paging, Structure of the page table, Segmentation.

Virtual Memory Management: Demand paging, Copy-on-Write, Page replacement Algorithms, Thrashing.

UNIT-IV: STORAGE MANAGEMENT (10 periods)

File System: File Concept, Access methods, Directory structure, File system structure, i-node, File Descriptors, File system implementation, Directory implementation, Allocation methods.

Secondary Storage Structure: Disk structure, Disk attachment, Disk scheduling, Swap-space management, Stable-storage implementation, Tertiary storage structure.

UNIT-V: I/O SYSTEMS AND PROTECTION (08 periods)

I/O Systems: I/O Hardware, Application I/O interface, Kernel I/O subsystem.

Protection: Goals of protection, Principles of protection, Domain of protection, Access matrix, Implementation of access matrix, Access control, Revocation of access rights.

Total Periods: 45

TEXT BOOK:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, *Operating System Principles*, Wiley India Edition, 7th edition, 2011.

REFERENCE BOOKS:

1. William Stallings, *Operating Systems, Internals and Design Principles*, Pearson Education, 7th edition, 2013.
2. Andrew S. Tanenbaum, *Modern Operating Systems*, PHI, 3rd edition, 2009.

III B.Tech. - I Semester
(16BT50231) **CONTROL SYSTEMS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Courses on Signals, Systems and Networks, DC Machines, Transformers & Induction Machines, Analog Electronic Circuits and Linear & Digital ICs.

COURSE DESCRIPTION:
Open and closed loop systems; DC and AC servo motor; stability analysis for mechanical and electrical systems; process control system; design of compensators.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- open and closed loop systems
- stability analysis of a given system
- process control
- speed control of DC motor
- compensators

CO2. analyze
- characteristicsof AC and DC servomotors
- stability of the system using root locus, Bode and Nyquist plots
- time and frequency domainspecifications of second order system
- concept of controllability and observability of the system

CO3. design
- compensators& controllers to analyze the stability of the system
- ladder network for PLC to verify boolean expressions

CO4. interpret the experimental investigations to provide feasible solutions using the concepts of control engineering.

CO5. select and apply appropriate technique for solving complex problems in control systems.

CO6. apply the conceptual knowledge of control systems in relevance to industry and society.

CO7. commit to ethical principles and standards while exercising the practical investigations on control systems.

CO8. work individually or in a group in the domain of control systems.

CO9. communicate effectively in verbal and written form in relevance to control systems.

DETAILED SYLLABUS:
Conduct any TEN experiments from the following:

1. Programmable logic controller - study and verification of truth tables of logic gates, simple Boolean expressions and application of speed control of motor.
2. Effect of feedback on DC servomotor.
3. Determination of transfer function for a given Mechanical/Electrical system.
4. Performance Characteristics of DC and AC servomotor.
5. Time response of second order system.
6. Determination of time domain specifications for unit step input using MATLAB.
7. Stability analysis of Mechanical and Electrical systems.
8. Study and analysis of second order system using frequency response and determination of transfer function from Bode plot.
9. Effect of P, PI and PID controllers on a second order system (Hardware/Software).
10. Lag, Lead and Lag-lead compensation of a linear time invariant system using Bode plot.
11. Analysis of a physical system using MATLAB.
    - Transfer function to state space and Vice versa
    - Controllability and observability
    - Implementation using SIMULINK
12. Design of P, PI and PID controllers for a time delayed systems.
13. Balance control of rotary inverter pendulum using LABVIEW.
14. Performance analysis of water tank level controller.

III B.Tech. - I Semester

(16BT50232) **SYNCHRONOUS MACHINES LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Course on Transformers and Induction Machines Lab

COURSE DESCRIPTION:
Construction, performance and parallel operation of alternators; V and inverted-V curves for synchronous motor; determination of equivalent circuit and performance characteristics of single phase induction motors.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- construction and operation of 3-phase synchronous machines and 1-phase motors.
- V and inverted-V curves of synchronous motor.
- parallel operation of 3-phase synchronous generators.
- characteristics of synchronous machines.

CO2. analyze the performance of synchronous and fractional kW machines for various operating conditions.

CO3. design the circuit with suitable accessories / controllers for desired operating conditions of synchronous and fractional kW machines.

CO4. interpret and synthesize the data obtained from experimentation on synchronous and fractional kW machines to provide valid conclusions.

CO5. select and apply appropriate technique for testing and control of synchronous and fractional kW machines for domestic and industrial applications.

CO6. apply the conceptual knowledge of synchronous and fractional kW machines in relevance to domestic and industrial needs.

CO7. follow ethical principles and standards while exercising the practical investigations on synchronous and fractional kW machines.

CO8. work individually or in a group while exercising practical investigations in the field of synchronous and fractional kW machines.

CO9. communicate effectively in verbal and written form in relevance to synchronous and fractional kW machines.

DETAILED SYLLABUS:

PART - A:

1. constructional details of alternator.
2. constructional details of single phase induction motor.

PART - B: Conduct any EIGHT experiments

1. Regulation of a three phase alternator by E.M.F and M.M.F. methods.
2. Regulation of three phase alternator by Z.P.F. and A.S.A methods.
3. Efficiency of a three phase alternator.
4. Determination of Xd and Xq of a salient pole synchronous machine.
5. Parallel operation of alternators.
6. V and inverted V curves of a three phase synchronous motor.
7. Determination of sequence impedance of a three phase alternator.
8. Equivalent circuit of a single phase induction motor.
9. Brake test on single phase induction motor.
10. Performance characteristics of Schrage motor.
11. Performance characteristics of Universal motor.

III B.Tech. - I Semester

(16BT4HS31) **SOFT SKILLS LAB**

(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: English Language Laboratory in I B.Tech or English Laboratory at Diploma Level.

COURSE DESCRIPTION:

This course covers Body Language; Assertiveness; Goal Setting; Creative Thinking; Interpersonal Skills; Team Work; Conflict Management; Etiquette; Report Writing; Group Discussions; Interviewing Skills.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge in
- Goal Setting
- Creative Thinking
- Leadership Skills and
- Team Work

CO2. analyse the situations and develop skills for
- Body Language
- Personality Development and
- Stress Management

CO3. apply the techniques of soft skills in a problem situation enhanced through multimedia software.

CO4. function effectively as an individual and as a member in diverse teams.

CO5. communicate effectively in public speaking in formal and informal forums.

LIST OF EXERCISES:

1. Body Language
2. Assertiveness
3. Goal Setting
4. Creative Thinking
5. Interpersonal Skills
6. Team Work
7. Conflict Management
8. Etiquette
9. Report Writing
10. Resume Writing
11. Group Discussions
12. Interviewing Skills

Total Lab Slots: 10

REFERENCE BOOKS:

1. R. C. Sharma & Krishna Mohan, *Business Correspondence and Report Writing*, Tata McGraw-Hill Publishing Company Limited, 3rd edition, New Delhi, 2012.
2. Gopalswamy Ramesh and Mahadevan Ramesh, *The Ace of Soft Skills*, Pearson, Noida, 2010.
3. Jeff Butterfeild, *Soft Skills for Everyone, Cengage learning*, Delhi, 2011.
4. Barun K. Mitra, *Personality Development and Soft Skills*, Oxford University Press, Noida, 2012

SUGGESTED SOFTWARE:

1. ETNL Language Lab Software Version 4.0
2. GEMS - Globarena E- Mentoring System
3. Speech Solutions.
4. English Pronunciation Dictionary by Daniel Jones.
5. Learning to Speak English 8.1, The Learning Company – 4 CDs.
6. Mastering English: Grammar, Punctuation and Composition.
7. English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
8. Dorling Kindersley Series of Grammar, Punctuation, Composition etc.
9. Language in Use 1, 2 & 3.
10. Cambridge Advanced Learner's Dictionary - 3rd Edition.
11. Centronix - Phonetics.
12. Let's Talk English, Regional Institute of English South India.

13. Ultimate English Tutor.

III B.Tech.- II Semester
(16BT5HS01) **MANAGEMENT SCIENCE**
(Common to ECE, EEE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: --

COURSE DESCRIPTION:
Concepts of Management; Environmental Scanning; Concepts Related to Organization; Operations Management; Work Study; Statistical Quality Control; Inventory Management; Marketing; Human Resource Management; Project Management; Project Crashing; Entrepreneurship; Contemporary Management Practices.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate the concepts of operations management, human resources management, project management and contemporary management practices in managerial con text.

CO2. identify and analyse management problems in the busi ness organizations reaching substantiated conclusions using principles of management.

CO3. design appropriate organization structure for meeting the needs of the organization with consideration of the employees of the organization.

CO4. competently employ broad based analytical tools for decision making, system design, analysis and performance.

CO5. provide solution to organizations for sustainable development.

CO6. apply knowledge of engineering and management prin ciples to manage the projects in multidisciplinary envi ronments.

DETAILED SYLLABUS:

UNIT-I:INTRODUCTION TO MANAGEMENT AND ORGANIZATION (09 periods)
Concepts of management and Administration, Nature and Importance of management, Evolution of management thought, Functions of management, Contributions ofF.W. Taylor and Henry Fayol to the management, Systems approach to management, Managerial skills, Elements of corporate planning process, Environmental scanning, SWOT Analysis, Social responsibilities of management.
Basic concepts related to organization, Objectives and Principles, Types of organizations- Line Organization, Line and Staff Organization, Functional Organization, Matrix Organization, Network organization.

UNIT-II: OPERATIONS MANAGEMENT (12 periods)
Plant location- Factors and Principles; Plant Layout- Principles and Types; Methods of production, Work study- Basic procedure involved in method study and work measurement; Statistical Quality Control- Factors affecting quality, Control charts for variables and attributes, Acceptance sampling; Materials management- objectives, Inventory- Types of inventory, Classical EOQ model, ABC analysis; Purchase procedure, Stores management, Marketing- Functions, Channels of distribution.

UNIT-III: HUMAN RESOURCE MANAGEMENT (HRM) (06 periods)
Nature and scope of HRM, Functions of HRM, Role of HR Manager in an organization, Job evaluation, Merit rating, Maslow's hierarchy of human needs, McGregor's theory X and theory Y, Herzberg's two-factor theory of motivation.

UNIT-IV: PROJECT MANAGEMENT (PERT/CPM) AND ENTREPRENEURSHIP (09 periods)
Network analysis - Critical path method (CPM), Program evaluation and review technique (PERT); Project cost analysis - Project crashing. Introduction to Entrepreneurship, Entrepreneurial Traits, Entrepreneur vs Manager, Role of Entrepreneurship in Economic Development, Women as an Entrepreneur.

UNIT-V: CONTEMPORARY MANAGEMENT PRACTICES (09 periods)
Basic concepts of Material Requirements Planning, Enterprise resource planning (ERP), Just In Time (JIT) system, Total Quality Management (TQM), Value Chain Analysis, Business Process Outsourcing (BPO), Globalization, Management Challenges, Supply Chain Management (SCM), Role of Information Technology in managerial decision making, Six Sigma Concept, Maintenance Strategies- Preventive, Periodic and Breakdown Maintenance..

Total Periods: 45

TEXT BOOKS:

1. O.P. Khanna, *Industrial Engineering and Management*, Dhan- pat Rai and Sons, 2010.
2. MartandT.Telsang, *Industrial Engineering and Production Management*, S. Chand, 2nd edition, 2006.

REFERENCE BOOKS:

1. Koontz and Weihrich, Essentials of Management, TMH, 6th edition, New Delhi, 2007.

2. N.D. Vohra, *Quantitative Techniques in Management*, TMH, 2nd edition, New Delhi.

III B.Tech - II Semester

(16BT60201) **POWER SEMICONDUCTOR DRIVES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:Courses on Power Electronics, Synchronous Machines and Control Systems.

COURSE DESCRIPTION:
DC drives: Rectifier fed and Chopper fed drives; AC Drives: Induction motor drives, Synchronous and Stepper motor drives.

COURSEOUTCOMES:On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- dynamics of electrical drives.
- operation and speed control of various DC & AC drives.
- open loop and closed loop control of DC & AC drives.

CO2. analyze single and multi-quadrant operations of DC & AC drives with speed-torque characteristics.
CO3. design and develop various configurations of power elec tronic converters for AC & DC drives.
CO4. investigateopen and closed loop operations of various drives using different speed control techniquesto enhance the drive performance.
CO5. applyappropriate power converters for controlling the drives in real time applications.
CO6. apply the conceptual knowledge of power semiconduc tor drivesin relevance to industry and society.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO ELECTRICAL DRIVES (08 periods)
Concept of electrical drives.Dynamics of electrical drives - fundamental torque equations, speed-torque conventions and multi-quadrant operation; Load torques - components, nature and classification.Steady state stability.Electric braking methods - regenerative dynamic and plugging.Modes of operation of electrical drive. Speed control and drive classifications, closed loop control of drives.

UNIT-II: SINGLE PHASE AND THREE PHASE CONVERTER FED DC DRIVES (11 periods)
Introduction to DC drives, control of DC separately excited motor by single-phase and three-phase half and full converters - voltage and current waveforms for continuous and discontinuous motor currents, speed-torque equations and characteristics. Dual converter control of DC separately excited motor.

UNIT-III: DC CHOPPER FED DRIVES (08 periods)
Control of DC separately excited motor by one, two and four quadrant choppers, voltage and current waveforms for continuous conduction mode. Closed loop model of separately excited DC motor, closed loop speed control scheme.

UNIT-IV: INDUCTION MOTOR DRIVES (10 periods)
Introduction, stator voltage control by AC voltage controllers.Stator frequency control - slip speed control, torque and power limitations, modes of operation.Variable frequency control by voltage source inverters (VSI), current source inverters (CSI).Static rotor resistance control. Slip power recovery schemes - static Scherbius drive, static Kramer drive.

UNIT-V: SYNCHRONOUS AND STEPPER MOTOR DRIVES (08 periods)
Modes of variable frequency control. Operation of self-controlled synchronous motors byVSI, CSI. Load commutated CSI fed synchronous motor drive - operation and waveforms. Stepper motor drives - torque Vs stepping rate characteristics, drive circuits. **Total Periods: 45**

TEXT BOOKS:
1. Gopal K. Dubey, *Fundamentals of Electric Drives*, Narosa Publications, 2nd edition, 2004.
2. VedamSubramaniam, *Electric drives (concepts and applications)*,Tata Mc Graw-Hill Education, 2011.

REFERENCE BOOKS:
1. Gopal K. Dubey, *Power Semiconductor Controlled Drives*, Prentice-Hall International, 1989.
2. Paresh C. Sen, *Thyristor DC Drives*, Wiley-Interscience, 1981.

III B.Tech.- II Semester

(16BT60202) **POWER SYSTEM ANALYSIS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Matrices & Numerical Methods, Electric Circuits and Transmission and Distribution.

COURSE DESCRIPTION:

Per unit representation; Symmetrical component theory; Sequence networks for power system networks; Formulation of bus impedance and admittance matrices; Computation of power flow using various numerical techniques; Analysis of various faults; Power system stability analysis.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- per unit representation, symmetrical component theory and sequence network representation of power system networks.
- formation of power system network matrices.
- load flow studies.
- various faults.
- power system stability.

CO2. analyze
- the power system network for sequence network rep resentation.
- the power system networks for the formation of bus impedance and admittance matrices.
- the load flow problem of a power system network for different conditions.
- various faults.
- the stability of the power system under different oper ating conditions.

CO3. evaluate
- per unit quantities for various power system components and networks.
- thepower system network for various planning strategies and provide a feasible solution.

CO4. apply appropriate techniques/methods to analyze power system network operating under various conditions.

CO5. apply the conceptual knowledge of power system analysis to assess and analyze a power system for various scenarios.

DETAILED SYLLABUS:

UNIT-I: PER UNIT SYSTEMS AND SYMMETRICAL COMPONENT THEORY (10 periods)

Per unit system representation, advantages, per unit equiva lent reactance representation of power system components. Symmetrical component theory - voltages, currents and impedances.Sequence representation of power system components - generators, transformers, transmission line, load and networks.

UNIT-II: POWER SYSTEM NETWORK MATRICES (08 periods)

Bus admittance matrix - Direct inspection method.Bus impedance matrix- Formation of Zbus matrix for partial network, algorithm for the modification of bus impedance matrix - addition of element from a new bus to reference, new bus to an old bus, between an old bus & reference and between two old buses.

UNIT-III: POWER FLOW STUDIES (12 periods)

Introduction, derivation of static load flow equations. Load flow solution using Gauss-Seidel method, Newton-Raphson method - with and without PV bus, Decoupled and Fast decoupled methods (maximum of 3-buses for one iteration only). Algorithm and flowcharts, Comparison of different load flow methods.

UNIT-IV: FAULT ANALYSIS (08 periods)

Introduction, Unsymmetrical faults - LG, LL, LLG - with and without fault impedance. Symmetrical fault - LLL & LLLG faults. Symmetrical fault analysis using Zbus, short circuit current and MVA calculations.

UNIT-V: POWER SYSTEM STABILITY (07 periods)

Elementary concepts of stability.Steady state stability - power limit, transfer reactance, power angle curve, derivation of swing equation.Transient stability - equal area criterion, applications - critical clearing angle, critical clearing time. Methods to improve stability - auto re-closure and fast operating circuit breakers.

Total Periods: 45

TEXT BOOKS:

1. C. L. Wadhwa, *Electrical Power Systems*, New Age International (P) Limited publishers, New Delhi, 6th edition, 2010.
2. P. Venkatesh, B.V. Manikandan, S. Charles Raja and A. Srin- ivasan, *Electrical power systems analysis, Security and de-regulation*, PHI learning private limited, Delhi, 2014.

REFERENCE BOOKS:

1. G. W. Stagg and A.H. El-Abiad, *Computer Methods in Power System Analysis*, Mc Graw-Hill, New Delhi, International student edition, 1968.
2. John J. Grainger and William D. Stevenson, JR, *Power System Analysis*, Mc Graw-Hill Education (India) Pvt. Limited, 1994.
3. HadiSaadat, *Power System Analysis*, Tata Mc Graw-Hill Pub lishing Company Limited, New Delhi, 2nd edition, 2002.

III B.Tech. - II Semester

(16BT50501) **COMPUTER NETWORKS**

(Interdisciplinary Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:Course on Computer Architecture and Organization

COURSE DESCRIPTION:

Introduction to Computer Networks; The Physical Layer; The Data Link Layer; The Medium Access Control Sublayer; The Network Layer; The Transport Layer; The Application Layer.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on:
- Functionalities of Various OSI and TCP/IP layers
- 3G Mobile phone networks, 802.11
- TCP,UDP and SMTP

CO2. analyze the issues related to data link, medium access and transport layers by using channel allocation and connection management schemes.

CO3. design and compute subnet masks and addresses for networking requirements.

CO4. solve problems related to Flow control, Error control, congestion control and Network Routing.

CO5. apply Network Standards - 802.3 and 802.11 for developing computer Networks.

CO6. assess the impact of wired and wireless Networks in the context of societal applications like VoIP, Multi-user Net work Games, Internet of Things.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION AND PHYSICAL LAYER (09 periods)

Introduction: Network hardware, Network software, Reference models - OSI, TCP/IP; Example networks - Internet; Wireless LANs - 802.11.

Physical Layer: Guided transmission media, Wireless transmission.

UNIT-II: DATA LINK LAYER AND MEDIUM ACCESS CONTROL SUBLAYER (10 periods)

Data Link Layer: Data link layer design issues, Error detection and correction-CRC, Hamming codes, Elementary data link protocols, Sliding window protocols.

Medium Access Control Sublayer: ALOHA, Carrier sense multiple access protocols, Collision-free protocols, Ethernet, Data link layer switching-Repeaters, Hubs, Switches, Routers, and Gateways.

UNIT-III: NETWORK LAYER (10 periods)

Network layer design issues, Routing algorithms - Shortest path, Flooding, Distance vector, Link state routing, Hierarchical, Broadcast, Multicast, Anycast; Congestion control algorithms, Network layer in the internet - The IP version 4 protocol, IP addresses, IP version 6, Internet control protocols.

UNIT-IV: TRANSPORT LAYER (09 periods)

UDP - Segment header, Remote procedure call, Real-time transport protocols; TCP - service model, Protocol, Segment header, Connection establishment, Connection release, Sliding window, Timer management, Congestion control.

UNIT-V: APPLICATION LAYER (07 periods)

Domain Name System (DNS)-Name space, Domain resource records, Name servers; Electronic mail-Architecture and services, User agent, Message formats, Message transfer, Final delivery; The World Wide Web- Architectural overview, HTTP. **Total Periods: 45**

TEXT BOOK:

1. Andrew S. Tanenbaum and David J. Wetherall, *Computer Networks*, Pearson Education, 5th edition, 2015.

REFERENCE BOOKS:

1. Behrouz A. Forouzan, Data Communication and Networking, Tata Mc Graw-Hill, 4th edition, 2010.
2. James F. Kurose and Keith W. Ross, Computer Networking: A Top-Down Approach Featuring the Internet, Pearson Education, 2nd edition, 2012.

III B.Tech.- II Semester

(16BT61001) **ARM PROCESSORS & PIC MICROCONTROLLERS**

(Common to EEE & EIE)

(Interdisciplinary Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Course on Switching theory and logic design.

COURSE DESCRIPTION:
ARM Processors architecture, Programming, PIC microcontroller architecture, Interrupts and timers of PIC microcontroller, Interfacing.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge in ARM Processors architecture, PIC architecture, Pin out, Instruction set.

CO2. analyze various design issues regarding usage of on chip resources and Low power modes.

CO3. design embedded systems using ARM Processors and PIC microcontrollers to suit market requirements.

CO4. solve engineering problems and arrive at solutions in de signing embedded Systems.

CO5. use on-chip resources to design embedded systems with an understanding of limitations.

CO6. practice professional engineering to deliver efficient and cost effective microcontroller based products.

DETAILED SYLLABUS:

UNIT-I: PIC MICROCONTROLLER ARCHITECTURE (10 Periods)
Microcontrollers vs general purpose microprocessor, Overview of PIC18 family, WREG register in PIC, PIC file register, Default access bank, PIC status register, Data formats and directives, Program counter and program ROM space, Arithmetic, Logic instructions, Branch, call and time delay instructions, I/O port programming, PIC18 pin description, Bit addressability of data RAM, bank switching, Macros and modules.

UNIT-II: TIMERS, SERIAL PORT AND INTERRUPTS (09 Periods)
Programming timers 0 and 1, Counter programming, Programming timers 2 and 3, Basics of serial communication, PIC18 connection to RS232, Serial port programming in assembly, PIC18 interrupts, Programming timer interrupts, Programming serial interrupts.

UNIT-III: PERIPHERALS AND INTERFACING (07 Periods)
7 segment LED and LCD interfacing, keyboard interfacing, interfacing ADC, DAC, Interfacing stepper motor, DC motor interfacing and PWM.

UNIT-IV: INTRODUCTION TO ARM PROCESSORS (09 Periods)
Introduction to ARM Cortex M3 processor, Background of ARM and ARM architecture, Cortex M3 Processor applications, Cortex M3 fundamentals, registers, Operation modes, Memory system, memory map, Memory system attributes, ARM Pipeline, Exception types.

UNIT-V: ARM PROGRAMMING (10 Periods)
Data transfer instructions, Pseudo Instructions, Data Processing Instructions, Call & unconditional Branch Instructions, Decisions & conditional Branch instructions, Several useful instructions in Cortex M3, ARM Assembly Language Programming, Thumb Instruction Set, ARM Mode & Thumb mode Programming, ARM Programming in C. **Total Periods: 45**

TEXT BOOKS:

1. Muhammad Ali Mazidi, Rolin D. McKinlay, Danny causey, *PIC Microcontroller and Embedded Systems*: Using C and PIC18, Pearson Education, 2008.
2. Joseph Yiu, The Definitive Guide to the *ARM Cortex-M3 & M4*, Elsevier, 3rd edition, 2013.

REFERENCE BOOKS:

1. Andrew Sloss, Dominic Symes, Chris Wright, ARM System Developer's Guide: *Designing and Optimizing System Software (The Morgan Kaufmann Series in Computer Architecture and Design)*, 2004.
2. John.B. Peatman, *Design with PIC Microcontroller*, Pearson education, 1988.

III B.Tech.- II Semester

(16BT61041) PROGRAMMABLE LOGIC CONTROLLERS

(Interdisciplinary Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Course on Switching Theory and Logic Design.

COURSE DESCRIPTION:
Introduction to PLC; PLC ladder diagrams; programming PLC; timers, counters and sequences used in PLC; data handling functions; Bit Patterns; advanced PLC functions.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on programmable logic controllers, various functions of PLCs.
CO2. analyze the process of automation using PLCs.
CO3. design skills in automating a process control.
CO4. solve engineering problems in industries using PLCs.
CO5. select suitable PLC with an understanding of limitations.
CO6. practice professional engineering to deliver efficient and cost effective designs for society and domestic applications.

DETAILED SYLLABUS:

UNIT-I:PLC BASICS AND PROGRAMMING (09 periods)

Introduction, PLC advantages, disadvantages, PLC system, CPU, I/O modules and interfacing, power supplies, Programming equipment, Programming formats, Construction of PLC ladder diagrams, Devices connected to I/O modules. Input instructions, Outputs, Operational procedures, Programming examples using contacts and coils, Fail-Safe Circuits, Drill press operation.

UNIT-II: LADDER DIAGRAMS, REGISTERS AND TIMER FUNCTIONS (09 periods)

Digital logic gates, Boolean algebra PLC programming, Conversion examples. Ladder Diagrams for process control: Ladder diagrams & sequence listings, ladder diagram construction and flowchart for spray process system. Characteristics of Registers, module addressing, holding registers, Input Registers, Output Registers.Timer function & Industrial applications, Counter function & industrial applications.

UNIT-III: INTERMEDIATE AND DATA HANDLING FUNCTIONS (09 periods)

Intermediate functions: Arithmetic functions, Number comparison functions, Number conversion functions. Skip, Master control relay, Jump functions. PLC data move systems: Move function, FIFO, FAL, ONS, CLR & Sweep functions and their applications.

UNIT-IV: PLC FUNCTIONS WORKING WITH BITS (08 periods)

Bit Pattern, Changing a register bit status, Shift register functions and applications, Sequencer functions and applications, Controlling of two-axis & three axis Robots with PLC, Matrix functions.

UNIT-V: ADVANCED PLC FUNCTIONS (10 periods)

Analog modules & systems, Analog signal processing, Multi-bit Data Processing, Analog output application examples, PID principle, position indicator with PID control, PID Modules, PID tuning, PID functions, Networking of PLCs, Alternative Programming languages, PLC auxiliary commands and functions.

TEXT BOOK:
1. John W. Webb & Ronald A. Reiss, *Programmable Logic Con-trollers Principles and Applications*, PHI, 5th edition, 2002

REFERENCE BOOK:
1. M.Chidambaram, *Computer Control of Process*, Narosa, 2nd edition, 2003.

III B.Tech.- II Semester

(16BT51241) **OBJECT ORIENTED PROGRAMMING**

(Interdisciplinary Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: --

COURSE DESCRIPTION:
Introduction of Java, Classes and Objects; Inheritance, Packages, Interfaces; Exception handling, Multithreading; Event handling, AWT, Collection Classes; Applets, Servlets.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. demonstrate knowledge on:
- Object Oriented Programming concepts - classes, objects, inheritance, polymorphism, encapsulation and abstraction.
- Packages, interfaces, multithreading, exception handling, event handling.

CO2. analyze complex engineering problems using object oriented concepts.

CO3. design and develop reusable code to provide effective solutions for real world problems using inheritance and polymorphism.

CO4. apply AWT and Applets to create interactive Graphical User Interfaces.

CO5. use advanced programming languages to develop web applications.

CO6. build Java Applications suitable for societal requirements.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION (10 periods)
Data types, Variables, Arrays, Operators, Control statements. Classes and Objects: Concepts of Classes, Objects, Constructors, Methods, this keyword, Garbage collection, Overloading Methods and Constructors, Parameter passing, Access control, Recursion, String Class.

UNIT-II: INHERITANCE, PACKAGES AND INTERFACES (09 periods)
Inheritance: Inheritance basics, Super keyword, Multi-level hierarchy, Abstract classes, Final keyword with inheritance.
Packages: Definition, Creating and accessing a package, Understanding CLASSPATH, Importing packages.
Interfaces: Definition, Implementing interfaces, Nested interfaces, Applying interfaces, Variables in interface and Extending interfaces.

UNIT-III: EXCEPTION HANDLING AND MULTITHREADING (08 periods)
Exception Handling: Concepts of exception handling, Exception types, Usage of Try, Catch, Throw, Throws and Finally, Built in exceptions, Creating own exception sub classes.
Multithreading: Java thread model, Creating threads, Thread priority, Synchronizing threads,Inter-thread communication.

UNIT-IV: COLLECTION CLASSES, THE APPLET CLASS AND AWT (10 periods)
Collection Classes: Array List Class, LinkedList Class, Hash set Class, LinkedHashSet Class, TreeSet Class, PriorityQueue Class, EnumSet Class.
The Applet Class: Types of applets, Applet basics, Applet architecture, Applet skeleton, Passing parameters to applets.
AWTControl Fundamentals:User interface components, Layout managers.

UNIT-V: EVENT HANDLING AND SERVLETS (08 periods)
Delegation event model: Event classes, Event Listener Interfaces - Mouse and Key; Adapter classes.
Servlets: Life cycle of a servlet, Using Tomcat for Servlet development, Create and compile the servlet source code, Servlet API, Javax.Servlet package.

Total Periods: 45

TEXT BOOK:

1. Herbert Schildt, *Java the Complete Reference*,Oracle Press, 9th edition, 2014.

REFERENCE BOOK:
1. SachinMalhotra and SaurabChoudhary, *Programming in Java*, Oxford University Press, 2nd edition, 2014.

III B.Tech.-II Semester

(16BT60203) DESIGN AND ESTIMATION OF ELECTRICAL SYSTEMS

(Program Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:Course on Electrical and Electronic workshop practice.

COURSE DESCRIPTION:

Design and estimation of residential & commercial buildings, overhead transmission & distribution lines and industrial buildings; Light sources, principals of light & design, types of lamps; electric heating, welding and their applications.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- electrical wiring of residential & commercial and indus trial buildings.
- material and size of conductors for overhead transmission & distribution lines.
- light sources and illumination.
- electric heating & welding.

CO2. analyze
- estimation of residential & commercial buildings, over head transmission & distribution lines and industrial buildings.
- proper illumination strategy for effective lighting.
- heating and welding schemes for industrial purpose.

CO3. design of electrical wiring for residential & commercial buildings and industrial buildings, overhead transmission & distribution lines and suitable illumination system for effective lighting.

CO4. solve engineering problems pertaining to utilization of electrical energy and provide feasible solutions.

CO5. apply suitable electric wiring, heating, welding and illumination techniques for domestic and industrial applications.

CO6. apply the conceptual knowledge of utilization strategies and techniques in relevance to industry and society.

CO7. adhere the constraints and standards for applications of electric energy in different fields.

DETAILED SYLLABUS:

UNIT-I: DESIGN AND ESTIMATION OF RESIDENTIAL AND COMMERCIAL BUILDINGS (11 periods)

Introduction to residential wiring system, systems of distribution of electric energy, methods of wiring, systems of wiring, choice of wiring, rating of wires and cables, load calculations and selection of size of conductor, Introduction to estimation & costing, sequence to be followed for preparing estimate, recording of estimates, determination of required quantity of material, preparation of detailed estimates and costing of residential and commercial building. General idea about IE rule, Indian electricity act and major applicable I.E rules

UNIT-II: DESIGN AND ESTIMATION OF OVERHEAD TRANSMISSION & DISTRIBUTION LINES (09 periods)

Introduction, typical AC electrical power system, main components of overhead lines, conductor materials, determination of size of conductor for overhead transmission line, conductors configuration spacing and clearances, span lengths, testing and commissioning of overhead distribution lines, some important specifications, preparation of detailed estimates and costing of overhead transmission and distribution lines.

UNIT-III: DESIGN AND ESTIMATION OF INDUSTRIAL NETWORK INSTALLATION (09 periods)

Introduction and classification of industrial buildings, design process, Industries with less than or equal to 1MVA and above 1MVA load, selection of distribution architecture, selection of transformer substations, selection of drives, selection of switch gears.

UNIT-IV: PRINCIPLES OF LIGHT AND DESIGN (10 periods)

Light sources, colour characteristics, terms used in illumination, laws of illumination, polar curves, photometry - integrating sphere. Types of lamps, LED lights, photometric analysis, lighting calculations, average lumen method, light loss factor, quality of lighting, design procedures, arrangement of fixtures, factory lighting, street lighting and flood lighting.

UNIT-V: ELECTRIC HEATING AND ELECTRIC WELDING (06 periods)

ELECTRIC HEATING: Design of heating element, advantages, methods and applications - resistance, induction and dielectric heating.

ELECTRIC WELDING: Classification, resistance and arc welding, electric welding, comparison between AC and DC welding.

Total Periods: 45

TEXT BOOKS:

1. J.B.Gupta, A Course in *Electrical Installation Estimating and Costing*, S.K.Kataria and Sons, Reprint edition, 2013.
2. M. K. Giridharan, *Electrical Systems Design*, I K International Publishing House Pvt. Ltd, 3rd edition, 2015.

REFERENCE BOOKS:

1. Hemant Joshi, Residential - *Commercial and Industrial Electrical Systems: Network and Installation(Volume 1)*, Mc Graw Hill Education, 21st edition, 2007.

2. Hemant Joshi, Residential - Commercial and Industrial Electrical Systems: Network and Installation(Volume 2), Mc Graw Hill Education, 21st edition, 2007.
3. J.B.Gupta, *Utilization of Electric Power and Electric Traction*, S.K.Kataria and Sons, 10th edition, 2013.

III B.Tech. - II Semester

(16BT60204) **DIGITAL SIGNAL PROCESSING FOR ELECTRICAL ENGINEERS**

(Program Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Signals, Systems &Networks and Power Electronics.

COURSE DESCRIPTION:
Discrete-time signals and systems; Discrete Fourier series, Discrete Fourier Transforms (DFT) and Fast Fourier Transform (FFT) algorithms for the analysis of discrete time sequences; design and realization of Digital IIR and FIR filters; DSP based control of stepper motors; DSP based implementation of DC-DC buck-boost converters.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- digital signals and systems
- DFT and FFT
- analog & digital filter
- digital filter realization

CO2. Analyze discrete time signals and systems using DFT and FFT techniques.
CO3. design and realize IIR and FIR digital filters using different techniques.
CO4. evaluate the Discrete Fourier Transform (DFT) of a sequence and use the DFT to compute the convolution of two sequences and plot the frequency response of lin eartime-invariant systems.
CO5. Use relevant DSP controllers and techniques for applica tions in power electronics and electrical machines.
CO6. apply the conceptual knowledge of digital signal processing in relevance to industry and society.

DETAILED SYLLABUS:

UNIT-I: FUNDAMENTALS OF DSP **(07 periods)**
Review of discrete time signals and systems, Solutions for difference equation of discrete time systems, frequency response of discrete time signals, A/D and D/A conversion, Introduction to DSP system with block diagram.

UNIT-II: FOURIER TRANSFORMS **(12 periods)**
Discrete Fourier series - Introduction to discrete Fourier series and its properties.
Discrete Fourier Transforms - Introduction, relation with other transforms, properties, circular and linear convolution. Fast Fourier Transforms - Radix-2 Decimation in time and Decimation in frequency algorithms.

UNIT-III: DIGITAL FILTERS **(10 periods)**
Digital Vs Analog filters, advantages and disadvantages of digital filters, Realization of Digital filters using Direct form-I and Direct form-II structures.

IIR Digital Filters:
Analog low pass filter design: Butterworth and Chebyshev low pass filters. Design of IIR filter from analog filters using Impulse Invariance and Bilinear transformation techniques. Frequency transformation in digital domain.

UNIT-IV: FIR DIGITAL FILTERS **(08 periods)**
Linear phase FIR filters and its frequency response, location of zeros in linear phase FIR filters, Fourier series method for design of FIR filters. Design of FIR filters using windows -Rectangular, Triangular, Hamming and Blackmann windows.

UNIT-V:TMSLF2407 DSP CONTROLLERS **(08 periods)**
Introduction to peripherals - types of physical memory - software used (Preliminary approach). DSP based control of stepper motors - principle of hybrid stepper motors - basic operation, stepper motor drive system, implementation of stepper motor control system using LF2407 DSP controller. DSP based implementation of DC-DC buck boost converters - introduction, converter structure, continuous and discontinuous conduction modes, connecting DSP to buck-boost converter, controlling the buck-boost converter.

Total Periods: 45

TEXT BOOKS:
1. A.Anandkumar, *Digital signal processing*, PHI Learning Private limited, New Delhi,2013.
2. Hamid A. Toliyat, Steven G. Campbell, *DSP based electromechanical motion control*, CRC Press Special Indian edition, 2012.

REFERENCE BOOKS:

1. John G. Proakis, Dimitris G. Manolakis, *Digital Signal Processing, Principles, Algorithms and Applications*, Pearson Education/PHI, 4th edition, 2007.
2. Alan.V. Oppenheim, Ronald.W. Schafer, John R Buck, *Discrete Time Signal Processing*, Prentice Hall, 2nd edition, 2006.

III B.Tech. - II Semester
(16BT60205) **ELECTRICAL MACHINE DESIGN**
(Program Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Course on Synchronous Machines.

COURSE DESCRIPTION:
Electrical machine design concepts; Design of transformers, DC machines, Induction machines and Alternators.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on design concepts of various types of electrical apparatus.
CO2. analyze the specific electric& magnetic loading characteristics for performance evaluation.
CO3. design a suitable electrical machine for domestic and industrial needs.
CO4. investigate and interpret the design data for evaluating the performance of electrical apparatus to provide valid conclusions.
CO5. apply appropriate technique/procedure for designing electrical apparatus.

DETAILED SYLLABUS:
UNIT-I: INTRODUCTION (08 periods)
Major considerations in electrical machine design, electrical engineering materials, space factor, choice of specific electrical and magnetic loadings, leakage reactance calculation. Thermal considerations, heat flow, temperature rise, rating of machines and standard specifications.
UNIT-II: DC MACHINES (08 periods)
Output equations, main dimensions, magnetic circuit calculations, Carter's coefficient, net length of iron, real & apparent flux densities, selection of number of poles, design of armature, design of commutator and brushes, performance prediction using design values.
UNIT-III: TRANSFORMERS (09 periods)
Output equations, main dimensions, kVA output for single and three phase transformers, window space factor, overall dimensions, operating characteristics, regulation, no load current, temperature rise in transformers, design of tank, methods of cooling of transformers.
UNIT-IV: INDUCTION MOTORS (10 periods)
Output equation of induction motor, main dimensions, length of air gap, rules for selecting rotor slots of squirrel cage machines, design of rotor bars & slots, design of end rings, design of wound rotor, magnetic leakage calculations, leakage reactance of poly phase machines, magnetizing current, short circuit current, circle diagram, operating characteristics.
UNIT-V: SYNCHRONOUS MACHINES (10 periods)
Output equations, choice of loadings, design of salient pole machines, short circuit ratio, shape of pole face, armature design, armature parameters, estimation of air gap length, design of rotor, design of damper winding, determination of full load field mmf, design of field winding, design of turbo alternators, rotor design. **Total Periods: 45**

TEXT BOOKS:
1. A.K. Sawhney, A. Chakrabarthi , A Course in *Electrical Machine Design*, 6th edition,Dhanpat Rai & Co, Delhi, 2013.
2. M.V.Deshpande, *Design and Testing of ElectricalMachines*, PHI learning Pvt. Ltd, New Delhi, 3rd edition, May 2010.

REFERENCE BOOKS:
1. R.K. Agarwal, *Principles of Electrical Machine Design*, 5th edition, S.K.Kataria & Sons, New Delhi, 2014.

2. V.N.Mittle, Arvind Mittal, *Design of Electrical Machines*, 5th edition, Standard publications, New Delhi, 2013.
3. A. NagoorKani, *A Simplified Text in Electrical Machine Design*, 2nd edition, RBA publications, Chennai 2017.

III B.Tech. - II Semester
(16BT60206) **HVDC TRANSMISSION**
(Program Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PREREQUISITES: Courses on Power Electronics and Transmission & Distribution.

COURSE DESCRIPTION:
Need for HVDC Transmission, planning and modern trends; Analysis and control of power converters; Harmonics; Characteristics and design of filters; Faults and protection of converters.

COURSEOUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on
- different types of HVDC transmission system, various converter configurations and their control.
- effects of harmonics, faults and their control methods.

CO2. analyze
- different converter configurations.
- different control and protection strategies in HVDC system.
- power flow in HVDC transmission system.

CO3. demonstrate skills in designing filter circuits for minimizing harmonics.
CO4. solve problems in HVDC transmission to provide viable solutions.
CO5. select and apply appropriate devices, schemes and techniques for real time applications in HVDC transmission.
CO6. apply the conceptual knowledge of HVDC transmission in relevance to industry and society.

DETAILED SYLLABUS:
UNIT-I: INTRODUCTION TO HVDC TRANSMISSION (08 periods)
Need for HVDC transmission, apparatus required for HVDC transmission system, types of DC links, comparison of EHVAC and HVDC transmission systems, applications of HVDC transmission system, planning and modern trends in HVDC transmission system.
UNIT-II: STATIC POWER CONVERTER ANALYSIS (10 periods)
Introduction, analysis of Graetz circuit, characteristics of 6 pulse & 12 pulse converters, commutation process, rectifier and inverter operation, equivalent circuit for converters, special features of converter transformers.
UNIT-III: CONTROL OF HVDC CONVERTER AND SYSTEMS (10 periods)
Principle of DC link control, constant current, constant extinction angle and constant ignition angle control, individual phase control and equidistant firing angle control. Effect of source inductance on the system. Starting and stopping of DC link. Power flow control.
UNIT-IV: HARMONICS AND FILTERS (09 periods)
HARMONICS: Generation of harmonics, characteristic harmonics, calculation of AC harmonics, non-characteristic harmonics, effects of harmonics, calculation of voltage and current harmonics, effect of pulse number on harmonics.
FILTERS: Types of AC filters, filter characteristics, design of single tuned filters, design of high pass filters, DC filters.
UNIT-V: CONVERTER FAULTS AND PROTECTION (08 periods)
Converter faults, over voltages in converter station, protection against over current and over voltage in converter station, surge arresters, protection of DC line, DC breakers. **Total Periods: 45**

TEXT BOOKS:
1. K.R. Padiyar,HVDC Power Transmission Systems,New Academic Science, 2nd edition, 2011.
2. Sunil S Rao, EHV-AC, HVDC Transmission and Distribution Engineering, Khanna Publishers, 3rd edition, 2001.

REFERENCE BOOKS:

1. E. Uhlman, *Power Transmission by Direct Current*, Springer Verlag, Berrlin/Heedelberg 1975.
2. Jos Arillaga, *High Voltage Direct Current Transmission, The Institute of Electrical Engineers*, London, United Kingdom, 2nd edition, 1998.
3. E. W. Kimbark, *Direct current Transmission*, John Wiely & Sons, New York.

III B.Tech.- II Semester

(16BT60207) **ADVANCED CONTROL SYSTEMS**

(Common to EEE & EIE)

(Program Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PREREQUISITES:Course on Control systems

COURSE DESCRIPTION:

Design of compensators and controllers, state space, canonical forms, controllability and observability, describing function, phase plane analysis, Lyapunov's stability analysis, Full order observer and reduced order observer.

COURSEOUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- state space analysis.
- various compensators and controllers.
- stability in the sense of Lyapunov.
- full and reduced order observers in state space analysis.

CO2. analyze the stability of nonlinear system using
- describing function approach.
- phase plane analysis.
- Lyapunov's method.

CO3. design suitable compensator and controllers using root locus and Bode plot.

CO4. evaluate stability of systems using pole placement and Lyopunov method to provide valid solutions.

CO5. select appropriate techniques for analyzing the stability of the system.

CO6. apply the conceptual knowledge of advanced control systems in relevance to industry and society.

DETAILED SYLLABUS:

UNIT-I: LINEAR CONTROL SYSTEM DESIGN (10 periods)

Introduction to control system design, types of compensators, design of compensators using root locus technique. Types of controllers, design of PI, PD and PID controllers using Bode plot and root locus technique.

UNIT-II: STATE SPACE ANALYSIS (08 periods)

Review of state space analysis. Canonical forms - Controllable canonical form, observable canonical form, Jordan canonical form. Tests for controllability and observability for continuous time systems - Time varying case, time invariant case, principle of duality, controllability and observability form Jordan canonical form.

UNIT-III: ANALYSIS OF NONLINEAR SYSTEMS (13 periods)

Introduction to non-linear systems, different types of physical nonlinearities, describing functions, derivation of describing functions for dead zone, saturation, backlash, relay and hysteresis. Stability analysis of nonlinear systems through describing functions, phase-plane analysis, singular points, methods for constructing trajectories - Isoclines' method, delta method.

UNIT-IV:STABILITY ANALYSIS (06 periods)

Stability in the sense of Lyapunov.Lyapunov's stability and Lypanov's instability theorems.Direct method of Lypanov for the linear and nonlinear continuous time autonomous systems.Generation of Lyapunov functions - Variable gradient method, Krasooviski's method and Popov's criterion.

UNIT-V:DESIGN OF CONTROL SYSTEMS IN STATE SPACE (08 periods)

Necessity of pole placement, design by pole placement, necessary and sufficient conditions for arbitrary pole placement. Determination of feedback gain matrix using direct substitution method and Ackermann's formula. Full order observer and reduced order observer. **Total Periods: 45**

TEXT BOOKS:

1. M. Gopal, *Modern Control System Theory*, New Age International (P) Ltd., 2nd edition, 2000.
2. K. Ogata, *Modern Control Engineering*, Prentice Hall of India, 4th edition, 2006.

REFERENCE BOOKS:

1. A. Nagoorkani, Advanced control theory, RBA publications, 2nd edition, 1999.
2. I.J. Nagrath and M.Gopal, *Control Systems Engineering*, New Age International (P) Ltd., 2007.

III B.Tech.- II Semester

(16BT60208) HIGH VOLTAGE ENGINEERING

(Program Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PREREQUISITES: Courses on Engineering Physics, Engineering Chemistry, Electromagnetic Fields and Electrical Measurements.

COURSE DESCRIPTION:

Types of insulation systems; Breakdown process in solid, liquid and gaseous dielectrics; Generation of high AC and DC voltages, Impulse voltages and currents; Measurement of high voltage, current, resistivity, dielectric constant and loss factor; Testing of electrical apparatus.

COURSE OUTCOMES: on successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- various insulation systems and their behavior under voltage stress.
- generation and measurement of high voltages and cur rents.
- testing of various high voltage electrical apparatus.

CO2. analyze
- breakdown phenomenon in different insulation systems.
- circuits for generation of high voltage and currents.
- methods of measuring high voltage quantities.

CO3. design circuits for high voltage generation, measurement and testing.
CO4. evaluate different parameters in high voltage engineering to provide valid conclusions.
CO5. select suitable testing and diagnostic techniques for the high voltage apparatus.
CO6. apply contextual knowledge of high voltage engineering to sustain industrial needs.
CO7. follow the appropriate standard for testing of high volt age apparatus.

DETAILED SYLLABUS:

UNIT-I: BREAKDOWN PHENOMENA (09 periods)

Introduction to High Voltage engineering, electrical field stresses.

Gaseous dielectrics: primary and secondary ionization processes, criteria for gaseous insulation breakdown mechanism- Townsend's theory, streamer's theory, corona discharges, breakdown in electro negative gases, Paschen's law and its significance, time lags of breakdown.

Breakdown in solid dielectrics: Intrinsic Breakdown, avalanche breakdown, thermal breakdown and electro mechanic breakdow.

Breakdown of liquid dielectrics: Suspended particle theory, electronic Breakdown, cavity breakdown, electro convection breakdown.

UNIT-II: GENERATION OF HVAC AND HVDC (08 periods)

Generation of HVAC: Need for cascade connection and working of transformer units connected in cascade; Series resonant circuit -principle of operation, Tesla coil.

Generation of HVDC: Voltage doubler circuit, Cockroft-walton type high voltage DC set, Vande-graaff generator, calculation of high voltage regulation, ripple and optimum number of stages for minimum voltage drop.

UNIT-III: GENERATION OF IMPULSE VOLTAGE AND CURRENT (08 periods)

Introduction to standard lightning and switching impulse voltages, analysis of single stage impulse generator-expression for output impulse voltage.Multistage impulse generator - working of Marx impulse, rating of impulse generator, components of multistage impulse generator, triggering of impulse generator by three electrode gap arrangement, trigatron gap and oscillograph time sweep circuits.Generation of switching impulse voltage and high impulse current.

UNIT-IV: MEASUREMENT OF HIGH VOLTAGES (08 periods)

Chubb and Fortescue method for HVAC measurement, generating voltmeter - Principle & construction.Series resistance micro ammeter for HVDC measurements, standard sphere gap measurements of HVAC, HVDC, and impulse voltages, factors affecting the measurements. Potential dividers-resistive, capacitance and mixed RC.Measurement of high impulse currents-rogowsky coil and magnetic Links.

UNIT-V: HIGH VOLTAGE TESTS ON ELECTRICAL APPARATUS (12 periods)

Measurement of DC resistivity, measurement of dielectric constant and loss factor, partial discharge measurements.Testing of electrical apparatus - insulators, bushings, isolators, circuit breakers, cables, transformers and surge arresters; radio interference measurements. **Total Periods: 45**

TEXT BOOKS:

1. M.S. Naidu and V.Kamaraju, *High Voltage Engineering*, 5th edition, Tata Mc Graw-Hill Publications, 2013.
2. E.Kuffel, W.S.Zaengl and J.Kuffel, *High Voltage Engineering*: Fundamentals, 2nd edition,2005.

REFERENCE BOOKS:

1. C.L.Wadhwa, *High Voltage Engineering*, 2nd edition, New Age International (P) Limited, 2007.
2. Mazen Abdel-Salam, Hussein Anis, Ahdab *El-Morshedy, RoshdyRadwan, High Voltage Engineering Theory and Practice*, 2nd edition (Revised & Expanded) Marcel-Dekker Publishers(Special Indian Edn.).
3. L.L.Alston, *High Voltage Technology*, Oxford University Press, 1st Indian edition, 2011.

III B.Tech.- II Semester

(16BT60209) **INSTRUMENTATION**

(Program Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PREREQUISITES: Courses on Analog Electronic Circuits, Electrical Measurements, Computer Architecture and Organization.

COURSE DESCRIPTION:

Principle of operation, advantages and limitations of various types of electronic and digital instruments for measurement of electrical quantities; Storage oscilloscopes, Data acquisition, display devices and recorders.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstration knowledge on
- various types of electronic and digital instruments.
- signal analyzers and storage oscilloscopes.
- data acquisition systems, display devices and recorders.

CO2. analyze
- various types of electronic and digital instruments.
- signal analyzers and storage oscilloscopes.
- display devices, recorders and various data acquisition systems.

CO3. design an appropriate display system for industrial and commercial applications.

CO4. estimate the magnitude, phase, frequency and spectrum of signal with oscilloscope to provide feasible solution.

CO5. selectan appropriate instrumentation principles and tech niques to substantiate the industrial requirements.

CO6. apply the conceptual knowledge of various instrumentation principles and techniques in relevance to industry.

DETAILED SYLLABUS:

UNIT-I: ELECTRONIC INSTRUMENTS (10 periods)

Electronic voltmeter using rectifiers, AC voltmeter - Average, Peak and true RMS voltmeters; Electronic multi meters-electronic ohm meter; Vector impedance meter, Vector voltmeters, Q meter-measurement of low, high impedance and band width, errors.

UNIT-II: DIGITAL INSTRUMENTS (09 periods)

Basic digital instrument. Digital frequency meter - Period and Time interval measurement; Digital phase meter, Capacitance meter, Digital Tachometer, Digital LCR meter, LCR Bridge, Characteristics of digital meters, specification of DVM, Digital multi meter. Microprocessor based ramp type DVM.

UNIT-III: SIGNAL ANALYZERS & STORAGE OSCILLOSCOPES (10 periods)

Analyzers-Resonant wave analyzers, Frequency-selective analyzers, Heterodyne analyzers, Application of wave analyzers; Harmonic distortion analyzers, Total Harmonic distortion analyzers, logic analyzers,Power analyzers. Spectrum analyzers-basic spectrum analyzers, spectra of different signal. Storage oscilloscope-Sampling oscilloscope, digital storage oscilloscope, electronic switch, oscilloscope probes.

UNIT-IV: DATA ACQUISITION SYSTEMS (09 periods)

Generalized data acquisition system and its components, Types of multiplexing systems - time division and frequency division multiplexing; Digital data acquisition system, use of data acquisition systems and recorders in digital systems, Digital recording systems -block diagram and its working; modern digital DAS- Analog Multiplexer operation, Operation of Sample- Hold circuits.

UNIT-V: DISPLAY DEVICES AND RECORDERS (07 periods)

Display devices-LED, LCD, LVD,VDU; Recorders- graphic, ultraviolet and magnetic tape recorders, digital tape recorders, biomedical recorders. **Total Periods: 45**

TEXT BOOKS:

1. A.K.Sawhney, A course on *Electrical and Electronics Measurements & Instrumentation*, DhanpatRai and Co. Publishe- rs,19th edition, 2015.

2. J.B. Gupta, A course on *Electrical and Electronics Measure ments & Instrumentation*, S.K. Kataria publishers, 14th edit- ion, 2015.

REFERENCE BOOKS:

1. H. S. Kalsi, *Electronic Instrumentation*-by Tata MC Graw Hill Company, 3rd edition, 2010.
2. D.V.S Murthy, *Transducers and Instrumentation*, Prentice Hall of India, New Delhi, 2nd edition,2010.

III B.Tech.- II Semester

(16BT60210) **SPECIAL ELECTRICAL MACHINES**

(Program Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PREREQUISITES: Course on Synchronous Machines

COURSE DESCRIPTION:

Construction, operation, types, characteristics and applications of Stepper Motors, Switched Reluctance Motor, PM Brushless DC Motor, Synchronous Reluctance, Linear Induction and synchronous Motors.

COURSEOUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- construction and operation of various types of special electrical machines.
- characteristics of special electrical machines.
- open loop and closed loop operation of special electrical machines.

CO2. analyze the operation and performance of special electrical machines for various operating conditions.

CO3. design suitable accessories / controllers for desired op eration and control of special electrical machines.

CO4. solve engineering problems pertaining to special electri cal machines to provide feasible solutions.

CO5. Select and apply appropriate technique and tools for con trol and operation of special electrical machines in domestic and industrial applications.

CO6. apply the conceptual knowledge of special electrical machines in relevance to industry and society.

DETAILED SYLLABUS:

UNIT-I:STEPPER MOTOR (09 periods)

Types of construction and working principle of stepping motor. Various configurations for switching the phase windings, torque equation and characteristics. Open loop and closed loop control of stepper motor, applications.

UNIT-II:SWITCHED RELUCTANCE MOTOR (09 periods)

Construction details, Principle of operation - Design of stator and rotor pole arcs - torque equation and characteristics, power converter for switched reluctance motor, control of switched reluctance motor, rotor sensing mechanism.

UNIT-III: SYCHRONOUS RELUCTANCE MOTOR (09 periods)

Constructional features, Types – Axial and Radial flux motors.

Principle of operation, torque-speed characteristics, Phasor diagram, Characteristics, control of SyRM, advantages and applications.

UNIT-IV:PERMANENT MAGNET BRUSHLESS DC MOTOR (09 periods)

Permanent magnet materials-hysteresis loop, analysis of magnetic circuits. Constructional details, principle of operation, BLDC square wave motor, types of BLDC motor, sensing and switching logic schemes, sensorless and sensor based control of BLDC motors.

UNIT-V:LINEAR MOTORS (09 periods)

Linear Induction Motor (LIM): Construction, principle of operation- single sided and double-sided LIM, thrust equations and performance equations based on current sheet concept, equivalent circuit of LIM, applications.

Linear Synchronous Motor (LSM): Construction, types, principle of operation, thrust equation, control and applications. **Total Periods: 45**

TEXT BOOKS:

1. K. VenkataRatnam, *Special electrical machines*, University press, New Delhi, 2009.
2. E.G. Janardhanan, *Special electrical machines*, PHI learning private limited, 2014.

REFERENCE BOOKS:

1. Takashi Kenjo, *Stepping Motors and their Microprocessor controls*, clarenden press, Oxford, 1984.

2. T. Kenjo and S. Nagamori, *Permanent-Magnet and Brushless DC Motors*, clarenden press, Oxford, 1984.
3. T.J.E. Miller, *Brushless Permanent Magnet and Reluctance Motor Drives*, clarenden press, Oxford 1989.
4. R. Krishnan, *Switched Reluctance Motor Drives - Modeling, Simulation, analysis, Design and Applications*, CRC press, Special Indian Edition, 2015.

III B.Tech.- II Semester

(16BT60231) **POWER ELECTRONICS AND DRIVES LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	--	--	3	2

PREREQUISITES: Courses on Transformers & Induction Machines and Power Electronics.

COURSE DESCRIPTION:
Characteristics of power switching devices; Triggering and commutation circuits of SCR; working of various power electronic converters and AC & DC drives.

COURSE OUTCOMES:On successful completion of the course, students will be able to

CO1. demonstrate knowledge on characteristics of power switching devices, their triggering and commutation circuits, various converters and drives.
CO2. analyse physical observations and measurements of vari ous parameters related to powerswitching devicwes, converter circuitsand drives.
CO3. design, validate and applydifferent triggering and commutation circuits for SCR.
CO4. interpret and synthesize the data obtained from experi mentation on power electronic devices / circuits / drives to provide valid conclusions.
CO5. select an appropriate power switching device and/or cir cuit for real time applications.
CO6. apply the conceptual knowledge of power semiconduc tor drives in relevance to industry and society.
CO7. commit to ethical principles and standards while exercising the practical investigations on power electronics and drives.
CO8. work individually or in a group in the field of Powerelectronics and drives.
CO9. communicate effectively in verbal and written form in relevance to power electronics and drives.

DETAILED SYLLABUS:

PART-A:Any Seven of the experiments to be conducted from PART-A.

1. Characteristics of SCRand TRIAC.
2. Characteristics of Power MOSFET and IGBT.
3. Gate firing circuits for SCR (R, RC and UJT).
4. Forced commutation circuits for SCR.
5. Single phase half and full controlled bridge converter with R and RL loads.
6. Three phase semi-controlled bridge converter with R and RL loads.
7. Single phase dual converter with RL loads.
8. DC Jones chopper with R and RL Loads.
9. Single phase AC voltage controller with R and RL Loads.
10. Single phase cycloconverter with R and RL loads.
11. Single phase parallel inverter with R and RL loads.

PART-B:Any Three of the experiments to be conducted from PART-B.

1. Speed control of separately excited DC motor using single phase full converter.
2. Four quadrant chopper fed DC drive.
3. Speed control of single phase induction motor using cycloconverter.
4. Three phase fully controlled rectifier fed separately excited DC motor.
5. Speed control of single phase induction motor using IGBT based PWM inverter.

III B.Tech.- II Semester
(16BT60232) **POWER SYSTEM - I LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	--	--	3	2

PREREQUISITES:Course on Transmission &Distribution and Power System Analysis.

COURSE DESCRIPTION:
Experimentation on Transmission and distributionsystems; Load flow, Fault and Stability analysis.

COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on transmission & distribution systems and various types of power system analysis for experimental implementation.
CO2. analyze, evaluate and relate experimental observations and measurements for validation.
CO3. design a suitable measuring and testing setup for experimentation on power systems.
CO4. interpret the data obtained from experimentation to provide valid conclusions
CO5. select and apply appropriate technique for solving complex problems in the power systems.
CO6. apply the conceptual knowledge of power systems in relevance to industry and society
CO7. commit to ethical principles and standards while exercising the practical investigations on power system.
CO8. work individually or in a group while exercising practical investigations in the field of power system analysis.
CO9. communicate effectively in verbal and written form in relevance to power system.

DETAILED SYLLABUS:

Conduct any **TEN** exercises from the following

1. Determination of transmissionline parameters.
2. Performance of a transmission line for different load conditions.
3. Corona characteristics.
4. Determination of efficiencyof string insulator.
5. Power angle characteristicof salient pole synchronous machine.
6. Performance characteristics of distribution system.
7. Formation of Ybus.
8. Formation of Zbus
10. Fault analysis.
11. Rotor dynamics using swing equation.
12. Transient stability analysis.

III B.Tech.- II Semester

(16BT60233) **SEMINAR**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
--	100	100	--	--	--	2

PREREQUISITES:
All the courses of the program up to III B. Tech. - I Semester.

COURSE DESCRIPTION:
Identification of topic for the seminar; Literature survey; Performing critical study and analysis of the topic identified; Preparation of report and presentation.

COURSE OUTCOMES:
Completion of the seminar work enables a successful student to demonstrate:

CO1. Knowledge on the seminar topic.
CO2. Analytical ability exercised during the seminar work.
CO3. Ability to investigate and solve complex engineering problems faced during the seminar work.
CO4. Ability to apply techniques to complex engineering activities with an understanding of limitations as applied in the seminar work.
CO5. Ability to function effectively as an individual as experienced during the seminar work.
CO6. Ability to present views cogently and precisely on the seminar topic.
CO7. Ability to engage in life-long leaning as experience during the seminar work.

IV B.Tech - I Semester
(16BT70201) **POWER SYSTEM OPERATION AND CONTROL**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PREREQUISITES: Courses on Transmission & Distribution and Control Systems.

COURSE DESCRIPTION:
Load forecasting; Optimal operation of generators in thermal power station; Optimal scheduling of hydrothermal system; Unit commitment; Modeling of Power system components; Reactive power and Voltage control; Load frequency control.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on:
- load forecasting methods.
- characteristics, scheduling and optimal operation of thermal and hydro power plants
- unit commitment.
- modeling of power system components for LFC and AVR studies.
- concepts of reactive power and voltage control.
- load frequency control in single - and two-area systems.

CO2. analyze
- the criteria for optimal operation of thermal and hydro thermal plants with and without transmission losses.
- unit commitment of thermal units.
- compensation and tap settings required for reactive power and voltage control
- LFC parameters in single - and two-area power system.

CO3. design suitable strategy to control reactive power, voltage and LFC dynamics in power system.

CO4. evaluate various operational parameters for scheduling & economic operation and control of power system to provide viable solution.

CO5. apply appropriate tools and techniques for secured operation and control of power system.

CO6. apply the conceptual knowledge of power system operation and control in relevance to industry and society.

DETAILED SYLLABUS:

UNIT-I: PLANNING AND ECONOMIC OPERATION OFTHERMAL POWER SYSTEM (12 Periods)

Planning: Load curves, importance of load forecasting, quadratic, simple regression and exponential curve fitting techniques of forecasting.

Economic Operation of thermal plants: Characteristics of thermal plants. Optimum allocation with and without transmission losses, loss coefficients, general transmission line loss formula.

UNIT-II: HYDROTHERMAL SCHEDULING (07 Periods)

Introduction, classification of hydro plants, scheduling of hydro plants - long-term, short-term, scheduling energy.Hydrothermal scheduling - problem formulation, objective function, operational constraints. Short term scheduling - Lagrange function, iteration method, penalty factor.

UNIT-III: UNIT COMMITMENT (07 Periods)

Unit commitment Vs Economic dispatch.Constraints in unit commitment - start-up and shut-down costs, up time and down time. Unit commitment solution methods - priority list method, dynamic Programming method (maximum of three plants for three operating hours only).

UNIT-IV: REACTIVE POWER AND VOLTAGE CONTROL (08 Periods)

Introduction, reactive power and voltage control in transmission lines - Line compensation, Load compensation and Static compensation. Voltage control methods - Excitation systems - AC, DC and Static types. Tap-changing transformers. Components and block diagram representation of IEEE type-1 excitation system, AVR model.

UNIT-V: LOAD FREQUENCY CONTROL IN POWER SYSTEM (12 Periods)

Load frequency control of single area system: Necessity of keeping frequency constant, LFC Model - speed governor, turbine - reheat and non-reheat, generator-load model. steady state response - uncontrolled and controlled case, dynamic response. Load frequency control and economic dispatch control. Load frequency control of two area system: Block diagram representation, uncontrolled and controlled case, tie-line bias control. State space representation and optimal controller.

TEXT BOOKS: **Total Periods: 45**

1. K. Uma Rao, *Power system operation and control*, Wiley India Pvt. Ltd, 1st edition, 2013.
2. A. Chakravarthi and S. Halder, *Power System Analysis Operation and Control*, Prentice Hall India, 3rd edition, 2006.

REFERENCE BOOKS:

1. C.L.Wadhwa, *Electrical Power Systems*, New age International, New Delhi, 5th edition, 2009.
2. Wood, Allen J., and Bruce F. Wollenberg, *Power generation, operation and control*, John Wiley & Sons, 3rd edition, 2013.

3. PrabhaKundur, P*ower system stability and control*, Mc Graw- hill, 1st edition, 2006.
4. T.J.E. Miller, *Reactive Power control in electric systems*, Wiley, 1982.

IV B. Tech. - I Semester

(16BT70402) **EMBEDDED SYSTEMS**

(Common to EEE, ECE and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PREREQUISITES:
Courses on Switching Theory and Logic Design and Computer Architecture and Organization

COURSE DESCRIPTION:
Embedded system design approaches; MSP430 Architecture; Instruction Set; On-Chip Resources; Programming; Communication with peripherals; Internet of Things related Issues.

COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1. demonstrate knowledge in
- MSP430 Architecture, Pin out, Instruction set
- High level programming
- Usage of On-chip resources like ADC, DAC, Timers
- Internet of Things related issues

CO2. analyze various design issues regarding
- Usage of on chip resources
- Low power modes
- Communication support

CO3. design embedded systems using MSP430 series micro controllers to suit market requirements.

CO4. solve engineering problems and arrive at solutions in de signing embedded systems to support interconnectivity.

CO5. apply techniques, program skills, On-Chip resources to design networked embedded systems with an under standing of limitations.

CO6. reason out and practice professional engineering to de liver efficient and cost effective embedded based products to society.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO EMBEDDED SYSTEMS (09 periods)
Embedded Systems - Definition, Approaches, Applications, Anatomy of microcontroller, Memory, Software; MSP430 Introduction- Pin out, Functional Block diagram, Memory, CPU, Memory mapped input and output, Clock generator; Exceptions- Interrupts and Resets.

UNIT-II: ARCHITECTURE OF MSP430 (09 periods)
CPU, Addressing Modes, Constant Generator and Emulated Instructions, Instruction Set, Example programs, Reflections on CPU and Instruction set, Resets, Clock System.

UNIT-III: FUNDAMENTALS FOR PROGRAMMING (09 periods)
Development Environment, C Programming Language, Assembly Language, Programming and Debugging, Sample programs- Light LEDs in C, Read input from a switch; Automatic Control-Flashing light by delay, use of subroutines, using Timer_A; Header files and issues, Functions, Interrupts and Low power modes.

UNIT-IV: TIMERS, MIXED SIGNAL SYSTEMS AND COMMUNICATION (09 periods)
Timers - Watchdog Timer, RTC, Measurement in capture mode; Mixed-Signal Systems- Comparator_A, ADC10 Architecture & operation, ADC12, Sigma-Delta ADC Architecture & operation, DAC; Communication- Communication Peripherals in MSP430, SPI, Inter-integrated Circuit Bus, Asynchronous communication with the USCI_A.

UNIT-V: HARDWARE SOFTWARE CO-DESIGN AND INTERNET OF THINGS (09 periods)
CO-Design Issues: Co-design Models, Architectures, Languages, a Generic Co-design Methodology.
IOT: Introduction, Origins, Drivers and Applications, IOT Communication Models - Device to Device, Device to Cloud, Device to Gateway, Back end Data Sharing Model; IPV6 and IOTs', IOT Issues, Security Issues-challenges; Privacy Considerations, Interoperability/Standards.

Total Periods: 45

TEXT BOOKS:
1. John H. Davies, *MSP430 Microcontroller Basics*, Newnes Publications, 2008.
2. Karen Rose, Scott Eldridge, Lyman Chapin, T*he Internet of Things: An Overview: Understanding the Issues and Challenges of a More Connected World*, Internet Society, Oct, 2015.
3. Jorgen *Staunstrup, Wayne Wolf, Hardware / software co- design Principles and Practice*, Springer, 2009.

REFERENCE BOOK:

1. Chris Nagy, *Embedded Systems Design using the TI MSP30 Series*, Newnes Publications, 2003.

IV B.Tech. - I Semester

(16BT70202) **SWITCHGEAR AND PROTECTION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PREREQUISITES: Courses on Transformers and Induction Machines, Synchronous Machines and Transmission & Distribution.

COURSE DESCRIPTION:

Overview of protection schemes; Fuses and circuit breakers; Electromagnetic, static and microprocessor based relays; Protection schemes for various components under various operating conditions; Neutral grounding.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- operation of various protective devices and schemes.
- protection principles for power system components.
- neutral grounding.

CO2. analyzedifferent protective devices and protection schemes under various operating conditions.

CO3. designproper protection scheme for different power sys tem components.

CO4. Evaluate operating parameters and settings of protective devices in different protection schemes to provide feasible solutions.

CO5. select and apply appropriate protective device and scheme for different scenarios.

CO6. apply various grounding methods for safety of power system components and personnel.

DETAILED SYLLABUS:

UNIT-I: RELAYS (11 periods)

Electromagnetic relays: Introduction, types of relays, construction, operation and torque equation of induction type relays, differential relays and biased differential relays. Characteristics of over current, directional and distance relays (R-X).

Static relays: Advantages and disadvantages, block diagram of a basic static relay, definite time, inverse and inverse definite minimum time (IDMT) static relays. Comparators - amplitude and phase comparators.

Microprocessor based relays: Advantages and disadvantages, block diagram with flow chart - distance relays and over current relays - definite, inverse & IDMT.

UNIT-II: FUSES AND CIRCUIT BREAKERS (09 periods)

Fuses - types of fuses & characteristics. Circuit breakers -elementary principles of arc interruption, recovery voltage, restriking voltage, RRV, average and maximum rate of rise of restriking voltage, current chopping and resistance switching. Construction and principle of operation - minimum oil circuit breaker, air blast circuit breaker, vacuum circuit breaker and SF_6 circuit breaker. Isolators.

UNIT-III: PROTECTION OF GENERATORS AND TRANSFORMERS (08 periods)

Protection of generators: Differential protection, restricted earth fault protection and inter turn fault protection, rotor fault protection, calculation of percentage winding unprotected.

Transformer protection: Differential protection, percentage differential protection, design of CT's ratio. Protection against internal faults - buchholtz relay.

UNIT-IV: PROTECTION OF FEEDERS AND TRANSMISSION LINES (10 periods)

Protection of transmission lines: Three-zone distance protection using distance relays, carrier current protection using over current relays.

Protection of feeders: Protection of radial and ring main feeders using over current relays. Protection of bus bars.

Protection against Over Voltages: Causes of over voltages in power systems, protection against lightning over voltages - non-linear (valve type) and metal oxide (zinc-oxide) surge arresters, surge absorbers. Insulation coordination, basic impulse insulation level (BIIL).

UNIT-V: NEUTRAL GROUNDING (07 periods)

Grounded and ungrounded systems.Effects of ungrounded neutral on system performance. Methods of neutral grounding - solid, resistance, reactance, arc suppression coil (Peterson coil), grounding practices.

Total Periods: 45

TEXT BOOKS:

1. Sunil S. Rao, *Switchgear Protection and Power Systems (Theory, practice and Solved Problems)*, Khanna Publishers, New Delhi, 13th edition, 2013.
2. Badri Ram, D. N. Viswakarma, *Power system Protection and Switchgear*, Mc Graw Hill education (India) Private Limited, New Delhi, 2nd edition, 2011.

REFERENCE BOOKS:

1. C. L. Wadhwa, *Electrical Power systems*, New Age International (P) Limited, Publishers, New Delhi, 5th edition, 2009.

2. T. S. Madhava Rao, *Power System Protection: Static Relays with Microprocessor Applications*, Tata Mc Graw-Hill Publishing Company Limited, New Delhi, 2nd edition, 2004.

IV B.Tech. - I Semester

(16BT70203) ENERGY CONSERVATION AND MANAGEMENT

(Program Elective-3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PREREQUISITES: Courses on Electrical Measurements and Transmission & Distribution.

COURSE DESCRIPTION:

Principles of energy conservation, audit and management; Energy efficient motors, lighting, instruments and significance of energy economics.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- energy auditing practices.
- energy conservation schemes.
- energy economics and management.

CO2. analyze
- energy conservation measures.
- energy auditing practices.
- energy economics and management.

CO3. design an appropriate energy conservation scheme for commercial and industrial applications.

CO4. explore relevant methods of energy auditing in various industries and provide feasible solutions to conserve energy.

CO5. select and apply appropriate technique for energy auditing and conservation.

DETAILED SYLLABUS:

UNIT-I: ENERGY AUDIT AND MANAGEMENT PRINCIPLES (10 periods)

Energy audit - definitions, concept, types of audit, energy index, cost index, pie charts, Sankey diagrams, load profiles, energy conservation schemes - energy audit of industries - energy saving potential, energy audit of process industry, thermal power station, building energy audit.

Energy management- Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting.

UNIT-II: ENERGY CONSERVATION PRINCIPLES (08 periods)

Rules for efficient energy conservation - technologies for energy conservation - Energy scenario, principles of energy conservation, resource availability, energy savings, current energy consumption in India, roles and responsibilities of energy managers in industries.

UNIT-III: ENERGY EFFICIENT MOTORS AND LIGHTING (09 periods)

Energy efficient motors - factors affecting efficiency, loss distribution, constructional details, characteristics, variable speed, variable duty cycle systems, motor energy audit.

Lighting: Good lighting system design and practice, lighting control, lighting energy audit.

UNIT-IV: ENERGY INSTRUMENTS AND ECONOMIC ANALYSIS (08 periods)

Energy Instruments- watt meter, data loggers, thermocouples, pyrometers, lux meters, tongue testers.PLCs and applications. Energy Economic Analysis - The time value of money concept. Cash flow models, payback analysis, depreciation, taxes and tax credit - numerical problems.

UNIT-V: DEMAND SIDE MANAGEMENT (10 periods)

Introduction to DSM, concept of DSM, benefits of DSM, different techniques of DSM - time of day pricing, multi-utility power exchange model, and time of day models for planning. Load management, load priority technique, peak clipping, peak shifting, valley filling, strategic conservation, energy efficient equipment. Management and organization of energy conservation awareness programs.

Total Periods: 45

REFERENCE BOOKS:

1. W.R. Murphy & G. Mckay Butter worth, *Energy management*, Butter worth-Heinemann publications, 2nd edition, 2016.
2. Albert Thumann, William J. Younger, *Handbook of energy au-dits*, Taylor & Francis Ltd, 7th edition, 2008.
3. UmeshRathore, *Energy management*, S.K. Kataria & Sons, 2nd edition, 2014.
4. W.C.Turner,Steve doty, *Energy management hand boo*k, CRC press, 6th edition, 2006.
5. D.P. Sen, K.R. Padiyar, IndraneSen, M.A. Pai, *Recent Ad vances in Control and Management of Energy Systems*, In terline Publisher, Bangalore, 1993.
6. Ashok V. Desai, Wiley Eastern, *Energy Demand - Analysis, Management and Conservation Hand book on energy auditing - TERI (Tata Energy Research Institute)*, 2005.
7. Craig B. Smith, Kelly E. Parmenter, *Energy management prin ciples Applications*, benefits, Savings, Elsevier Inc(Pergamon Press), 1st edition, 2016.
8. Dale R. Patrick, Stephen W. Fardo, Ray E. Richardson, Steven R. Patrick, *Energy Conservation guide book*, Taylor & Francis Ltd, 2nd edition, 2007.
9. Ashok V. Desai, *Energy Economics*, Wiley Eastern, 1st edition, 1990.

10.Industrial *Energy Conservation Manuals*, Cambridge, MIT Press, 1982.
11.Frank Kreith, Ronald E. West, H*andbook of Energy Efficiency*, CRC Press, 1st edition, 1996.

IV B.Tech. - I Semester

(16BT70204) FLEXIBLE AC TRANSMISSION SYSTEMS

(Program Elective-3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PREREQUISITES: Courses on Power Electronics and Transmission & Distribution.

COURSE DESCRIPTION:
Conventional AC Power Transmission System; Real and Reactive Power Transmission; load and line compensation; Concepts of FACTS; Compensation using FACTS Devices and Controllers; Shunt Compensation, Series Compensation, Phase angle Regulation and Combined compensation.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- real and reactive power flow in conventional system.
- concept of FACTS devices and controllers.
- shunt and series compensation using FACTS devices.
- phase angle regulation and combined compensation.

CO2. analyze
- stability and voltage profile of a compensated and un compensated transmission lines.
- Voltage regulation, improvement of transient stability, prevention of voltage instability, power oscillation damping with various FACTS devices and controllers.

CO3. design suitable compensation strategy for better volt age profile and secured operation of power system.

CO4. solve problems of transmission system to provide feasible solutions.

CO5. select and apply appropriate devices, schemes and tech niques for real time applications in AC power transmission.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO AC TRANSMISSION SYSTEMS (10 Periods)
Overview of interconnected power system. Power flow in AC systems - Expression for real and reactive power flow between two nodes of a power system, controllable parameters, conventional controllers for real and reactive power flows - merits and demerits.
FACTS - benefits - types of FACTS controllers.

UNIT-II: REACTIVE POWER CONTROL (09 Periods)
Reactive power - it's significance and control in Electrical Power Transmission - Different types of reactive power compensation equipment for transmission systems. Load compensation - specification of load compensator. Uncompensated and compensated transmission lines: shunt and series compensation.

UNIT-III: STATIC SHUNT COMPENSATION (11 Periods)
Operating characteristics and control schemes of static VAR generators - variable impedance type: TCR, TSR, TSC, Switching converter type - STATCOM; Hybrid VAR generators. Applications of static shunt compensators - Voltage regulation, improvement in transient stability, prevention of voltage instability, power oscillation damping. Comparison of static shunt compensators.

UNIT-IV: STATIC SERIES COMPENSATION (08 Periods)
Operating characteristics and control schemes of static VAR generators - variable impedance type: GCSC, TSSC, TCSC, Switching converter type: SSSC. Applications of static series compensators - improvement in transient stability, power oscillation damping. Comparison of static series compensators.

UNIT-V: STATIC PHASE ANGLE REGULATORS AND COMBINED COMPENSATORS (07 Periods)
Power flow control by phase angle regulators - operation and control of TCPAR, objectives of TCPAR: improvement of transient stability, power oscillation damping. Principle of UPFC - comparison of UPFC to series compensators and phase angle regulators, control schemes of UPFC, operating principle and characteristics of IPFC. **Total Periods: 45**

TEXT BOOKS:
1. T.J.E. Miller, *Reactive Power control in electric systems*, Wiley, 1982.
2. Narain G. Hingorani, LasziGyugyi, *Understanding FACTS: Concepts and Technology of Flexible AC Transmission Systems*, Wiley-IEEE Press, 1999.

REFERENCE BOOKS:
1. Xiao-Ping, Rehtanz, Christian, Pal, Bikash, *Flexible AC Transmission Systems: Modeling and Control, Springer Power Systems Series*, 2006.

2. R. Mohan Mathur and Rajiv K. Varma, *Thyristor based FACTS controllers for Electrical Transmission Systems*, Wiley-IEEE Press, 2002.

IV B.Tech. - I Semester
(16BT70205) **POWER SYSTEM AUTOMATION**
(Program Elective-3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PREREQUISITES: Course on Switchgear and Protection.
COURSE DESCRIPTION:
Power system operation and control, Substation and Distribution automation; Deregulation and Restructuring of power system.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on
- real time operation and control of power system.
- substation and distribution automation.
- restructuring of power system.

CO2. analyze
- various automation devices.
- technical issues.
- restructured model of power system.

CO3. design a suitable architecture for substation automation.
CO4. examine operational and technical issues to provide fea ible solutions for substation and distribution automation.
CO5. apply principles of DMS framework to integrate with real time power system.
CO6. apply the conceptual knowledge of real time operation and control of power system in relevance to industry and society.

DETAILED SYLLABUS:
UNIT-I: POWER SYSTEM CONTROL **(08 periods)**
Introduction, Decomposition, Operation of power systems, organization and operator activities, Investment factor, Control centre, elements of computer control system.
UNIT-II: POWER SYSTEM AUTOMATION **(10 periods)**
Evolution of automation systems, SCADA in power system, Building blocks of SCADA system, Remote terminal unit, Intelligent electronic devices, Data concentrators and merging units, SCADA communication systems, Master station, Human-machine interface, Classification of SCADA systems.
UNIT-III: SUBSTATION AUTOMATION **(09 periods)**
Substation automation, conventional automation, New smart devices for substation automation, new integrated digital substation, technical issues, new digital simulation. Substation automation architectures, Substation automation applications functions, Benefits of data warehousing.
UNIT-IV: DISTRIBUTION AUTOMATION **(08 periods)**
Introduction to Distribution automation - Customer, Feeder and substation automation, Subsystems in a distribution control center, Distributed Management System(DMS) framework integration with subsystems, Advanced real-time DMS applications, advanced analytical DMS applications, DMS coordination with other systems.
UNIT-V: POWER SYSTEM RESTRUCTURING **(10 periods)**
Deregulation- need for deregulation, Advantages of deregulation in power system; Restructuring Models- PoolCo Model, Bilateral Model, Hybrid Model; Independent system operator (ISO) - Role of ISO; Power exchange, Market operations, Market power, Standard cost, Transmission pricing, Congestion pricing - management of congestion.

Total Periods: 45

TEXT BOOKS:
1. Torstencegrell, *Power systems control Technology*, Prentice Hall, 1986.
2. Mini S Thomas and John D Mcdonald, *Power System SCADA and Smart Grids*, CRC Press, 2015.
3. M Shahidehpour, MuwaffaqAlomoush, *Restructured electrical power systems operation*, trading and volatility, CRC Press, 2001.

REFERENCE BOOKS:
1. James Northcote-Green and Robert Wilson, *Control and Automation of Electrical Power Distribution Systems*, CRC Press, 2013.
2. Edmund Handschin, *Real time control of Electric Power System*, Elsevier Publishing company, 1972.

IV B.Tech. - I Semester

(16BT70206) **POWER SYSTEM RELIABILITY**

(Program Elective-3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PREREQUISITES: Courses onMulti-variable Calculus & Differential Equations and Transmission & Distribution.

COURSE DESCRIPTION:
Overview of Probability theory; Study of network modelling and reliability functions; Assessment of repairable systems; Evaluation of generation system reliability, estimation of distribution system reliability indices.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- elements of probability theory and probability distributions.
- types of failures, reliability block diagram reductions.
- network reduction techniques and Markov modelling.
- loss of generation, frequency and duration techniques.
- distribution system reliability indices.

CO2. analyze
- various probability distributions.
- the network reduction techniques and Markov modelling.
- frequency and duration techniques.
- loss of generation, customer, load and energy oriented indices.

CO3. design component/system for desired life expectancy and reliability.

CO4. investigate various reliability indices and evaluate the power system performance to provide feasible solutions.

CO5. select and apply appropriate mathematical tool for assessment of power system reliability indices.

CO6. apply the conceptual knowledge of reliability engineering and its applications in relevance to industry and society.

DETAILED SYLLABUS:

UNIT-I: PROBABILITY THEORY (09 periods)

Introduction - rules for combining probabilities of events - bernoulli's trials, probability density and distribution functions.

Probability Distributions - discrete distributions - binomial distribution, poisson distribution. Continuous distributions - exponential distribution, weibull distribution and normal distribution - mean, standard deviation, variance.

UNIT-II: RELIABILITY FUNCTIONSAND NETWORK MODELLING (10 periods)

Reliability functions f(t), F(t), R(t), ?(t) and their relationships, bath tub curve. Reliability measures - MTTF, MTTR, MTBF. Reliability economics. Reliability block diagrams - series, parallel systems and combined series-parallel systems.Reliability analysis of series parallel networks using exponential distribution.Reliability evaluation of non-series-parallel systems - decomposition method, cut-set and tie-set method. Concept of redundancy - standby redundant systems, perfect switching, imperfect switching.

UNIT-III:MARKOV MODELLING & FREQUENCY AND DURATION TECHNIQUES (10 periods)

Markov chain - concept of stochastic transitional probability matrix (STPM), evaluation of limiting state probabilities. Markov processes - time dependent probability evaluation - evaluation of limiting state probabilities using STPM - one, two component repairable models. Frequency and duration concept - evaluation of frequency of encountering state for one, two component repairable models - evaluation of cumulative probability and cumulative frequency of encountering of merged states.

UNIT-IV:GENERATION SYSTEM RELIABILITY ANALYSIS (08 periods)

Generation system reliability analysis - reliability model of a generation system - recursive relation for unit addition and removal. Load modelling - merging of generation load model - evaluation of transition rates for merged state model - cumulative probability, cumulative frequency of failure evaluation - LOLP, LOLE, LOEE.

UNIT-V:DISTRIBUTION SYSTEM RELIABILITY ANALYSIS (08 periods)

Distribution system reliability analysis - radial networks - evaluation of basic reliability indices, performance indices - customer oriented, load and energy oriented indices and application to radial systems - effect of lateral distributor protection, disconnects and protection failure.

TEXT BOOKS: **Total Periods: 45**

1. Roy Billinton and Ronald N Allen, *Reliability Evaluation of Engineering Systems*, Springer, 2nd edition, 2007.
2. Roy Billinton and Ronald N Allen, *Reliability Evaluation of Power Systems*, Springer, 2nd edition, 2007.

REFERENCE BOOKS:
1. V. Sankar, *System Reliability Concepts*, Himalaya Publishing House, 1st edition. 2015.

2. Charles E. Ebeling, *An Introduction to Reliability and Maintainability Engineering*, Tata McGraw-Hill, 2nd edition, 2000.

IV B.Tech. - I Semester

(16BT70207) **ANALYSIS OF POWER ELECTRONIC CONVERTERS**

(Program Elective-4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PREREQUISITES: Courses on Electrical Circuits, Electronic Devices & Circuits, Analog Electronics Circuits, Linear and Digital ICs and Power Electronics.

COURSE DESCRIPTION:

Advanced Power semiconductor devices; MOSFET and IGBT-Gate and base drive circuits; 3-, 6- and 12- pulse converters; Switching Regulators; Advanced PWM Techniques.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on the characteristics of various special power switching devices & various triggering methods for MOSFET and IGBT.

CO2. analyze the performance of different power converters subjected to various loads.

CO3. design the suitable switching regulators for appropriate power electronic applications.

CO4. examine various configurations of power electronic circuits to provide feasible solutions.

CO5. select an appropriate power semiconductor device and/ or circuit for real time applications.

CO6. apply the conceptual knowledge of power semiconductor devices and/or circuits in relevance to industry.

DETAILED SYLLABUS:

UNIT-I: SPECIAL POWER SWITCHING DEVICES (10 periods)

Thyristors: GTOs - Construction, operation, steady state characteristics and switching characteristics. Construction and operation of BCTs, FET - CTHs, ETOs, IGCTs, MCTs, SITHs, ASCR, RCT, SCS and light activated thyristor. Comparison of various thyristors Transistors: Construction and operation of COOLMOS and SITs.

UNIT-II: GATE & BASE DRIVE CIRCUITS (10 periods)

MOSFET and BJT gate drive circuits. Isolation of gate and base drives - pulse transformer, opto-couplers. Thyristor firing circuits - R, RC firing circuits, photo - SCR isolator, pulse transformer isolation, 1:6 isolation transformer for inverter gate bias circuits and thyristor converter gating circuits. Gate drive ICs - MOSFETs and IGBTs. Drive ICs for converters - MOS Gated Driver.

UNIT-III: ANALYSIS OF MULTIPULSE CONVERTERS (09 periods)

Operation of 3-, 6-, and 12- pulse converters. Performance analysis of 3-, 6-, and 12- pulse converters - Low Order Harmonics (LOH), Total Harmonic Distortion(THD), Power Factor, Ripple Factor, Form Factor, Distortion Factor.

UNIT-IV: SWITCHING REGULATORS (08 periods)

Design and analysis of buck, boost, buck-boost and cuk converters.Resonant Converters-Zero Voltage Switching (ZVS) and Zero Current Switching (ZCS) converters.

UNIT-V: ADVANCED PWM TECHNIQUES (08 periods)

Modified Sinusoidal Pulse Width Modulation, Phase Displacement Control, Trapezoidal Modulation Technique, Staircase Modulation, Stepped Modulation, Harmonic Injection Modulation, Delta Modulation. Selective Harmonics Elimination (SHE) Technique. **Total Periods: 45**

TEXT BOOKS:

1. Muhammad H. Rashid, *Power Electronics: Circuits, Devices and Applications*, Pearson Education, 4th Edition, 2013.
2. Ned Mohan, T. M. Undeland, W.P. Robbins, *Power Electronics: Converters, Applications and Design*, Wiley, 3rd Edition, 2007.

REFERENCE BOOKS:

1. P C Sen , *Modern Power Electronics*, Wheeler publishing Co, 1st Edition , New Delhi, 1998.
2. Bimal K Bose, *Modern Power Electronics and Drives*, Pearson Education, 2nd Edition, 2003.

IV B.Tech. - I Semester

(16BT70208) **POWER QUALITY**

(Program Elective-4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PREREQUISITES: Course on Transmission and Distribution

COURSE DESCRIPTION:

Power quality terminology, power quality issues, classification; Different sources of power quality disturbances; Harmonic distortion; Principles for controlling harmonics; Power quality measuring equipment; Power quality monitoring standards; Impact of distributed generation on power quality.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- sources of power quality disturbances and issues.
- power quality monitoring and measuring instruments.
- power quality standards.
- effect of distributed generation on power quality.

CO2. analyze various power quality issues.

CO3. design a suitable harmonic filter for commercial and industrial loads.

CO4. investigate various power quality issues and provide fea sible solutions for improvement of power quality.

CO5. Select and use an appropriate equipment for monitoring and measurement of power quality.

CO6. apply the conceptual knowledge of power quality in relevance to industry and society.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO POWER QUALITY (08 periods)

Power Quality- definition, terminology, issues, evaluation procedure, responsibilities of the suppliers and users of electric power, power quality standards, CBEMA and ITI curves.

UNIT-II: POWER QUALITY DISTURBANCES (10 periods)

General classes of power quality problems- Impulsive and oscillatory transients. Long duration voltage variations - over voltage, under voltage, sustained interruption. Short duration voltage variations- interruption, sag, swell and outage. Sources of sags and interruptions, estimating voltage sag performance -overview of mitigation methods.

UNIT-III: FUNDAMENTALS OF HARMONICS (10 periods)

Harmonic distortion, voltage versus current distortion, harmonics versus transients, power system quantities under non-sinusoidal conditions, harmonic indices.Harmonic sources from commercial and industrial loads.Effects of harmonic distortion. Applied harmonics - harmonic distortion evaluation, principles of controlling harmonics, devices for controlling harmonic distortion. Harmonic filter design and standards on harmonics.

UNIT-IV: POWER QUALITY MONITORING (09 periods)

Power quality benchmarking, monitoring considerations, choosing monitoring locations, permanent power quality monitoring equipment, historical perspective of power quality measuring instruments. Power quality measurement equipment-types of instruments, assessment of power quality measurement data, power quality monitoring standards.

UNIT-V: DISTRIBUTED GENERATION AND GRID INTERCONNECTION (08 periods)

Distributed generation -connection requirements and impacts on the network.Interaction and optimal location of DG-Eigen analysis and voltage interaction.Power quality in DG-Mitigation of voltage dip during motor start, harmonic effects with DG, voltage flicker and fluctuation. Islanding issues, distribution line compensation-heavy Load and Light load condition, real generation, protection issues for distributed generation, technologies for distributed generation, power quality impact from different DG types.

Total Periods: 45

TEXT BOOKS:

1. Roger C. Dugan, Mark F. Mc Granaghan, Surya Santoso, H. Wayne Beaty, *Electrical Power Systems Quality*, 3rd edition, TMH Education Pvt. Ltd., 2012.
2. ArindamGhosh, Gerard Ledwich, *Power quality enhancement using custom power devices*, Kluwer academic publishers, 2002.

REFERENCE BOOKS:

1. G.T. Heydt, *Electric Power Quality*, Stars in a circle Publications, 1991. USA.
2. Surajit Chattopadhyaya, Madhuchhanda Mitra, Samarjit Senugupta, *Electrical Power Quality*, Springer Dordrecht Heidelberg London New York.
3. Math H. J. Bollen, *Understanding Power quality problems,* IEEE Press, 2007.

IV B.Tech. - I Semester
(16BT70209) **SMART GRID TECHNOLOGY**
(Program Elective-4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PREREQUISITES: Course on Transmission and Distribution

COURSE DESCRIPTION:
Smart grid benefits and requirements; Distribution management systems, smart substations, energy management systems; Smart meters and AMI; Power quality in smart grids; Communication channels and networks.

COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on
- smart grid initiatives and technologies
- communication technologies for the smart grid
- sensing, measurement, control and automation.

CO2. analyze different communication channels and networks in smart grid.
CO3. use modern techniques/tools to convert conventional grid to smart grid.
CO4. apply principles of energy management systems to industrial applications.
CO5. follow the protocols and standards for communication technologies.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO SMART GRID (07 periods)
Smart Grid - Key requirements, operations, key features, challenges - technical and non-technical, comparison between smart grid and conventional grid. Concept of smart grid, need for smart grid and smart grid drivers. Functions and benefits of smart grid. Smart grid deployment in India. Functional model of a smart grid.

UNIT-II: TECHNOLOGIES FOR TRANSMISSION AND DISTRIBUTION SYSTEMS (12 periods)
Distribution system topology. Distribution system tools - Remote terminal unit (RTU) and its architecture; Distribution Management System (DMS) - functions, features and applications; Voltage/VAR control - devices, fault detection, isolation and service restoration; Outage management systems. Smart substation - functions, features, substation automation, wide area monitoring system (WAMS); Feeder automation - functions. Energy management systems - benefits, functions, duality between DMS and EMS.

UNIT-III: SMART METERS AND ADVANCED METERING INFRASTRUCTURE (09 periods)
Smart electricity meters - evolution, need for smart meter, benefits, differences between conventional and smart meter, hardware used; Advanced metering infrastructure (AMI) - benefits, drivers, system model, security requirements, AMI Vs AMR; Communication infrastructure and protocols for smart metering - Home area network (HAN), Neighbourhood area network (NAN) - protocols and standards for communication; Intelligent Electronic Devices (IEDs) - functions, Smart meter issues.

UNIT-IV: POWER QUALITY MANAGEMENT IN SMART GRID (07 periods)
Introduction to power quality, Electromagnetic compatibility (EMC) in smart grid, Grid connected renewable energy sources - equipment required, power quality conditioner; Web based power quality monitoring - hardware and software. Power quality audit.

UNIT-V: HIGH PERFORMANCE COMPUTING FOR SMART GRID APPLICATIONS (10 periods)
Introduction, communication channels - wired and wireless, wired Vs wireless; Networks used in communication - LAN, WAN, HAN, FAN, NAN, IAN, BAN; Communication technologies - Internet protocol, introduction to cloud computing and properties. **Total Periods: 45**

TEXT BOOKS:
1. Bharat Modi, AnuPrakash and Yogesh Kumar, *Fundamentals of Smart Grid Technology*, S.K.Kataria& Sons, 2016.
2. JanakaEkanayake, KithsiriLiyanage, Jianzhong Wu, Akihiko Yokoyama, Nick Jenkins, *Smart Grid Technology and Applications*, Wiley Publications, 2012.

REFERENCE BOOKS:
1. James Momoh, Smart Grid: *Fundamentals of Design and Anal sis*, Wiley, IEEE Press, 2012.

IV B.Tech. - I Semester

(16BT70210) **SOFT COMPUTING TECHNIQUES**

(Program Elective-4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PREREQUISITES: Courses on DC Machines and Transmission and Distribution.

COURSE DESCRIPTION:
Architectures of artificial neural networks; Learning strategies; Fuzzy set theory; Fuzzy systems design; Applications of neural networks and fuzzy systems; Genetic algorithms and its applications.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- learning rules, strategies and algorithms of artificial neural network.
- fuzzy logic system.
- genetic algorithms.

CO2. analyze
- learning methods and algorithms of neural networks.
- fuzzy& classical sets.
- operators of genetic algorithms.

CO3. design fuzzy systems, neural networks and genetic algorithms for desired specifications.

CO4. evaluate electrical engineering problems using soft com puting techniques to provide feasible solutions.

CO5. select and apply suitable soft computing techniques to solve electrical engineering problems.

CO6. apply the conceptual knowledge of soft computing tech niques in relevance to industry and society.

DETAILED SYLLABUS:

UNIT-I: FUNDAMENTALS OF ARTIFICIAL NEURAL NETWORKS (09 periods)
Neural networks - introduction, biological neural network. Artificial neural network - advantages, architectures, activation functions, important terminologies of ANN. Mcculloch-pits neuron model. Learning strategies - supervised, unsupervised and reinforced. Hebbian learning rule, Perceptron learning rule, delta learning rule, Widrow-hoff learning rule, correlation learning rule, winner-take-all learning rule, out star learning rule, concept of linear separability.

UNIT-II: FEEDFORWARD AND FEEDBACK NETWORKS (11 periods)
Supervised networks: Back propagation neural network - architecture, training algorithm, learning factors, initial weights, steepness of the activation function, learning constant, momentum method and necessary number of hidden neurons. Un-supervised networks: Kohonen self-organizing map-competitive process, cooperation process, adaptive process, training algorithm.

Associative memories: Concepts, Bidirectional Associative Memory (BAM) - architecture, discrete BAM-algorithm, analysis of hamming distance, energy function and storage capacity. Discrete Hopfield network - architecture and training algorithm. Electrical load forecasting - Artificial neural networks for short-term electrical load forecasting.

UNIT-III: CLASSICAL AND FUZZY SETS (09 periods)
Introduction to fuzzy logic. Classical sets - operations, properties. Fuzzy sets - operations, properties. Crisp relations - cardinality, operations, properties, cartesian product, composition. Fuzzy relations - cardinality, operations, properties, fuzzy cartesian product, composition. Linguistic hedges, membership functions - features, methods of membership value assignments - intuition, inference, rank ordering, neural networks, inductive reasoning.

UNIT-IV: FUZZY LOGIC SYSTEMS (08 periods)
Defuzzification - Lambda-cuts for fuzzy sets and fuzzy relations. Defuzzification methods - max membership principle, weighted average, centroid, center of sums. Fuzzy rule base - formation of rules, decomposition of rules, aggregation of rules - design procedure.

Speed control of DC motor - need of fuzzy logic, selection of membership functions, design of rule base for speed control.

UNIT-V: GENETIC ALGORITHM (08 periods)
Introduction to evolutionary computing - GA, biological background of GA. Terminologies and operators of GA - search space, individuals, genes, fitness function, population, encoding - binary encoding, breading. Selection - roulette wheel, rank, tournament. Crossover - single point and two point crossovers. Mutation - flipping, interchanging and reversing. Probabilities of cross over and mutation. Replacement - random, weak parent replacement. Termination criteria, flow chart, advantages, limitations and applications. Application of genetic algorithm for optimal allocation of capacitors in distribution system.

Total Periods: 45

TEXT BOOKS:

1. S.N. Sivanandam, S.N. Deepa, *Principles of Soft computing*, Wiley India private Ltd., 2nd edition, 2013.
2. Timothy J Ross, Fuzzy Logic with Engineering Application, Mc Graw Hill Inc., 3rd edition, 2014.

REFERENCES:

1. Jacek M. Zurada, I*ntroduction to Artificial Neural Networks*, Jaico Publishing House.
2. Simon Haykin, *Neural Networks - A Comprehensive Foundation*, Prentice-Hall Inc, 1999.

IV B.Tech. - I Semester

(16BT6HS01) **BANKING AND INSURANCE**

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION:
Origin of Banking; Functions of Banking; Role & Functions of RBI; Bank-Customer Relationship; Deposit and Loan Services of Banks; Banking Procedures; Electronic Payment Mechanisms; Business Models; Concepts of Risk and Uncertainty; Fundamentals of Insurance; Principles of Insurance; Essentials of Insurance Contracts; Insurance players in India.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate Knowledge in
- Tools and concepts of Banking and Insurance.
- Basic Principles and concepts of Insurance and Banking.
- e-fund transfers, e-payments and e-business models.

CO2. develop skills in providing solutions for
- Online banking and e – payments...
- Risk Management through insurance benefits the society at large.
- Money management by leveraging on technology, banking and insurance services.

CO3. exhibit conceptual soundness about banking and insurance, this would contribute to More employment opportunities.

CO4. provide life skills for effective utilization of Banking and Insurance facilities.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO BANKING (09 Periods)
Origin and growth of banking, meaning and functions of banking, importance of banking, Reserve Bank of India; functions, monetary policy, open market operations.

UNIT-II:BANK-CUSTOMER RELATIONSHIP (09 Periods)
Debtor-creditor relationship, anti-money laundering, deposit products or services, payment and collection of cheques. Accounts – Types of accounts, procedure for opening and closing an account. Loans and Advances- principles of lending, types of loans.

UNIT-III:BUSINESS MODELS AND ELECTRONIC PAYMENT SYSTEM (09 Periods)
Features, types of e-payment system, e-cash,NEFT, RTGS, Credit cards, Electronic purses and Debit cards.Business models- B2B, B2C, C2C, and B2G.

UNIT-IV:INTRODUCTION TO RISK AND INSURANCE (09 Periods)
Concept of risk, risk *Vs* uncertainty. Insurance definition, Insurance as risk mitigation mechanism, elements of insurance.

UNIT-V:INSURANCE OVERVIEW (09 periods)
Principles of insurance, insurance types, LIC & GIC insurance contract- nature, elements, functions, IRDA, Insurance Players in India. **Total Periods: 45**

TEXT BOOKS:
1. A.V. Ranganadha Chary, R.R. Paul,*Banking and Financial system*, Kalyani Publisher, New Delhi, 2nd edition.
2. P.K.Gupta,*Insurance and Risk Management*, Himalaya Publishing House, New Delhi.

REFERENCE BOOKS:
1. Diwan, Praq and Sunil Sharma, *Electronic Commerce-A Manager's Guide to E-Business*, Vanity Books International, Delhi, 2002.
2. Kalakota Ravi and Whinston Andrew B, *Frontiers of Electronic Commerce*, Pearson Education India, New Delhi, 1996.
3. Schneider, Grey P, *Electronic Commerce, Course Technology*, Cengage Learning, 8th edition, New Delhi, 2008.

IV B.Tech. - I Semester

(16BT6HS02) **BUSINESS COMMUNICATION AND CAREER SKILLS**

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION:
Nature and scope of communication; Corporate communication; Writing business documents; Careers and resumes; Interviews.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge in
- Corporate Communication
- Main Stages of Writing Messages
- Career Building

CO2. analyze the possibilities and limitations of language in
- Communication Networks
- Crisis Management/Communication

CO3. design and develop the functional skills for professional practice in Business Presentations & Speeches

CO4. apply written and oral communication techniques in preparing and presenting various documents in technical writing.

CO5. function effectively as an individual and as a member in diverse teams.

CO6. communicate effectively with the engineering community and society in formal and informal situations.

DETAILED SYLLABUS:

UNIT-I: NATURE AND SCOPE OF COMMUNICATION (09 Periods)
Introduction: Functions of Communication – Roles of a Manager – Communication Basics – Communication Networks – Informal Communication – Interpersonal Communication –Communication Barriers.

UNIT-II: CORPORATE COMMUNICATION (09 Periods)
Introduction: What is Corporate Communication? – Corporate Citizenship and Social Responsibility – Corporate Communication Strategy – Crisis Management/Communication – Cross-Cultural Communication.

UNIT-III: WRITING BUSINESS DOCUMENTS (09 Periods)
Introduction: Importance of Written Business Communication, Types of Business Messages – Five Main Stages of Writing Business Messages – Business Letter Writing – Effective Business Correspondence – Common Components of Business Letters – Strategies for Writing the Body of a Letter.

UNIT-IV: CAREERS AND RESUMES (09 Periods)
Introduction – Career Building – Business Presentations and Speeches – Resume Formats – Traditional, Electronic and Video Resumes – Sending Resumes – Follow-up Letters – Online Recruitment Process.

UNIT-V: INTERVIEWS (09 Periods)
Introduction – Fundamental Principles of Interviewing – General Preparation for an Interview – Success in an Interview – Types of Interviewing Questions – Important Non-verbal Aspects – Types of Interviews – Styles of Interviewing.

Total Periods: 45

TEXT BOOK:

1. Meenakshi Raman and Prakash Singh, *Business Communication*, Oxford University Press, New Delhi, 2nd edition, 2012.

REFERENCE BOOKS:

1. Neera Jain and Sharma Mukherji, *Effective Business Communication*, Tata Mc Graw-Hill Education, Pvt. Ltd., New Delhi, 2012.
2. Courtland L.Bovee et al., *Business Communication Today*, Pearson, New Delhi, 2011.
3. Krizan, *Effective Business Communication*, Cengage Learning, New Delhi, 2010.

4. R.K. Madhukar, *Business Communication*, Vikas Publishing House Pvt. Ltd., New Delhi, 2005.

IV B.Tech. – I Semester

(16BT6HS03) **COST ACCOUNTING AND FINANCIAL MANAGEMENT**

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION:
Scope, Objectives and Elements ofcost Accounting; Cost Sheet and Tender quotations; Variance Analysis: Material variances, Labor variances; Meaning and Scope, Liquidity, Profitability Ratios: concept of Risk and Return on Investment.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate Knowledge in
- Elements of Costing.
- Basic concepts of Financial Management.
- Risk and Return
- Significance of Cost Accountancy
- Behavioral Finance

CO2. develop skills in
- Material, Labor, Overheads control.
- Excellence and ability to minimize the cost of the organization

CO3. develop effective Communication in Cost control and Financial Management.

CO4. provide solutions for effective investment decisions.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO COST AND COST ACCOUNTING (09 Periods)
Cost and Cost Accounting, Scope, Objectives, Advantages and disadvantages – Cost Accounting vs. Management Accounting – Elements of Costing – Installation of costing system – Material Control, Labour Control, Overhead Control.

UNIT-II: COST SHEET AND PREPARATION OF COST SHEET (09 Periods)
Analysis of Cost – Preparation of cost sheet, estimate, tender and quotation (Simple problems) – Importance of Costing while pricing the products.

UNIT-III: STANDARD COSTING AND VARIANCE ANALYSIS (09 Periods)
Introduction to Standard Costing & Variances – Variance Analysis: Material variances, Labour variances (Simple Problems).

UNIT-IV: INTRODUCTION TO FINANCIAL MANAGEMENT AND RATIO ANALYSIS (09 Periods)
Financial Management-Meaning and Scope, Liquidity, Profitability, Financial Statement Analysis through ratios (Simple Problems).

UNIT-V: INTRODUCTION TO INVESTMENT AND BEHAVIORAL FINANCE (09 Periods)
Investment-Meaning and Definition- concept of risk and returns-Investment Alternatives- Introduction to Behavioral Finance – Anomalies –Key Concepts –Anchoring – Mental Anchoring-Confirmation and Hindsight Bias-Gambler's Fallacy-Herd Behavior-Over Confidence-Overreaction and Availability Bias-Prospect Theory.

Total Periods: 45

TEXT BOOKS:

1. S.P. Jain and K.L. Narang,*Cost Accounting*, Kalyani Publishers, Ludhiana, 6th edition,2002.
2. James C Van Horne, *Financial Management and Policy*, Prentice-Hall of India/Pearson, 12th edition, 2001.

REFERENCE BOOKS:

1. The Institute of Company Secretaries of India, *Cost and Management Study Material*, New Delhi.
2. I.M. Pandey, *Financial Management*, Vikas Publishing House Pvt. Ltd., 10th edition, 2010.

IV B.Tech. – ISemester

(16BT6HS04) **ENTREPRENEURSHIP FOR MICRO, SMALL AND MEDIUM ENTERPRISES**

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —

COURSE DESCRIPTION:

Introduction to Entrepreneur Development; Idea generation and formation of Business Plan; Micro and Small Enterprises; Institutional Finance and Support to Entrepreneur; Woman Entrepreneurship.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate Knowledge in
- Schemes and institutions encouraging entrepreneurship.
- Basic Principles and concepts of Accountancy.
- Significance of entrepreneurship.

CO2. develop skills in providing solutions for
- Personal excellence through financial and professional freedom.
- Women entrepreneurship serving as contrivance in societal development

CO3. develop critical thinking and evaluation ability.

CO4. widens knowledge and build up attitude towards trouble shooting.

CO5. demonstrate business acumen

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO ENTREPRENEURSHIP DEVELOPMENT (09 Periods)

Concept of Entrepreneurship – Growth of Entrepreneurship in India **-** Factors affecting entrepreneurship growth - Characteristics of an Entrepreneur – Functions of Entrepreneur – Need for an Entrepreneur – Entrepreneurial Decision Process – Types of Entrepreneurs – Distinction between an Entrepreneur and a manager.

UNIT-II: IDEA GENERATION AND FORMULATION OF BUSINESS PLANS (09 Periods)

Sources of Ideas – Methods of idea generation – Steps in Setting up of a Small Business Enterprise – Formulation of Business Plan – Contents of Business Plan – Significance – Common Errors in Business Plan Formulation, The role of incubation centers for promoting Entrepreneurship, Start-up – New Guidelines.

UNIT-III: MICRO AND SMALL ENTERPRISES (09 Periods)

Meaning and Definition – Micro and Macro units – Essentials – Features – Characteristics– Scope of Micro and Small Enterprises – Objectives of Micro Enterprises – relationship between Micro and Macro Enterprises- Problems of Micro and Small Enterprises.

UNIT-IV: INSTITUTIONAL FINANCE (09 Periods)

Institutional Finance **–** Need-Scope-Services - Various Institutions offering Institutional support: – Small Industries Development of Bank of India (SIDBI), State Industrial Development Corporations (SIDCs)– Small Industries Development Organisation (SIDO) – Small Industries Service Institutes (SISIs) – District Industries Centres (DICs) – National Institute of Entrepreneurship and Small Business Development (NIESBUD) – Technical Consultancy Organizations (TCOS). Micro Units Development and Refinance Agency Bank (MUDRA).

UNIT-V:WOMEN AND RURAL ENTREPRENEURSHIP (09 Periods)

Concept of Women entrepreneur - Functions of Women entrepreneurs - Growth of women entrepreneurship in India - Challenges of Women entrepreneurs- Programmes supporting women entrepreneurship – Rural Entrepreneurship – Meaning, Need for Rural entrepreneurship, Problems of rural entrepreneurship, Role of NGOs, Role of BharatiyaMahila Bank for encouraging Women Entrepreneurs.

Total Periods: 45

TEXT BOOKS:

1. Dr.S.S.Khanka*, Entrepreneurial Development*, S. Chand and Company Ltd, Revised edition, 2012.
2. MadhurimaLall & ShikhaSahai, *Entrepreneurship*, Excel Books India, 2nd edition 2008.

REFERENCE BOOKS:

1. Nandan, H., *Fundamentals of Entrepreneurship*, PHI Learning Pvt. Ltd., 2013, New Delhi, 3rd edition 2013.

2. Vasanth Desai, *The Dynamics of Entrepreneurial Development and Management*, Himalaya Publishing House, 4th edition, 2009.
3. BholanathDutta, *Entrepreneurship Management* – Text and Cases, Excel Books, 1st edition 2009.

IV B. Tech. – I Semester

(16BT6HS05) **FRENCH LANGUAGE (La Langue Francais)**

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	0	3

PREREQUISITES:—

COURSE DESCRIPTION:
Oral communications; Basic grammar; advancedgrammar; basic writing; Business French (La Francais Commercial)

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. demonstrate knowledge in
- Process of communication
- Modes of listening
- Paralinguistic features
- Skimming and Scanning
- Elements of style in writing

CO2. analyze the possibilities and limitations of language, understanding
- Barriers to Communication
- Barriers to Effective Listening
- Barriers to Speaking
- Formal and metaphorical language

CO3. design and develop language skills for professional practice**.**

CO4. apply basic writing skills in writing Emails and understanding wide range of technical terminologies.

CO5. understand French culture and civilization.

CO6. communicate effectively with the native French in day to day situation**.**

DETAILED SYLLABUS:

UNIT-I: ORAL COMMUNICATION (09 Periods)
Introduction - Language as a Tool of Communication, French alphabets, Phonetics and pronunciation, making contacts, giving information, Arranging things, Expression of feelings.

UNIT-II: BASIC GRAMMAR (09 Periods)
Introduction –Articles, -Er ending Verbs, Nouns, Numbers, Gender, Pronouns, Sentence structure – Case study.

UNIT-III: ADVANCED GRAMMAR (09 Periods)
Introduction -Adjectives, Prepositions, Introduction to tenses – Present tense, past tense and future tense, Active and Passive voice.

UNIT-IV: BASIC WRITING (09 Periods)
Introduction -Introduction to written communication, Pre-writing, Creating context for writing and Data collection, fill in forms, Write greeting cards, Invitations and Short personal announcements, Short text to describe photos and pictures.

UNIT-V: BUSINESS FRENCH (La Francais Commercial) (09 Periods)
Introduction - E-mail writing, Letter writing, Learning technical vocabulary and its application.
Case study of influential French companies, Learning computer/desktop/new age- media vocabulary, Introduction to how to present a topic, Fixing an Appointment

Total Periods: 45

TEXT BOOK:

1. Annie Berther, *Alter Ego*, Hachette Publications, 2012.

REFERENCE BOOKS:

1. RegineMerieux, Yves Loiseau, *Connexions*, Goyall Publishers, 2011.

2. DelphineRipaud,*Saison*, French and Euroean Inc., 2015.

IV B.Tech. - I Semester

(16BT6HS06) **GERMAN LANGUAGE (Deutsch alsFremdsprache)**

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:–

COURSE DESCRIPTION:
Oral communication; Basic grammar; Advanced grammar; Basic writing; Berufsdeutcsch (Business German)

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. demonstrate knowledge in
- Process of communication
- Modes of listening
- Paralinguistic features
- Skimming and Scanning
- Elements of style in writing

CO2. analyze the possibilities and limitations of language, understanding
- Barriers to Communication
- Barriers to Effective Listening
- Barriers to Speaking
- Formal and metaphorical language

CO3. design and develop language skills for professional practice**.**

CO4. apply basic writing skills in writing Emails and understanding wide range of technical terminologies.

CO5. understandGerman culture and civilization.

CO6. communicate effectively with the native German in day to day situation**.**

DETAILED SYLLABUS:

UNIT-I: ORAL COMMUNICATION (09 Periods)
Introduction - Language as a Tool of Communication, German alphabets, Phonetics and pronunciation, making contacts, giving information, Arranging things, Expression of feelings.

UNIT-II: BASIC GRAMMAR (09 Periods)
Introduction –Articles, Verbs, Nouns, Numbers, Gender, Pronouns, Sentence structure – Case study.

UNIT-III: ADVANCED GRAMMAR (09 Periods)
Introduction -Adjectives, Prepositions, Introduction to tenses – Present tense, past tense and future tense, Active and Passive voice, Introduction to Case- Akkusativ, Nominativ, Dativ & Genetiv Case.

UNIT-IV: BASIC WRITING (09 Periods)
Introduction -Introduction to written communication, Pre-writing, Creating context for writing and Data collection, fill in forms, Write greeting cards, Invitations and Short personal announcements, Short text to describe photos and pictures.

UNIT-V: BERUFSDEUTCSCH (BUSINESS GERMAN) (09 Periods)
Introduction - E-mail writing, Letter writing, Learning technical vocabulary and its application.
Case studies of influential German companies, Learning computer/desktop/new age- media vocabulary, Introduction to how to present a topic, Fixing an Appointment.

Total Periods: 45

TEXT BOOK:

1. Heuber,*Tangram Aktuelleins*, HeuberVerlag Publications, 2011.

REFERENCE BOOKS:

1. Anta Kursisa, Gerhard Newner, Sara vicenta, *Fir fuer Deutsch 1 und Deutsch 2,* HeuberVerlag Publications, 2005.

2. Herman Funk,*Studio D A1*, Cornelsen GOYAL SAAB Publication, 2011.

IV B.Tech. - I Semester

(16BT6HS07) **INDIAN CONSTITUTION**

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —

COURSE DESCRIPTION:

Elements, functions and functionaries according to Indian Constitution, understanding forbetter professional practice and good citizenry.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. demonstrate knowledge in

- Parliamentary proceedings, laws, legislature, administration and its philosophy
- Federal system and judiciary of India
- Socials problems and public services like central civil services and state civil services
- Indian and international political aspects and dynamics

CO2. develop etiquette and professional behavior in line with the constitution of India for becoming a responsible citizen

DETAILED SYLLABUS:

UNIT-I: PREAMBLE AND ITS PHILOSOPHY **(08 Periods)**

Introduction and Evolution of Indian Constitution, preamble and its Philosophy.

UNIT-II: UNION GOVERNMENT **(08 Periods)**

Powers, Functions and Position of President, Vice-President and Council of Ministers, Composition of parliament, Constitution Amendment Procedure, Financial Legislation in Parliament.

UNIT-III:FEDERAL SYSTEM **(14 Periods)**

Centre-State relations, Directive Principles of State Policy, Fundamental Rights and Duties, Centre-State Relations, Features of Federal System, Administrative Relationship between Union and States, Powers, Functions and Position of Governors, Function of Chief Ministers, Council of Ministers, Composition and powers of the State Legislature.

UNIT-IV:JUDICIARY AND PUBLIC SERVICES **(10 Periods)**

The Union Judiciary - Supreme Court and High Court, All India Services, Central Civil Services, State Services, Local Services and Training of Civil Services.

UNIT-V: INTERNATIONAL POLITICS **(05 Periods)**

Foreign Policy of India, International Institutions like UNO, WTO, SAARC and Environmentalism.

Total Periods: 45

TEXT BOOK:

1. Briji Kishore Sharma, *Introduction to the Constitution of India*, Prentice Hall of India, 2005.

REFERENCE BOOKS:

1. Mahendra Pal Singh, V. N. Shukla's, *Constitution of India*, Eastern Book Company, 2011.
2. Pandey J. N, *Constitutional Law of India* - Central Law Agency, 1998.

IV B.Tech. - I Semester
(16BT6HS08) INDIAN ECONOMY
(Open Elective)
(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —

COURSE DESCRIPTION:
Introduction; Time Value of Money; Elementary Economic Analysis; Value analysis, Value Engineering; Economic Planning.

COURSE OUTCOMES:
On successful completion of the course, the students will be able to

CO1. demonstrate knowledge in
- Micro and Macro Economics.
- Traditional and Modern methods of Capital Budgeting.
- Five year plans and NITI Aayog.

CO2. analyze
- Capital Budgeting.
- Value Analysis and Value Engineering.
- Economic analysis
- Law of supply and demand

CO3. understand the nuances of project management and finance

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION **(09 Periods)**
Economics- Flow in an Economy, Law of Supply and Demand; Micro and Macro Economics; Relationship between Science, Engineering, Technology, and Economic Development; Concept of Engineering Economics-Types of Efficiency, Definition and Scope of Engineering Economics.

UNIT-II: TIME VALUE OF MONEY **(12 Periods)**
Concepts and Application; Capital Budgeting-Traditional and Modern Methods; Simple and Compound Interest, Cash Flow Diagram, Principle of Economic Equivalence; Evaluation of Engineering Projects – Present Worth Method, Future Worth Method, Annual Worth Method, Internal Rate of Return Method, Cost-benefit Analysis in Public Projects; Depreciation Policy-Depreciation of Capital Assets, Causes of Depreciation, Straight Line Method and Declining Balance Method.

UNIT-III: ELEMENTARY ECONOMIC ANALYSIS **(09 Periods)**
Economic Analysis – Meaning, Significance, Simple Economic Analysis; Material Selection for a Product, Substitution of Raw Material; Design Selection for a Product; Material Selection-Process Planning, Process Modification.

UNIT-IV: VALUE ENGINEERING **(06 Periods)**
Introduction- Value Analysis, Value Engineering, Functions, Aims; Value Analysis vs. Value Engineering; Value Engineering Procedure- Advantages, Application Areas.

UNIT-V: ECONOMICPLANNING **(09 Periods)**
Introduction- Need For Planningin India,Five year plans(1951-2012), NITI Aayog(from 2014 onwards); Inclusive Growth-Meaning, Significance, Need for inclusive growth in India, Strategy for more inclusive growth, Challenges and Prospects; Employment and Inclusive Growth in India, Role of engineers in sustaining inclusive growth.

Total Periods: 45

TEXT BOOKS:

1. Panneer selvam R, *Engineering Economics*, PHI Learning Private Limited, Delhi, 2nd edition,2013.
2. Jain T.R., V. K.Ohri, O. P. Khanna. *Economics for Engineers*, VK Publication, 1st edition, 2015.

REFERENCE BOOKS:

1. DuttRudar & Sundhram K. P. M., *Indian Economy*, S. Chand, New Delhi, 62nd revised Edition, 2010.

2. Misra, S.K. & V. K. Puri., *Indian Economy: Its Development Experience*, Himalaya Publishing House, Mumbai 32nd edition, 2010.

IV B.Tech. - I Semester

(16BT6HS09) INDIAN HERITAGE AND CULTURE

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION:
Basic traits of Indian Culture; Humanistic Reforms under Jainism and Buddhism; Culture in the medieval period; Socio Religious reforms in Indian Culture; Reform movements for harmonious relations.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge in
- Human aspirations and values in Vedic culture.
- Cultural aspects of Buddhism and Jainism
- Unification of our country under Mourya's and Gupta's administrations
- Socio Religious aspects of Indian culture
- Reform movements and harmonious relations.

CO2. apply ethical principles and reforms as models for the upliftment of the societal status in the present culturalcontexts

DETAILED SYLLABUS:

UNIT-I: BASIC TRAITS OF INDIAN CULTURE (09 Periods)
Meaning and definition and various interpretations of culture.Culture and its features.The Vedic and Upanishadic culture and society.Human aspirations and values in these societies.Chaturvidhapurushardhas, Chaturashrma and Chaturvarna theory.

UNIT-II: HUMANISTIC REFORMS UNDER JAINISM AND BUDDHISM (09 Periods)
Salient features of Jainism - contributions of Jainism to Indian culture. Contributions of Aachaarya and Mahaapragya.Buddhism as a humanistic culture.The four noble truths of Buddhism.Contributions of Buddhism to Indian culture.

UNIT-III: CULTURE IN THE MEDIEVAL PERIOD (09 Periods)
Unifications of India under Mouryas and Guptas and their cultural achievements. Cultural conditions under satavahanas. Contributions to pallavas and cholas to art and cultural achievements of vijayanagara rulers.

UNIT-IV: SOCIO RELIGIOUS REFORMS IN INDIAN CULTURE (09 Periods)
Western impact on India, Introduction of western education, social and cultural awakening and social reform movements of Rajaramohan Roy – DayanandhaSaraswathi- Anne Besant. (theosophical society)

UNIT-V: REFORM MOVEMENTS FOR HARMONIOUS RELATIONS (09 Periods)
Vivekananda, Eswar Chandra vidyasagar and Veeresalingam- emancipation of women and struggle against caste. Rise of Indian nationalism. Mahatma Gandhi- Nonviolence and satyagraha and eradication of untouchability.

Total Periods: *45*

TEXT BOOK:

1. ValluruPrabhakaraiah, *Indian Heritage and Culture*, Neelkamal Publications Pvt. Ltd. Delhi, 1st edition, 2015.

REFERENCE BOOKS:

1. L. P. Sharma, *History of Ancient India*, Konark Publishers, Pvt. Ltd., New Delhi, 2010.
2. L. P. Sharma, *History of Medieval India*, Konark Publishers, Pvt. Ltd., New Delhi, 2010.
3. L. P. Sharma, *History of Modern India*, Konark Publishers, Pvt. Ltd., New Delhi, 2010.

4. The Cultural Heritage of India Vol-I, II, III, IV, V, *The Ramakrishna Mission Institute of Culture*, Calcutta.

IV B.Tech. - I Semester

(16BT6HS10) **INDIAN HISTORY**

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION:
Introduction; Ancient India; Classical and Medieval era; Modern India; India after independence.

COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on evolution and history of India as a nation
CO2. analyze social and political situations of past and current periods
CO3. practice in career or at other social institutions morally and ethically

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION **(08 Periods)**
Elements of Indian History; History Sources: Archaeology, Numismatics, Epigraphy & Archival research; Methods used in History; History & historiography; sociological concepts-structure, system, organization, social institutions, Culture and social stratification (caste, class, gender, power), State& Civil Society.

UNIT-II: ANCIENT INDIA **(09 Periods)**
Mohenjo-Daro civilization; Harappa civilization; Mauryan Empire.

UNIT-III: CLASSICAL AND MEDIEVAL ERA **(12 Periods)**
Classic Era (200 BC - 1200 AD); Hindu - Islamic Era (1200 - 1800 AD).

UNIT-IV: MODERN INDIA **(06 Periods)**
Age of Colonialism (17^{th} - 19^{th} centuries); First war of Indian Independence; Freedom Struggle (1857-1947).

UNIT-V: INDIA AFTER INDEPENDENCE (1947 -) **(10 periods)**
The Evolution of the Constitution and Main Provisions; Consolidation of India as a Nation; Politics in the States; Indian economy; Modernization and globalization, Secularism and communalism, Nature of development, Processes of social exclusion and inclusion, Changing, Nature of work and organization.

Total Periods: 45

TEXT BOOK:

1. K. Krishna Reddy, *Indian History*, Tata McGraw-Hill, 21^{st} reprint,2017.

REFERENCE BOOKS:

1. Guha, Ramachandra, *India after Gandhi*, Pan Macmillan, 2007.

2. Thapar, Romila, *Early India*, Penguin, 2002.

IV B.Tech. - I Semester

(16BT6HS11) **PERSONALITY DEVELOPMENT**

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION:
Self-esteem & Self-Management; Developing Positive Attitudes; Self-Motivation & Self-Management; Getting Along with the Supervisor; Workplace Success.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge in
- Self-Management
- Planning Career

CO2. analyze the situations based on
- Attitudes
- Thinking strategies

CO3. design and develop the functional skills for professional practice in

CO4. function effectively as an individual and as a member in diverse teams.

CO5. communicate effectively in public speaking in formal and informal situations.

DETAILED SYLLABUS:

UNIT-I: SELF-ESTEEM AND SELF-IMPROVEMENT (09 Periods)
Know Yourself – Accept Yourself; Self-Improvement: Plan to Improve - Actively Working to Improve Yourself.
Case study: 1

UNIT-II: DEVELOPING POSITIVE ATTITUDES (09 Periods)
How Attitudes Develop – Attitudes are Catching – Improve Your Attitudes.
Case study: 2

UNIT-III: SELF-MOTIVATION AND SELF-MANAGEMENT (09 Periods)
Show Initiative – Be Responsible Self-Management; Efficient Work Habits – Stress Management – Employers Want People Who can Think – Thinking Strategies.
Case study: 3

UNIT-IV: GETTING ALONG WITH THE SUPERVISOR (09 Periods)
Know your Supervisor – Communicating with Your Supervisor – Special Communications With Your Supervisor – What Should You Expect of Your Supervisor? – What Your Supervisor Expects of You - Moving Ahead Getting Along with Your Supervisor.
Case study: 4

UNIT-V: WORKPLACE SUCCESS (09 Periods)
First Day on the Job – Keeping Your Job – Planning Your Career – Moving ahead.
Case study: 5

Total Periods: 45

TEXT BOOK:
1. Harold R. Wallace and L. Ann Masters, *Personality Development*, Cengage Learning, Delhi, 6th Indian Reprint 2011.

REFERENCE BOOKS:

1. Barun K. Mitra, *Personality Development and Soft Skills,* Oxford University Press, New Delhi, 2011.
2. Stephen R. Covey, *The 7 Habits of Highly Effective People*, Free Press, New York, 1989.
3. K. Alex, *Soft Skills*, S. Chand & Company Ltd, New Delhi, Second Revised Edition 2011.

4. Stephen P. Robbins and Timothy A. Judge, *Organizational Behaviour*, Prentice Hall, Delhi, 16th edition 2014.

IV B.Tech. - I Semester

(16BT6HS12) **PHILOSOPHY OF EDUCATION**

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION:
Introduction to Philosophy and Engineering Education; Philosophical methods and their implications in engineering; Philosophical education in India; Values and Engineering education; Outcome based education.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge in
- Philosophy of Engineering education.
- Philosophical Methods.
- Knowledge acquiring methods.
- Engineering education and responsibilities.

CO2. understand the impact of Outcome Based Education for effective educational outcomes

CO3. apply reasoning to assess societal issues with the contextual knowledge of engineering education and responsibilities.

DETAILED SYLLABUS:

UNIT-I:INTRODUCTION TOPHILOSOPHY AND ENGINNERING EDUCATION (09 Periods)
Concept , Significance, and Scope of Philosophy in Engineering – Aims of Engineering Education – relationship between philosophy and engineering education – speculative, normative and critical approaches of philosophy in engineering.

UNIT-II:PHILOSOPHICAL METHODS AND THEIR IMPLICATIONS INENGINEERING (09 Periods)
Introduction to Philosophical approaches: Idealism, Naturalism, Pragmatism, Realism and Existentialism; Significance and Scope in Engineering Education.

UNIT-III: PHILOSOPHICAL EDUCATION IN INDIA (09 Periods)
Different branches of philosophy- meaning, Epistemology: nature and scope; Knowledge acquiring methods;Kinds and instruments of knowledge; Re-shapingof educational thoughts by Indian thinkers: Rabindranath Tagore, Sri Aurobindo Gosh, Mahatma Gandhi,Jiddu Krishnamurthy and Swamy Vivekananda.

UNIT-IV: VALUES AND ENGINEERING EDUCATION (09 Periods)
Introduction; Engineering educationand responsibilities: health,social, moral, ethics aesthetic;Value: crisis and strategies forinculcation;

Case study: Engineering Solutions given by Mokshagundam Visvesvaraya.

UNIT-V: OUTCOME-BASED EDUCATION (09 Periods)
Institutional visioning;educational objectives; programme outcomes, curriculum,stakeholders, infrastructure and learning resources; governance and management, quality in education.

Total periods: 45

TEXT BOOKS:

1. Ganta Ramesh, *Philosophical Foundations of Education*, Neelkamal Publications, 1st edition,2013.
2. CarlMicham,*Thinking through technology (The Paths between Engineering and Philosophy)*, University of Chicago Press, 1st edition,1994.
3. Louis L Bucciarelli, *Engineering Philosophy,* Delft University Press, 1st edition, 2003.
4. NBA/ABET Manuals.

REFERENCE BOOKS:

1. Louis L Bucciarelli, *Philosophy of Technology and Engineering Sciences*, North Holland, 1st edition, 2009 (e-book).

2. Samuel Florman, *Existential pleasures of education*, Martins's Griffin S.T. publication, 1st edition, 1992.

IV B.Tech. - I Semester

(16BT6HS13) PUBLIC ADMINISTRATION

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION:

Introduction; Public Policy; Good Governance; E-Governance; Development Administration.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge in
- Public Policy.
- Good Governance.
- E-governance.
- Development Administration.

CO2. analyze the possibilities and limitations ofexisting policies through Good Governance perspective.

CO3. design and develop solutions in e-governance modelsto find and provide opportunities in e-governance.

CO4. adopt principles ofe-governance in addressing the existing issues and challenges in e-governance sector.

CO5. understand the significance of Administrative Development in finding professional engineering solutions by probing
- Bureaucracy.
- Role of civil society.

DETAILEDSYLLABUS:

UNIT-I: INTRODUCTION **(09 Periods)**

Public and Private Administration- Differences and Similarities, Meaning, Scope; Importance of Public Administration in Modern Era; Public Administration and its implications in the field of Engineering.

Case Study: Unique Identification Authority of India (UIDAI):Aadhaar Project: Challenges Ahead.

UNIT-II: PUBLIC POLICY **(09 Periods)**

Meaning and Scope; Policy Formulation in India; Policy making process; Policy Implementation.

Engineering and Public Policy**,**Social, ethical, Monetary and fiscal policies; policy implications of engineering;The engineer's role in Public Policy.

Case Study:NITI Aayog: Demonetization and Aftermath of Demonetization – Cashless transactions.

UNIT-III: GOOD GOVERNANCE **(09 Periods)**

Significance; Objectives;Concepts;Reforms;Organization and its basic problemsAdministrative and Governance reforms in India; Sustainable and Inclusive growth in India;Engineering and Sustainable Environment-Role of Engineers; Right to information Act.

Case Study: Strategies in Good Governance: A Case Study of Karnataka, Kerala and Orissa.

UNIT-IV: E-GOVERNANCE **(09 Periods)**

Meaning, Significance, Issues in E-governance; E-governance Models, Problems and Opportunities; Application of DataWarehousing and Data Mining in Governance; Engineers role in re-engineering E-governance.

Case Study: e-Housing System for Bhavana Nirman Dhanasahayam Online disbursement of housing assistance in Kerala.

UNIT-V: DEVELOPMENT ADMINISTRATION **(09 Periods)**

Introduction; Development Administration-Administrative Development- Sustainable Development - Significance- Objectives; Bureaucracy - Personnel administration and human resources development; Role of civil society-Citizens and administration;Development and Engineering: Issues Challenges and Opportunities.

Case Study: Neeru-Chettu (Water-Tree) of Andhra Pradesh.

Case Study: TPDDL of Delhi and Odisha. **Total Periods: 45**

TEXT BOOKS:

1. M.P. Sharma, B.L. Sadana, Harpreet Kaur, *Public Administration in Theory and Practice,* Kitab Mahal, Mumbai, 1st edition,2014.
2. CSR Prabhu, *E., Governance – concepts and case studies*, PHI, New Delhi, 2nd edition, 2012.

REFERENCE BOOKS:

1. Surendra Munshi, Bijupaul Abraham, *Good Governance, Democratic societies and Globalization,* Sage publications, New Delhi, 1st edition, 2004.
2. R.K.Sapru, *Public Policy,*Sterling Publishers Pvt. Ltd., New Delhi, 1st edition, 2001.

IV B.Tech. - I Semester

(16BT60112) **BUILDING MAINTENANCE AND REPAIR**

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION:

Durability of buildings, Failure and repair of buildings, Material Techniques for repair, Maintenance of buildings, Conservation and recycling.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate basic knowledge on durability and serviceability, failures, repair and rehabilitation of buildings.
CO2. analyzefailures, repair and rehabilitation techniques.
CO3. solve complex building maintenance problems through proper investigations and interpretation.
CO4. use modern tools and techniques for various repairs and rehabilitation of structures.
CO5. provide solutions for building maintenance and repair problems considering health and safety.
CO6. consider environmental sustainability in building maintenance and repair.
CO7. maintain ethical standards for quality in repairs and rehabilitation of structures.
CO8. evaluate specifications and perform cost analysis of building components while repair and rehabilitation.

DETAILED SYLLABUS:

UNIT-I: DURABILITY AND SERVICEABILITY OF BUILDINGS (10 Periods)

Life expectancy of different types of buildings; Effect of environmental elements such as heat, dampness, frost and precipitation on buildings; Effect ofchemical agents on building materials, Effect of pollution on buildings, Effect of fire onbuilding; Damage by biological agents like plants, trees, algae, fungus, moss, insects, etc.; Preventive measures on various aspects, Inspection, Assessment procedure for evaluating for damaged structures, Causes of deterioration, Testing techniques.

UNIT-II:FAILURE AND REPAIR OF BUILDINGS (10 Periods)

Building failure – Types, Methodology for investigation; Diagnostictesting methodsandequipment, Repair of cracks inconcrete and masonry, Materials for Repair,Methods of repair, Repair and strengthening of concrete buildings, Foundationrepair and strengthening, Underpinning, Leakage of roofs and repair methods.

UNIT-III: TECHNIQUES FOR REPAIR (08 Periods)

Rust eliminators and polymers coating for rebars during repair, Foamed concrete, Mortar and dry pack, Vacuum concrete, Gunite and shotcrete, Epoxy injection, Mortar repairs for cracks, Shoring and underpinning.

UNIT-IV: MAINTENANCE OF BUILDINGS (09 Periods)

Reliability principles and its applications in selection of systemsfor building, Routine maintenance of building, Maintenance cost, Specifications formaintenance works, Dampness-Damp proof courses, Construction details for prevention ofdampness; Termite proofing, Fire protection, Corrosion protection.

UNIT-V: CONSERVATION AND RECYCLING (08 Periods)

Performance of construction materials and components in service, Rehabilitation of constructed facilities, Conservation movement, Materials and methodsfor conservation work, Recycling of old buildings and its advantages, Examples. **Total Periods: 45**

TEXT BOOKS:

1. Dennison Campbell, Allen and Harold Roper, *Concrete Structures – Materials, Maintenance and Repair*, Longman Scientific and Technical, UK, 1991.
2. Allen, R.T. L., Edwards, S.C. and J. D. N. Shaw,*TheRepair of Concrete Structures*, Blackie Academic & Professional, UK, 1993.

REFERENCE BOOKS:

1. Peter H. Emmons, *Concrete Repair and Maintenance*, John Wiley and Sons Publications, 2002.
2. Building Constructionunder Seismic Conditions in the Balkan Region, UNDP/UNIDO Project Rer/79/015,Volume 5, *Repair and Strengthening of Reinforced Concrete, Stone and Brick Masonry Buildings*, United Nations Industrial Development Organisation, Vienna.
3. Shetty, M. S., *Concrete Technology*, S. Chand and Company.
4. Smith, P. and Julian, W., *Building Services*, Applied Science Publications, London, 1976.
5. SP: 25, BIS;*Causes and Prevention of Cracks in Buildings*.

6. Champion, S., *Failure and Repair of Concrete Structures*, John Wiley and Sons Publications, 1961.
7. Perkins, P. H., Repair, Protection and Water Proofing of Concrete Structures, E & FN Spon, UK, 3rd edition, 1997.

IV B.Tech. - I Semester

(16BT60113) **CONTRACT LAWS AND REGULATIONS**

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —

COURSE DESCRIPTION:
Construction contracts; Tenders; Arbitration; Legal requirements; Labour regulations.

COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate basic Knowledge on construction contracts, tenders, arbitration, legalrequirements and labour regulations.
CO2. analyze contracts and tenders.
CO3. address the legal issues in contracts and tenders.
CO4. follow laws and regulations in the preparation of contracts and tenders.
CO5. prepare contract and tender documents as per the standards.
CO6. consider project schedule, cost, quality and risk in the preparation of contracts and tenders.

DETAILED SYLLABUS:
UNIT-I:CONSTRUCTION CONTRACTS (09 Periods)
Indian contracts act, Elements of contracts, Types of contracts, Features, Suitability, Design of contract documents, International contract document and laws, Standard contract document, Law of torts.

UNIT-II: TENDERS (09 Periods)
Prequalification, Bidding, Accepting; Evaluation of tender from technical, contractual and financial points of view; Two cover system, Preparation of the documentation, Contract formation and interpretation, Potential contractual problems, Price variation clause, Comparison of actions and laws, Subject matter, Violations.

UNIT-III: ARBITRATION (09 Periods)
Arbitration, Comparison of actions and laws, Agreements, Appointment of arbitrators, Conditions of arbitration, Powers and duties of arbitrator, Rules of evidence, Enforcement of award, Arbitration disputes, Dispute review board.

UNIT-IV: LEGAL REQUIREMENTS (09 Periods)
Legal requirements for planning, Property law, Agency law, Tax laws – Income tax, Sales tax, Excise and custom duties, Local government approval, Statutory regulations, Insurance and bonding, Laws governing purchase and sale, Use of urban and rural land, Land revenue codes, EMD, Security deposits, Liquidated damages.

UNIT-V:LABOUR REGULATIONS (09 Periods)
Social security, Welfare legislation; Laws relating to wages, bonus and industrial disputes; Labour administration, Insurance and safety regulations, Workmen's compensation act, Maternity benefit act, Child labour act, Other labour laws. **Total Periods: 45**

TEXT BOOKS:

1. **Subba Rao,G.C.V., *Law of Contracts I & II*, S. Gogia & Co., 11th edition, 2011.**
2. Jimmie Hinze, *Construction Contracts,*McGraw Hill, 3rd edition, 2011.

REFERENCE BOOKS:
1. Kishore Gajaria, *GT Gajaria's Law Relating to Building and Engineering Contracts in India*, Lexis Nexis Butterworths India, 4th edition, 2000.
2. Patil, B. S,*Civil Engineering Contracts and Estimates*, University Press (India) Private Ltd., 4th edition, 2015.

3. Joseph T. Bockrath, *Contracts and the Legal Environment for Engineers and Architects*, McGraw Hill Education, 7th edition, 2010.
4. AkhileshwarPathak, *Contract Law*, Oxford University Press, 2011.

IV B.Tech. - I Semester
(16BT60114) **DISASTER MITIGATION AND MANAGEMENT**
(Open Elective)
(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION:
Disasters; Earthquakes; Floods; Cyclones; Droughts; Landslides; Disaster management.

COURSE OUTCOMES: On successful completion of course, students will be able to:
CO1. demonstrate knowledge on disasters, their vulnerability and mitigation measures.
CO2. analyze disasters and their vulnerability.
CO3. design strategies for effective disaster mitigation.
CO4. address pre and post disaster issues for better preparedness and mitigation measures, through proper analysis and interpretation.
CO5. use appropriate methods in disaster mitigation and management.
CO6. use historical data of disasters to inform the people over preparedness and mitigation measures.
CO7. solve disaster related issues considering environment.
CO8. consider economical issues in disaster management.

DETAILED SYLLABUS:
UNIT-I: DISASTERS **(09 Periods)**
Types of disasters - Natural disasters; Impact of disasters on environment, infrastructure and development; Concepts of hazards and vulnerability analysis, Hazard Assessment, Guidelines for hazard assessment and vulnerability analysis, Basic principles and elements of disaster mitigation.
UNIT-II: EARTHQUAKES **(09 Periods)**
Introduction to earthquake, Intensity scale (MSK–64), Seismic activity in India, Seismic zones of India, Earthquakes in A.P., Action plan for earthquake disaster preparedness, Elements at risk, Recovery and rehabilitation after earthquake, Earthquake resistant design and construction of buildings; Tsunami – Onset, Types and causes,Warning, Elements at risk, Typical effects, Specific preparedness and mitigation strategies.
UNIT-III: FLOODS, CYCLONES AND DROUGHTS **(11 Periods)**
Floods and Cyclones: Onset, Types, Warnings; Elements at risk, Typical effects, Indian floods and cyclones, Hazard zones, Potential for reducing hazards, Mitigation strategies and community based mitigation.
Droughts: Onset, Types and warning; Causes, Impact, Early warning and response mechanisms, Mitigation strategies, Droughts in India.
UNIT-IV: LANDSLIDES **(08 Periods)**
Onset, Types and warning; Causes, Elements at risk, Indian landslides, Hazards zones, Typical effects, Mitigation strategies and community based mitigation.
UNIT-V: DISASTER MANAGEMENT **(08 Periods)**
Disaster management organization and methodology, Disaster management cycle, Disaster management in India – Typical cases; Cost–benefit analysis with respect to various disaster management programs implemented by NGOs and Government of India.

Total Periods: 45

TEXT BOOKS:
1. V. K. Sharma, *Disaster Management, Medtech Publishing,* 2nd edition, 2013.
2. Anand S. Arya, AnupKaranth, and AnkushAgarwal, *Hazards, Disasters and Your Community: A Primer for Parliamentarians,* GOI–UNDP Disaster Risk Management Programme, Government of India, National Disaster Management Division, Ministry of Home Affairs, New Delhi, Version 1.0, 2005.

REFERENCE BOOKS:

1. Donald Hyndman and David Hyndman, *Natural Hazardsand Disasters*, Cengage Learning, 3rd edition, 2011.
2. *Disaster Management in India,* AStatus Report, Ministry of Home Affairs, Govt. of India, May, 2011.
3. Rajendra Kumar Bhandari, *Disaster Education and Management: A Joyride for Students, Teachers, and Disaster Managers*, Springer India, 2014.
4. R. B. Singh, *Natural Hazards and Disaster Management*, Rawat Publications, 2009.

IV B.Tech - I Semester

(16BT60115) **ENVIRONMENTAL POLLUTION AND CONTROL**

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —

COURSE DESCRIPTION:

Fundamentals ofair pollution;Dispersion of pollutants; Effects and control of air pollution; Water pollution;Soil pollution and control; Municipal solid waste management.

COURSE OUTCOMES: On successful completion of the course,
students will be able to

CO1. demonstrateknowledge on air, water, soil pollution and their control and solid waste management.
CO2. analyze causes and effects of air, water and soilpollution and their remedial measures.
CO3. recommend suitable solutionsto complex environmental pollution problems.
CO4. use appropriate remedial technique to solve environmental pollution problems.
CO5. understand the effects of environmental pollutionon human health and vegetation.
CO6. encourage sustainable development through implementation of pollution control measures.
CO7. maintain IS Codes for environmental quality control.

DETAILED SYLLABUS:

UNIT-I: AIR AND NOISE POLLUTION (08 Periods)

Air Pollution: Scope, Significance, Classification, Sources – Line, Area, Stationary, Mobile; Effects of air pollutants on man, material and vegetation; Global effects of air pollution; Air pollution meteorology - Lapse rate, Inversion, Plume pattern;Dispersion of air pollutants - Dispersion models and applications; Ambient air quality standards.

Noise Pollution: Sound pressure, Power and intensity,Impacts of noise, permissible limits of noise pollution, measurement of noise.

UNIT-II: AIR AND NOISE POLLUTIONCONTROL (10 Periods)

Self-cleansing properties of the environment,Dilution method, Control at source, Process changes and equipment modifications, Control of particulates–Types of equipment, Design and operation – Settlingchambers,Centrifugal separators, Bag house filters, Wet scrubbers, Electrostatic precipitators; Control of gaseouspollutants – Adsorption, Absorption, Condensation, Combustion; Control of air pollution from automobiles, Control of noise pollution.

UNIT-III: WATER POLLUTIONAND CONTROL (10 Periods)

Water pollution – Sources, Causes, Effects; Surface and groundwater quality – Physical, Chemical, Biological; Drinking water quality standards, Water purification – Processes, Engineered systems – Aeration, Solids separation, Settling operations, Coagulation, Softening, Filtration, Disinfection; Wastewater – Sources, Causes, Effects, Treatment and disposal – Primary, Secondary, Tertiary; Case studies.

UNIT-IV: SOIL POLLUTION AND CONTROL (08 Periods)

Soil pollutants, Sources of soil pollution, Causes, Effectsand control of soil pollution, Diseases caused by soil pollution, Methods to minimize soil pollution, Effective measures to control soil pollution, Case studies.

UNIT-V: MUNICIPAL SOLID WASTE MANAGEMENT (09 Periods)

Types of solid waste, Composition of solid waste, Collection and transportation of solid waste, Methods of disposal – Opendumping, Sanitary landfill, Composting, Incineration, Utilization - Recovery and recycling, Energy Recovery. **Total Periods: 45**

TEXT BOOKS:

1. Peavy, H. S, Rowe, D. R., and Tchobanoglous, G., *Environmental Engineering*, McGraw Hill Inc., 1985.
2. C.S.Rao, *Environmental Pollution Control Engineering*, New Age International Pvt. Ltd., 2nd edition, 2007.
3. Ibrahim A. Mirsa, *Soil Pollution: Origin, Monitoring & Remediation*, Springer, UK, 2nd edition, 2008.

REFERENCE BOOKS:

1. M.N. Rao and H.V.N. Rao, *Air Pollution,* Tata McGraw–Hill Education Pvt. Ltd., 19th edition, 2010.
2. Daniel Vallero, *Fundamentals of Air Pollution,* Academic Press (Elsevier), 5th edition, 2014.
3. S.M.Khopkar,*Environmental Pollution Monitoring and Control,* New Age International Pvt. Ltd., 2nd edition, 2007.
4. V. M. Domkundwar, Environmental Engineering, Dhanpat Rai & Co. Pvt. Ltd., New Delhi, 2014.

IV B.Tech - I Semester
(16BT60116) PLANNING FOR SUSTAINABLE DEVELOPMENT
(Open Elective)
(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —

COURSE DESCRIPTION:
Sustainable development;Environmental impact;Sustainable Policies; Governance; Theories and strategies; Media and education for sustainability.

COURSE OUTCOMES: On successful completion of the course, students will be able to
- CO1. demonstrate the knowledge on sustainable development, environmental impact, sustainable policies, governance, systems and strategies, media and education for sustainability.
- CO2. analyze theories, environmental impact, policies, systems and strategies for sustainable development.
- CO3. develop suitable methods and systems for sustainable development.
- CO4. use appropriate techniquesin solving issues related to sustainable development.
- CO5. provide solutions to problems associated with sustainable development considering society.
- CO6. consider environment while planning sustainable development.
- CO7. communicate effectively on sustainable development issues through media and education.
- CO8. consider economical issues while planning for sustainable development.

DETAILED SYLLABUS:

UNIT-I: SUSTAINABLE DEVELOPMENT (09 Periods)
Definition and concepts of sustainable development, Capitalization of sustainability - National and global context;Millennium development goals, Emergence and evolution of sustainability and sustainable development, Theories of sustainability, Case studies.

UNIT-II: ENVIRONMENTAL IMPACT (09 Periods)
Climate change – Science, Knowledge and sustainability; Unforeseen environmental impacts on development, Challenges of sustainable development, Centrality of resources in sustainable development, Case studies.

UNIT-III: SUSTAINABLE POLICIES AND GOVERNANCE (09 Periods)
Governance - Democracy and Eco–welfare; Global civil society and world civil politics, Civic environmentalism, Policy responses to sustainable development, Economics of sustainability, Social responsibility in sustainability, National action, ISO 14001: Environmental management system.

UNIT-IV: SUSTAINABLE SYSTEMS AND STRATAGIES (09 Periods)
Need for system innovation, Transition and co–evolution, Theories and methods for sustainable development, Strategies for eco–innovation, Ecological foot print analysis, Socio ecological indicators – Eco labels; Policy programmes for system innovation, Case studies.

UNIT-V: MEDIA AND EDUCATION FOR SUSTAINABILITY (09 Periods)
Role of emerging media, Remarkable design and communication art, Activism and the public interest, Education for sustainability, Participation in decision making, Critical thinking and reflection, Case studies.

Total Periods: 45

TEXT BOOKS:

1. John Blewitt, *Understanding Sustainable Development*, Earth Scan Publications Ltd., 2nd edition, 2008.
2. Jennifer A. Elliot, *An Introduction to Sustainable Development*, Earth Scan Publications Ltd., 4th edition, 2006.

REFERENCE BOOKS:

1. Peter Rogers, Kazi F Jalal and John A Boyd, *An Introduction to Sustainable Development*, Earth Scan Publications Ltd., 2006.
2. Simon Dresner, *The Principles of Sustainability*, Earth Scan Publications Ltd., 2nd edition, 2008.
3. Peter Bartelmus, *Environment Growth and Development: The Concepts and Strategies of Sustainability*, Routledge, 3rd edition, 2003.
4. Gabriel Moser, Enric Pol, Yvonne Bernard, MiriliaBonnes, Jose Antonio Corraliza and Maria Vittoria Giuliani, *People Places and Sustainability*, Hogrefe & Huber Publishers, 2nd edition, 2003.

IV B.Tech. - I Semester

(16BT60117) **PROFESSIONAL ETHICS**

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —

COURSE DESCRIPTION:
Engineering ethics; Professional ideals and virtues; Engineering as social experimentation; Responsibilities and rights; Global issues.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate the principles of ethics, importance of professional values and social responsibility.
CO2. analyze the problems in the implementation of moral autonomy and use ethical theories in resolving moral dilemmas.
CO3. develop suitable strategies to resolve problems arise in practicing professional ethics.
CO4. provide solutions to complex problems associated with professional ethics by proper analysis and interpretation.
CO5. use appropriate theories in resolving issues pertain to professional ethics.
CO6. understand the impact of professional ethics on society and address the limitations of codes of ethics.
CO7. practice engineering with professionalism, accountability and ethics.
CO8. function as a member, consultant, manager, advisor and leader in multi-disciplinary teams.
CO9. write reports without bias and give instructions to follow ethics.

DETAILED SYLLABUS:

UNIT-I: ENGINEERING ETHICS (09 Periods)
Scope and aim of engineering ethics, Senses of engineering ethics, Variety of moral issues, Types of inquiry, Moral dilemmas, Moral autonomy-Kohlberg's theory, Gilligan's theory, Consensus and controversy.

UNIT-II:PROFESSIONAL IDEALS AND VIRTUES (08 Periods)
Theories about virtues, Professions, Professionalism, Characteristics, Expectations, Professional responsibility, Integrity, Self-respect, Sense of responsibility, Self-interest, Customs and religion, Self-interest and ethical egoism, Customs and ethical relativism, Religion and divine command ethics, Use of ethical theories, Resolving moral dilemmas and moral leadership.

UNIT-III:ENGINEERING AS SOCIAL EXPERIMENTATION (10 Periods)
Engineering as experimentation, Similarities to standard experiments, Learning from the past and knowledge gained, Engineers as responsible experimenters, Conscientiousness, Moral autonomy and accountability, The challenger case, Codes of ethics and limitations, Industrial standards, Problems with the law of engineering.

UNIT-IV: RESPONSIBILITIES AND RIGHTS (09 Periods)
Collegiality and loyalty, Respect for authority, Collective bargaining, Confidentiality, Conflict of interests, Occupational crime, Rights of engineers, Professional rights, Whistle-blowing, The BART case, Employee rights and discrimination.

UNIT-V: GLOBAL ISSUES (09 Periods)
Multinational corporations, Professional ethics, Environmental ethics, Computer ethics, Engineers as consultants, Witnesses, Advisors and Leaders, Engineers as Managers, Managerial ethics applied to Engineering Profession, moral leadership.

Total Periods: 45

TEXT BOOKS:

1. Mike W. Martin and Roland Schinzinger, *Ethics in Engineering*, Tata McGraw-Hill, 3rd edition, 2007.
2. Govindarajan, M., NataGovindarajan, M., Natarajan, S. and Senthilkumar, V. S., *Engineering Ethics*, Prentice Hall of India, 2004.

REFERENCE BOOKS:

1. S. Kannan and K. Srilakshmi, *Human Values and Professional Ethics*, Taxmann Allied Services Pvt Ltd., 2009.

2. Edmund G. Seebauer and Robert L. Barry, *Fundamental of Ethics for Scientists and Engineers*, Oxford University Press, 2001.
3. Charles F. Fledderman, *Engineering Ethics*, Pearson Education, 2nd edition, 2004.

IV B.Tech. - I Semester

(16BT60118) **RURAL TECHNOLOGY**

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION:
Rural technology; Non conventionalenergy; Community development; IT in rural development.

COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate the knowledge on technologies for rural development.
CO2. analyze various technologies available which are appropriate for rural development.
CO3. carryout feasibility study on the public and private partnership for rural development.
CO4. develop and use latest technologies for rural development.
CO5. address health and safety issues while choosing technologies for rural development.
CO6. educate the rural populace on the positive impacts of bio-fertilisers and usage of agro machinery in agriculture.

DETAILED SYLLABUS:

UNIT-I:RURAL TECHNOLOGY (09 Periods)
India - Technology and rural development, Pre and post-independence period,Rural India Life, Indian farmer, Role of science and technology in rural development, Rural technology and poverty eradication, Rural business hubs, Technology in improving rural infrastructure,Various organizations related to innovation, Issues of technology transfer - CAPART, NABARD, CSIR, NIF.

UNIT-II: NON CONVENTIONAL ENERGY (09 Periods)
Definition of energy, Types of alternative sources of energy, Sources of non-conventional energy – Solar energy: Solar cooker,Solar heater; Biogas, Recycling and management,Wastes conservation, Assessment and production of biomass products and their utilization.

UNIT-III: TECHNOLOGIES FOR RURAL DEVELOPMENT (09 Periods)
Food and agro based technologies, Tissue culture, Nursery,Building and construction technologies, Cultivation and processing of economic plants, Cottage and social industries.

UNIT-IV: COMMUNITY DEVELOPMENT (09 Periods)
Water conservation, Rain water Harvesting, Drinking water, Environment and Sanitation, Bio fertilizers, Medical and aromatic plants, Employment generating technologies–Apiculture, Pisciculture and Aquaculture.

UNIT-V:IT IN RURAL DEVELOPMENT (09 Periods)
Role of information technology (IT) in rural areas, Impact of IT in rural development, Need and necessity of technology, Corporate social responsibilities, Private sector participation (Activities in different spheres: Employment, Education, Health, Agriculture and service sectors) and SaansadAdarsh Gram Yojana (SAGY), Village adoptionschemes. **Total Periods: 45**

TEXT BOOKS:
1. M.S.Virdi, *Sustainable Rural Technologies*, Daya Publishing House, 2009.
2. S.V. Prabhathand, P. Ch. Sita Devi, *Technology and Rural India*, Serials Publications, 2012.

REFERENCE BOOKS:
1. R. Chakravarthy and P.R.S. Murthy, *Information Technology and Rural Development,*Pacific Book International, 2012.
2. Shivakanth Singh, *Rural Development Policies and Programmes,* Northern Book Centre, 2002.
3. L.M.Prasad, *Principles and Practice of Management*, S. Chand & Sons, 8th edition, 2014.

4. Venkata Reddy, K., *Agriculture and Rural Development -Gandhian Perspective*,Himalaya Publishing House, 2001.

IV B.Tech - I Semester

(16BT60308) GLOBAL STRATEGY AND TECHNOLOGY

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —

COURSE DESCRIPTION:
Introduction to strategic management; Strategic management process; Principles of good strategy; Globalization strategies; Research and Development strategies; Technology Management and Transfer; Elements of Transfer Process; Corporate Governance in the Indian scenario.

COURSE OUTCOMES:
On successful completion of the course, students will be able to

CO1. demonstrate the knowledge on Strategic management, Research & development strategies, Technology management and transfer, Globalization and Corporate governance.
CO2. identify and analyze crucial problems in strategic management to improve performance of the organizations.
CO3. develop the products and production process by using research and development strategies.
CO4. conduct investigations on the impact of globalization in current scenario in the context of corporate governance.
CO5. appraise the resources and capabilities of the firm in terms of their ability to confer sustainable development.
CO6. apply ethics in strategic decision making.

DETAILED SYLLABUS:

UNIT-I: STRATEGIC MANAGEMENT (09 Periods)
Introduction, Classes of decisions, Levels of strategy, Core competence, Strategic intent and stretch, Approaches to strategy making, Roles of different strategists, Strategic management- Process, Benefits, Limitations; Ethics in strategic decision making, Principles of good strategy, Strategic Management in India.

UNIT-II: RESEARCH & DEVELOPMENT STRATEGIES (09 Periods)
Concept, Evolution of R&D Management, R&D as a business, R&D as competitive advantage, Elements of R & D strategies, Integration of R & D, Selection and implementation of R & D strategies, R & D trends.

UNIT-III: TECHNOLOGY MANAGEMENT AND TRANSFER (09 Periods)
Technology Management: Introduction, Technology - Definition, Components, Classification Features; Technology Management- Concept, Nature; Drivers of Management of Technology- Significance, Scope, Responding to technology challenges.
Technology Transfer: Introduction, Definition, Classification, Significance, Elements of process, Types of Technology Transfer, Package, Modes of Transfer, Routes, Channels and Effectiveness of Technology Transfer.

UNIT-IV: GLOBALISATION (09 Periods)
Definition, Stages, Essential conditions for globalization, Globalization strategies, Competitive advantage of Nations, Factors affecting Globalization, Globalization of Indian business.

UNIT-V: CORPORATE GOVERNANCE: THE INDIAN SCENARIO (09 Periods)
Emergence of corporate governance in India- Landmarks, Models, Codes and status in India, Role and Responsibilities of Regulators, The Board of Directors; Corporate Governance- Specific issues in India, Family owned Business, Corporate Governance and the Indian ethos.

Total periods: 45

TEXT BOOKS:

1. Francis Cherunilam, *Strategic Management*, Himalaya Publishing House, 3rd edition, 2002.
2. C.S.G.Krishnamacharyulu and Lalitha Ramakrishnan, *Management of Technology*, Himalaya Publishing House, 2nd edition, 2012.

REFERENCE BOOKS:

1. White and Bruton, *The Management of Technology and Innovation: A Strategic Approach*, Cengage Learning, 1st edition, 2007.
2. S.K.Mandak, *Ethics in Business and Corporate Governance*, TMH, 2nd edition, 2012.

IV B.Tech - I Semester

(16BT60309) **INTELLECTUAL PROPERTY RIGHTS AND MANAGEMENT**

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —

COURSE DESCRIPTION:

Protection of ideas; innovation and artistic endeavors; Acts and procedure related to patents, trademarks, copy right, design registration, trade secrets and cyber laws; Infringement; Commercialization of intellectual property rights; Case studies in each.

COURSE OUTCOMES:

On successful completion of the course, students will be able to

CO1. demonstrate knowledge on intellectual property rights, patents, trademarks, copyrights, trade secrets and commercialization of intellectual property.

CO2. analyse the commercial significance of discoveries and developments and to assist in bringing these into public use.

CO3. investigate and ensure smooth transition from concept to final product by following National & International Laws of Intellectual Property.

CO4. utilize the various policies and procedures related to patents, trademarks and copyrights relating to IPR.

CO5. safeguard, review and manage the intellectual property so that it may receive adequate and appropriate legal protection against unauthorized use.

CO6. follow ethical standards in capacity building and work as a platform for development, promotion, protection, compliance, and enforcement of intellectual property and knowledge.

CO7. prepare documents and fill applications needed for filing a patent, design, copyright and trade mark.

DETAILED SYLLABUS:

UNIT-I: OVERVIEW OF INTELLECTUALPROPERTY RIGHTS (09 Periods)

Introduction, Intellectual Property vs. Conventional Property, and importance of intellectual property rights (IPRs), types of intellectual property, International Treaties for protection of IPR-Paris Convention, World Intellectual Property Organization (WIPO), World Trade Organization (WTO), Trade Related Aspects of Intellectual Property Rights (TRIP) Agreement, General Agreement on Tariffs and Trade(GATT).

UNIT-II: TRADEMARKS (09 Periods)

Introduction, Functions and kinds of trademarks, Trade Mark Registration Process, Post registration procedures, Trade Mark maintenance, Transfer of rights, Inter parties Proceedings, Infringement and Dilution of Ownership of Trade Mark, Trade Mark claims, International Trade Mark Law.

UNIT-III: PATENTS (09 Periods)

Introduction, Rights under Patent Law, Patent Application Process, Terms and Maintenance of Patents Requirements, Patent Ownership and Transfer, Licensing of Patent Rights, Sole and Joint Inventors, Disputes over Inventorship, Patent Infringement, International Patent Law, Patent Cooperation Treaty (PCT), Patent Law Treaty (PLT), Substantive Patent Law Treaty (SPLT).

UNIT-IV: COPY RIGHTS, TRADE SECRETS, CYBER LAWS (09 Periods)

Copy Rights: Introduction, nature and scope, subject matter, Rights afforded by copyright law, Copyrights ownership, transfers and duration, Copyright registration process.

Trade Secrets: Introduction, Determination of Trade Secret Status, Employer-Employee Relationships, Protection of submissions.

Cyber laws: E-commerce and cyber laws, cybercrime and legislation- need, objective and scope; IT Act 2000, Information Technology and Information Security.

UNIT-V: INDUSTRIAL DESIGN AND COMMERCIALIZATION OF INTELLECTUAL PROPERTY RIGHTS (09 Periods)

Industrial Design: Introduction, Indian Law related to registration of Industrial Designs, Essential requirements for registration of a design in India, International Agreements – Hague System; Conflicts related to registration of design.

Commercialization of Intellectual Property Rights: Competition and Confidentiality Issues, Antitrust Laws, Assignment of Intellectual Property Rights, Technology, Transfer Agreements, Intellectual Property Issues in the Sale of Business, Legal Auditing of Intellectual Property, Due Diligence of Intellectual Property Rights in a Corporate Transaction. **Total Periods: 45**

TEXT BOOKS:

1. Deborah E. Bouchoux, *Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets*, Cengage Learning, 4th edition, 2016.
2. KompalBansal and ParikshitBansal, *Fundamentals of Intellectual Property for Engineers*, BS Publications, 1st edition, 2013.

REFERENCE BOOKS:

1. PrabuddhaGanguli, *Intellectual Property Rights-Unleashing the Knowledge Economy*, McGraw Hill Education, 6th reprint, 2015.
2. P. Narayanan, *Intellectual Property Law*, Eastern Book Company, 3rd edition, 2013.

3. R.Radha Krishnan, S. Balasubramanian, *Intellectual Property Rights: Text and Cases*, Excel Books, 1st edition, 2008.

IV B.Tech. - I Semester

(16BT60310) MANAGING INNOVATION AND ENTREPRENEURSHIP

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION:

Evolution of entrepreneurship from economic theory Managerial and entrepreneurial competencies; Concepts of Shifting Composition of the Economy Purposeful Innovation & Sources of Innovative Opportunity; The Innovation Process; Innovative Strategies; Entrepreneurial Motivation; Entrepreneurs versus inventors; Ethics and International Entrepreneurship; Strategic Issues in International Entrepreneurship; Problem solving Innovation and Diversification.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate the principles of business innovation and entrepreneurship for establishing industrial ventures.

CO2. analyze business plans for potential investors and stakeholders and effectively answer probabilistic questions on the substance of plan.

CO3. develop a comprehensive and well planned business structure for a new venture.

CO4. conduct investigation on complex problems, towards the development of Project.

CO5. apply modern statistical and mathematical tools to design projects and subsequent work procedures.

CO6. apply ethics in constructive innovation framework.

CO7. exhibit professionalism by employing modern project management and financial tools.

DETAILED SYLLABUS:

UNIT-I: CREATIVITY AND INNOVATION (07 Periods)

Introduction, Levels of innovation, Purposeful innovation and the sources of innovative opportunity, The innovation process, Innovative strategies, Strategies that aim at introducing and innovation, Dynamics of ideation and creativity – Inbound, Outbound; Context and process of new product development, Theories of outsourcing.

UNIT-II: PARADIGMS OF INNOVATION (11Periods)

Systems approach to innovation, Innovation in the context of developed economies and Emerging economies, Examining reverse innovation and its application, Performance gap, Infrastructure gap, Sustainability gap, Regulatory gap, Preference gap, organizational factors effecting innovation at firm level.

UNIT-III: SOURCES OF FINANCE AND VENTURE CAPITAL (07 Periods)

Importance of finance, Comparison of venture capital with conventional development capital, Strategies of venture funding, Investment phases, Investment process, Advantages and disadvantages of venture capital, Venture capital developments in India.

UNIT-IV: INTELLECTUAL PROPERTY INNOVATION AND ENTREPRENEURSHIP (11 Periods)

Introduction to Entrepreneurship, Evolution of entrepreneurship from economic theory, Managerial and entrepreneurial competencies, Entrepreneurial growth and development, Concepts, Ethics and Nature of International Entrepreneurship, Intellectual property – forms of IP, Patents, Trademarks, Design registration, Copy rights, Geographical indications, Patent process in India.

UNIT-V: OPEN INNOVATION FRAMEWORK AND PROBLEM SOLVING (09 Periods)

Concept of open innovation approach, Difference between open innovations and Cloud innovation approaches, Limitations and Opportunities of open innovation framework, Global context of strategic alliance, Role of strategic alliance, Problem Identification and Problem Solving, Innovation and Diversification.

Total Periods: 45

TEXT BOOKS:

1. Vinnie Jauhari, SudhanshuBhushan, *Innovation Management*, Oxford University Press, 1st edition, 2014.
2. Drucker, P. F., *Innovation and Entrepreneurship*, Taylor & Francis, 2nd edition, 2007.

REFERENCE BOOKS:

1. Robert D Hisrich, Claudine Kearney, *Managing Innovation and Entrepreneurship,* Sage Publications, 1st edition, 2014.

2. V.K.Narayanan, *Managing Technology and Innovation for Competitive Advantage*, Pearson India, 1st edition, 2002.

IV B.Tech. - I Semester
(16BT60311) MATERIALS SCIENCE
(Open Elective)
(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION:
Structure and Bonding in metals; Steels, Cast Irons and Non Ferrous alloys; Material Selection for conductors, Insulators and semiconductors; Strengthening mechanisms of metals; Plastics and Ceramics as Insulators; AC and DC properties of Insulators; Semiconductors and Magnetic materials; Composite materials in Electrical and Electronics engineering; Material Selection and manufacturing of Optical fibers.

COURSE OUTCOMES: On successful completion of the course, students will be able to

- CO1. demonstrate the knowledge on concepts of fundamental science and engineering principles relevant to materials.
- CO2. analyze the structures of various types of Ferrous, Non-ferrous alloys influencing various engineering applications.
- CO3. conduct investigations to select suitable materials with desired properties for engineering applications.
- CO4. use phase diagrams to interpret the data regarding microstructure of materials.
- CO5. consider health and safety issues while providing materials to real time applications.
- CO6. use composite materials that reduce material waste in design and manufacturing for sustainability.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO MATERIAL SCIENCE (07 Periods)

Structure of metals: Bonds in Solids, Crystallization of metals, Grain and grain boundaries, Effect of grain boundaries on the properties of metals / alloys, Determination of grain size measurement.

Constitution of alloys: Necessity of alloying, Types of solid solutions, Hume rothery rules, Intermediate alloy phases.

UNIT-II: CAST IRONS, STEELS AND NON-FERROUS METALS (12 Periods)

Structure and properties of Grey cast iron, Spheroidal cast iron, White Cast iron, Malleable Cast iron, Alloy cast irons, Classification of steels, structure and properties of plain carbon steels, Structure and properties of Copper and its alloys, Aluminum and its alloys.

UNIT-III: ELECTRIC CONDUCTORS AND INSULATORS (12 Periods)

Type of materials selected for conductors, Insulators and semiconductors, Introduction to ceramics - Bonding and microstructure, DC properties of ceramic materials, AC properties of ceramic materials, mechanical properties, Ceramics as Conductors, Insulators and capacitors; Introduction to Plastics - DC properties, AC properties, Mechanical properties.

UNIT-IV: SEMICONDUCTORS AND MAGNETIC MATERIALS (09 Periods)

Fabrication of Semiconductors, Producing a silicon wafer-Lithography and Deposition packaging of semiconductors materials; Types of magnetic materials, Measuring magnetic properties, Application of soft magnetic materials in Electromagnets and relays, AC transformers, Generators and motors.

UNIT-V: ADVANCED MATERIALS AND APPLICATIONS (05 Periods)

Composites - Fiber reinforced metal matrix, Ceramic matrix, Polymer matrix, Properties and applications of composites; Ceramics - Alumina, Zirconia, Silicon Carbide, SiAlONs, Reaction Bonded Silicon Nitride (RBSN); Glasses- properties and applications, manufacturing of optical fibers.

Total Periods: 45

TEXT BOOKS:

1. Kodgire V D, *Material Science and Metallurgy*, Everest Publishing House, Pune, 31st edition, 2011.
2. Ian. P.Jones, *Material Science for Electrical and Electronic Engineers*, Oxford University Press, 1st edition, 2000.

REFERENCE BOOKS:

1. V. Raghavan, *Physical Metallurgy: Principles and Practices*, PHI, New Delhi, 2nd edition, 2006.
2. William. D. Callister, *Materials Science & Engineering-An Introduction*, John Wiley and Sons, New Delhi, 6th edition, 2002.

IV B.Tech. - I Semester

(16BT70412) **GREEN TECHNOLOGIES**

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION:
Principles of green engineering; Green communications; Green energy; Green computing; Green construction; Green manufacturing.

COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. deploy conceptual knowledge in green technologies pertaining toengineering practice.
CO2. analyze various green technologies for engineering practice.
CO3. provide green solutions to engineering problems.
CO4. apply various green techniques in the engineering practice.
CO5. consider health and safety issues while providing green solutions to the society.
CO6. understand issues related to environment sustainability.
CO7. apply ethical standards for environmental sustainability in the engineering practice.

DETAILED SYLLABUS:

UNIT-I: PRINCIPLES OF GREEN ENGINEERING AND GREEN COMMUNICATIONS (11 Periods)

Principles of Green Engineering:
Introduction, Definition of green engineering, Principles of green engineering.

Green Communications:
Introduction, Origin of Green Communications, Energy Efficiency in Telecommunication systems, Telecommunication system model and energy Efficiency, Energy saving concepts, Quantifying energy efficiency in ICT, Energy efficiency metrics of green wireless networks, Embodied energy of communication devices- Introduction, The extended energy model, Embodied/Operating Energy of a BS in Cellular network- A Case study; Energy efficient standards for wireline communications.

UNIT-II: GREEN ENERGY (09 Periods)
Introduction, adverse impacts of carbon emission, control of carbon emission– methods, greenhouse gas reduction – methods, Energy sources and their availability, Green energy for sustainable development. Green energy sources – Solar energy, Wind energy, Fuel cells, Biofuels, Wave and Geothermal energy (Principle of generation only).

UNIT-III: GREEN IT (09 Periods)
The importance of Green Information technologies, Strategizing Green Initiatives, Implementation of Green IT, Information Assurance, Communication and Social Media, Regulating Green IT- Laws, Standards and Protocols; RoHS, REACh, WEEE, Legislating for GHG Emissions and Energy Use of IT Equipment, Non-regulatory Government Initiatives, Industry Associations and Standard Bodies, Green Building Standards, Green Data Centres, Social Movements and Greenpeace, Conclusions.

UNIT-IV: GREEN CONSTRUCTION (09 Periods)
Green Building: Definition, Typical features, Benefits, Requisites for green building construction, Sustainability, Concept of REDUCE, REUSE, RECYCLE, RETHINK, REPLENISH AND REFUSE (6 R's), Sustainable construction focus point – Site selection, Planning, Water, Energy, Material, Indoor air quality, Construction procedures.
Indian Green Building Council: Introduction to IGBC green homes, Benefits of IGBC, IGBC green home rating system, Introduction to USGBC, LEED rating system, Procedure to get IGBC certification, GRIHA Rating.

UNIT-V: GREEN MANUFACTURING (09 Periods)
Introduction, background, definition, motivation and barriers to green manufacturing, Impact of manufacturing in environmental ecology, Need for green manufacturing, Advantages and Limitations, green manufacturing strategies, Green manufacturing and sustainability, Sustainability tools; Waste stream mapping and application, Green manufacturing through clean energy supply, green lean manufacturing, green packaging and supply chain. **Total Periods: 47**

TEXT BOOKS:
1. Konstantinos Samdanis, Peter Rost, Andreas Maeder, MichelaMeo, Christos Verikoukis, *Green Communications: Principles, Concepts and Practice,* John Wiley & Sons, 2015.
2. Soli J. Arceivala, *Green Technologies for a better future,* McGraw Hill Education (India) Pvt. Ltd, 2014.
3. San Murugesan, G.R. Gangadharan, *Harnessing Green IT – Principles and Practices,* John Wiley & Sons Ltd., 2008.
4. Tom Woolley, Sam Kimmins, Paul Harrison and Rob Harrison, *Green Building Handbook*, *Volume 1*, E & FN Spon, an imprint of Thomson Science & Professional.
5. *IGBC Green Homes Rating System Version 1.0* – A bridged reference guide.
6. J Paulo Davim, Green Manufacturing: Processes and Systems, Springer, 2012.
7. David A Dornfeld, Green Manufacturing: Fundamentals and Applications, Springer, 2013.

REFERENCE BOOKS:

1. Athanasios V Alavanidis, ThomaisVlachogianni, *Green Chemistry and Green Engineering*, SynchronaThemata, 2012.
2. G.D. Rai, *Non-conventional Energy Sources*, Khanna Publishers, Delhi, 5th edition,2011.
3. Marty Poniatowski, *Foundation of Green Information Technology, Prentice Hall, 2009.*
4. R. K. Gautham, *Green Homes*, BS publications, 2009.

IV B.Tech. - I Semester

(16BT70413) **INTRODUCTION TO NANOSCIENCE AND NANOTECHNOLOGY**

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION:

Introduction to the concept ofnano;Description of nanomaterial;Nanostructure characterization tools;Classification of nanomaterials;Fabrication of nanomaterial;Different applications of nanostructures and nanomaterials.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge in
- Nanoscale technology.
- Difference between micro and nanotechnology
- Classification of Nanostructure and Nanomaterial
- Fabrication of various nanomaterials and nanostructures.

CO2. analyze numerical and analytical problems in
- Nanomaterial size by using Scanning Electrons
- Microscope and X-Ray diffraction

CO3. design and fabricate devices based on nanostructures like
- Nano solar cell
- Nano cantilever
- Nano bio-sensor

CO4. synthesize nano particle of different materials to solve the problems related to fabrication of nanostructures.

CO5. select appropriate technique for fabrication of nanostructures and Nano composites.

CO6. apply ethical standards and legal issues while using chemical substances infabrication of new nanostructures.

DETAILED SYLLABUS:

UNIT-I: FUNDAMENTALS OF NANOTECHNOLOGY (08 Periods)

Introduction – Scientific revolutions, Time and length scale in structures, Definition of a nanosystem; Dimensionality and size dependent phenomena - Surface to volume ratio Fraction of surface atoms, Surface energy and surface stress, surface defects, Properties at nanoscale (optical, mechanical, electronic, and magnetic).

UNIT-II:IDENTIFICATION AND CHARACTERIZATION TOOLS FOR NANOMATERIALS AND NANOSTRUCTURE (10 Periods)

Field Emission Scanning Electron Microscopy (FESEM), Environmental Scanning ElectronMicroscopy (ESEM) High Resolution, Transmission Electron Microscope (HRTEM), Scanning Tunneling Microscope(STM), Surface enhanced Raman spectroscopy (SERS), Secondary Ion Mass Spectroscopy, Focused Ion Beam Photoelectron Spectroscopy, X-ray Photoelectron Spectroscopy (XPS), Auger electron spectroscopy (AES), Rutherford backscattering spectroscopy (RBS), X-Ray Diffraction, Intensities in X-Ray Scattering Particle Size Effect.

UNIT-III:CLASSIFICATION OF NANOMATERIALS (10 Periods)

Classification based on dimensionality, Quantum Dots,Wells and Wires-III-V Nanoparticles, Electronic Structure of Nanosemiconductor, Carbon based nanomaterials (buckyballs, nanotubes, graphene), Metal based nano materials (nanogold, nanosilver and metal oxides), Nanocomposites, Nanopolymers, Nanoglasses, Nano ceramics, Biological nanomaterials, Fulrene-discovery and early years,.

UNIT-IV:SOME FABRICATION TECHNIQUES OF NANOMATERIALS AND NANOSTRUCTURES(09 Periods)

Chemical Methods: Metal Nanocrystals by Reduction, Solvothermal Synthesis, Photochemical Synthesis,Sonochemical Routes, Chemical Vapor Deposition (CVD), Metal Oxide Chemical Vapor Deposition (MOCVD), Plasma Enhanced Chemical Vapour Deposition Technique(PECVD), Hydrothermal Method, Sol-Gel.

PhysicalMethods: Ball Milling, Electrodeposition, Spray Pyrolysis, Flame Pyrolysis, DC/RF Magnetron Sputtering, Molecular Beam Epitaxy (MBE) Thermal Evaporation Method.

UNIT-V:APPLICATIONS (08 Periods)

Solar energy harvesting, Catalysis,Molecular electronics and printed electronics Nanoelectronics, Polymers with aspecial architecture, Liquid crystalline systems, Linear and nonlinear optical and electro-optical properties, Applications in displays and other devices, Nanomaterials for data storage, Photonics, Plasmonics, Chemical and biosensors, Nanomedicine and Nanobiotechnology, MESFET.

TEXT BOOKS: **Total Periods: 45**

1. Pradeep T., *A Textbook of Nanoscience and Nanotechnology*, Tata McGraw Hill Education Pvt. Ltd., 2012.
2. Hari Singh Nalwa, *Nanostructured Materials and Nanotechnology*, Academic Press, 2002.

REFERENCE BOOKS:

1. Nabok A., *Organic and Inorganic Nanostructures*, Artech House, 2005.
2. Dupas C., Houdy P., Lahmani M, *Nanoscience: Nanotechnologies and Nanophysics*, Springer - Verlag Berlin Heidelberg, 2007.
3. S.M. Sze, Physics of Semiconductor Devices, 2nd edition, 2001.

IV B.Tech. - I Semester

(16BT60505) **ENGINEERING SYSTEM ANALYSIS AND DESIGN**

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION:
Systems Process; Technologies for Systems; System Development Life Cycle; System Analysis and Modeling; Levels of Management; Project Management; Systems Implementation and Importance of UML Prototyping; Maintaining and Managing the Systems Output Process.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge in
- Systems Process and System Design
- Systems Analysis and Modeling
- System Development Life Cycle
- Design Management and Maintenance Tools.

CO2. analyze system Process and estimate the given models by using case tools.
CO3. design and develop a model to the organizational systems.
CO4. solve complex problems related to engineering systems and produce accurate results
CO5. apply object oriented techniques for modeling dynamic systems.
CO6. contribute towards societal issues and responsibilities in designing, modeling and developing of organizational systems.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION **(09 Periods)**
Systems, Types of systems, Integrating technologies for systems, Need for system analysis and design, Role of the systems analyst, System development life cycle, CASE tools for analysis and design.

UNIT-II: ANALYSIS AND MODELING ORGANIZATIONAL SYSTEM **(09 Periods)**
Organization as system, System analysis, Depicting systems graphically, Use case modeling, Levels of management, Organizational culture.

UNIT-III: PROJECT MANAGEMENT **(10 periods)**
Project initiation, Problem in organization, Determining feasibilities, Ascertaining hardware and software needs, Identifying, Forecasting, Comparing costs and benefits, Activity planning and control, Managing the project.

UNIT-IV: OBJECT ORIENTED ANALYSIS AND DESIGN USING UML **(08 Periods)**
Introduction, Object modeling, Dynamic modeling, functional modeling, packages and other UML artifacts, the importance of using UML for modeling.

UNIT-V: DESIGNING EFFECTIVE OUTPUT **(09 Periods)**
Output design objectives, Relating output content to output method, Realizing how output bias affects users, Designing output for display, Case studies-Designing a web site management, Online exam management, Online portal design.

Total Periods:45

TEXT BOOK:
1. Kenneth E. Kendall and Julie E. Kendall,*System Analysis and Design*, Pearson Education, 9th edition, 2011.

REFERENCE BOOKS:
1. Dennis, Wixom and Roth,*Systems Analysis and Design*, John Wiley, 5th edition, 2012.

2. Shelly and Rosenblatt, *Systems Analysis and Design*, Cengage Learning, 9th edition, 2012.

IV B.Tech.- I Semester

(16BT71011) MICRO-ELECTRO-MECHANICAL SYSTEMS

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION:
Overview of Micro Electro Mechanical Systems (MEMS); scaling laws; working principles of microsensors and microactuators; materials; microfabrication processes; packaging of Microsystems.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on MEMS devices, scaling laws, microsensors and microactuators
CO2. analyze the properties of materials and identify its suitability for MEMS devices.
CO3. design MEMS devices that meet desired specifications and requirements.
CO4. analyze and synthesize the information to provide effective solution to engineering problems with MEMS devices.
CO5. use modern techniques in micro manufacturing process.
CO6. develop efficient and cost effective MEMS based products for society.

DETAILED SYLLABUS:

UNIT-I: OVERVIEW OF MEMS AND SCALING LAWS (09 periods)
MEMS and Microsystems, Microsystems and microelectronics, miniaturization, applications of MEMS in the automotive industry and in other industries.
Scaling laws of miniaturization: Introduction to scaling, scaling in: geometry, rigid- body dynamics, electrostatic forces, electromagnetic forces, Electricity, Fluid mechanics, Heat transfer.

UNIT-II: **WORKING PRINCIPLES OF MICROSYSTEMS (09 periods)**
Microsensors,acoustic wave sensors, biomedical and biosensors, chemical sensors, pressure sensors, thermal sensors. Microactuation: actuation using thermal forces, shape-memory alloys, piezoelectric crystals, electrostatic forces. MEMS with microactuators, microgrippers, micromotors, microvalves, micropumps.Microaccelerometers, microfludics.

UNIT-III:MATERIALS FOR MEMS AND MICROSYSTEMS (09 periods)
Substrate and wafers, silicon as a substrate material, silicon compounds, silicon piezoresistors, gallium arsenide, quartz, piezoelectric crystals, polymers, carbon nano tube (CNT), development of CNTs, application of CNTs.

UNIT-IV: MEMS FABRICATION PROCESS AND MICROMANUFACTURING (09 periods)
Photolithography, ion implantation, diffusion, oxidation, chemical vapor deposition, physical vapor deposition, deposition by epitaxy, etching, bulk micromanufacturing, surface micromanufacturing, LIGA process.

UNIT-V: MEMS PACKAGING (09 periods)
Introduction to microsystem packaging, objectives and general considerations in packaging design, three levels of microsystem packaging, interfaces in microsystem packaging, packaging technologies, three-dimensional packaging, selection of packaging materials, signal mapping and transduction, Design case: Pressure sensor packaging.

Total Periods: 45

TEXT BOOK:

1. Tai-Ran Hsu, *MEMS & Microsystems, Design and Manufacture*, McGraw Hill Education (India) Pvt. Ltd., 2002.

REFERENCES BOOKS:

1. G.K.Ananthasuresh, K.J.Vinoy,*Micro and Smart Systems*, Wiley India, 2010.
2. Nitaigour Premchand Mahalik, *MEMS*, McGraw Hill Education (India) Pvt. Ltd., 2007.

IV B.Tech. – I Semester

(16BT61205) **CYBER SECURITY AND LAWS**

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION:

Cyber Crimes and Indian IT Act; Cyber Offenses; Tools and Methods used in Cyber Crime; Phishing ad Identity Theft; Indian and Global Perspective on Cyber Crimes and Cyber Security; Organizational Implications on Cyber Security; IPR Issues; Cyber Crime and Terrorism; Cyber Crime Illustrations

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge in Cyber security, Cybercrimes and its related laws in Indian and Global Act.
CO2. analyze the legal perspectives and laws related to cybercrimes in Indian context.
CO3. apply security and privacy methods in development of modern applications and in organizations to protect people and to prevent cybercrimes.
CO4. solve Cyber security issues using privacy policies.
CO5. use antivirus tools to minimize the impact of cyber threats.
CO6. follow security standards for the implementation of Cyber Security and laws.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO CYBER CRIMES AND OFFENSES (09 Periods)

Cyber Crimes: Introduction, Definition, Origin, Cybercrime and information security, Cyber criminals, Classifications of cybercrimes, The legal perspectives and Indian perspective, Cybercrime and Indian ITA 2000, Global perspective on cybercrimes.

Cyber Offenses: Introduction, Criminals planning on attacks, Social engineering, Cyber stalking, Cyber cafe and crimes, Botnets.

UNIT-II: TOOLS AND METHODS USED IN CYBER CRIME AND PHISHING AND IDENTITY THEFT (09 Periods)

Introduction, Proxy servers and Anonymizers, Phishing, Password cracking, Key loggers and Spywares, Virus, Worms and Ransomware, Trojan horses and Backdoors, Steganography, DoS and DDoS attacks.

Phishing and Identity Theft: Introduction, Phishing, Identity Theft (ID Theft).

UNIT-III: CYBER CRIMES AND CYBER SECURITY-LEGAL PERSPECTIVES (08 Periods)

Introduction, Cyber laws in Indian context, The Indian IT act, Challenges to Indian law and Cybercrime scenario in India, Consequences of not addressing the weakness in IT act, Digital signatures and the Indian IT Act, Cyber Crime and Punishment, Cyber law, Technology and Students in India scenario.

UNIT-IV: CYBER SECURITY-ORGANIZATIONAL IMPLICATIONS (10 Periods)

Introduction, Web threats for organizations – evils and perils, Security and privacy implications from cloud computing, Social Media Marketing-Security risks and Perils for organizations, Social computing and associated challenges for organizations, Protecting people's privacy in organization, Organizational guidelines for internet usage, Safe computing and Usage policy, Incident handling and Best practices.

UNIT-V: CYBER CRIME AND TERRORISMAND ILLUSTRATIONS (09 Periods)

Cyber Crime & Terrorism: Introduction, Intellectual property in the cyber space, The ethical dimension of cybercrimes, The psychology, Mindset and skills of hackers and cyber criminals, Sociology of cyber criminals, Information warfare.

Cyber Crime Illustrations: Indian banks lose millions of rupees, Justice vs. Justice, Parliament attack, The Indian case of online gambling, Bank and credit card related frauds, Purchasing goods and services scam, Nigerian 419 scam.

Total Periods: 45

TEXT BOOK:

1. Nina Gobole and SunitBelapure, *Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives,* Wiley India, 2011.

REFERENCE BOOK:
1. Prashant Mali, *Cyber Law and Cyber Crimes,* Snow White Publications Pvt. Ltd., 2013.

IV B.Tech. - I Semester

(16BT61505) BIO-INFORMATICS

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION:
Introduction to Bioinformatics; Biology and Information; Sequence alignment and dynamic programming; Biological Database; Homology Modeling; Structure Prediction; Molecular Dynamics.

COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge on concepts of biological databases, Genome and proteome.
CO2. analyze biological sequences for Homology Modeling.
CO3. apply clustering methods for Phylogenetic trees.
CO4. solve bio sequencing problems using dynamic programming.
CO5. select and apply appropriate techniques and tools to structure Prediction.

DETAILED SYLLABUS:

UNIT-I: NUCLEIC ACIDS, PROTEINS AND AMINO ACIDS (08 periods)
Bioinformatics - Definition, Nucleic acid structure, Protein structure, the central dogma, Physico-chemical properties of the amino acids and their importance in protein folding, Polymerase chain reaction (PCR)

UNIT-II: INFORMATION RESOURCES FOR GENES AND PROTEIN (10 periods)
Database file formats, Nucleic acid sequence databases, Protein sequence databases.
Sequence Alignment Algorithm
Pair wise sequence alignment – The problem, Pair wise sequence alignment – Dynamic programming methods, The effect of scoring parameters on the alignment, Multiple sequence alignment.

UNIT-III: PREDICTION OF THE THREE-DIMENSIONAL STRUCTURE OF A PROTEIN AND HOMOLOGY MODELING (09 Periods)
Secondary Structure Prediction, Basic Principles, The Steps of Comparative Modeling, Accuracy of Homology Models, Manual versus Automatic Models, SNPs, Motifs**.**

UNIT-IV: PHYLOGENETIC METHODS (10 periods)
Phylogenetic trees, choosing sequences, Distance matrices and clustering methods, Calculation of distances in the neighbor-joining method, Bootstrapping, Tree optimization criteria and tree search methods, The maximum-likelihood criterion, Calculating the likelihood of the data on a given tree, The parsimony criterion.

UNIT-V: NEW FOLD MODELING (08 periods)
Estimating the Energy of a Protein Conformation, Energy Minimization, Molecular Dynamics, The "Omics" Universe-Transcriptomics, Proteomics, Interactomics, Structural Genomics, Pharmacogenomics.

TEXTBOOKS:

1. Paul G. Higgs and Teresa K. Attwood, *Bioinformatics and Molecular Evolution* Blackwell Publishing, 2005.
2. Anna Tramontano, *Introduction to Bioinformatics* Chapman and Hall/CRC, 2006.

REFERENCE BOOKS:

1. Hooman H. Rashidi and Lukas K. Buehler, *Bioinformatics Basics, Applications in Biological Science and Medicine*, CRC Press, Taylor & Francis Group, 2nd edition, 2005.

2. Rastogi S. C., NamitaMendiratta and ParagRastogi, *Bioinformatics: Methodsand Applications: Genomics, Proteomics and Drug Discovery*, PHI Learning Pvt. Ltd., 3rd edition, 2011.

IV B.Tech. - I Semester

(16BT70231) **POWER SYSTEM - II LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Courses on Matrices and Numerical Methods, Electric Circuits and Transmission & Distribution.

COURSE OUTCOMES: on successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- formation of network matrices and parameters of power system.
- various load flow methods and faults.
- load frequency control and stability of power system.

CO2. analyze
- the formation of power system network matrices.
- the power flow solutions using various load flow techniques.
- various types of power system faults.
- load frequency problem.
- stability for the stable operation of power system.

CO3. design a suitable operating and control strategy to meet the required specifications of power system.

CO4. develop programming skills to solve and simulate power system problems to provide viable solution.

CO5. select and apply appropriate technique for solving complex problems in the power systems.

CO6. apply the conceptual knowledge of power systems in relevance to industry and society.

CO7. commit to ethical principles and standards while exercising the practical investigations on power system.

CO8. work individually or in a group in the field of power systems.

CO9. communicate effectively in verbal and written form in power system domain.

LIST OF EXPERIMENTS:

Conduct any **TEN** experiments using MATLAB/SIMULINK/PSCAD/MiPower/PSIM.

1. Determination of load parameters from load curve.
2. Determination of transmission line parameters.
3. Formation of Ybus.
4. Formation of Zbus.
5. Load flow analysis.
6. Fault analysis.
7. Rotor dynamics using swing equation.
8. Transient stability analysis.
9. Economic dispatch problem.
10. Modeling, simulation and analysis of AVR.
11. Modeling, simulation and analysis of LFC in an interconnected power system.
12. Power quality problems.
13. Determination of transformer inrush current.
14. Simulation of capacitor switching transients.
15. Demonstration of soft computing techniques tool boxes (ANN, FUZZY, GA).

IV B.Tech. - I Semester
(16BT70432) **EMBEDDED SYSTEMS LAB**
(Common to EEE, ECE and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Course on Embedded systems.

COURSE DESCRIPTION:
IDE for Embedded System Design using MSP430; Interfacing Switch & LED; Timers-WDT, Configuring, Programming; ADC-usage; Power down modes; DAC; PWM Generator; Networking - SPI, Wi-Fi.

COURSE OUTCOMES: On successful completion of this course, the student will be able to:

CO1. demonstrate knowledge in designing complex energy efficient embedded systems.
CO2. analyze usage of various on-chip resources like GPIO, Timers, Interrupts, ADC, DAC, Comparator, SPI.
CO3. design embedded systems to suit market requirements.
CO4. solve engineering problems by proposing potential solu tions using industry choice advanced Microcontrollers.
CO5. apply appropriate techniques, resources, and CCSV6 based IDE for modeling embedded systems with understanding of limitations.
CO6. provide embedded system solutions for societal needs.
CO7. work individually and in a group to develop embedded systems.
CO8. communicate effectively in oral and written form in the field of embedded systems.

LIST OF EXCERSISES:

1. Introduction to MSP430 launch pad and Programming Environment.
2. Read input from switch and Automatic control/flash LED (software delay).
3. Interrupts programming example using GPIO.
4. Configure watchdog timer in watchdog & interval mode.
5. Configure timer block for signal generation (with given fre quency).
6. Read Temperature of MSP430 with the help of ADC.
7. Test various Power Down modes in MSP430.
8. PWM Generator.
9. Use Comparator to compare the signal threshold level.
10. Speed Control of DC Motor
11. Master slave communication between MSPs using SPI.
12. Networking MSPs using Wi-Fi.

TOOL REQUIREMENT:

Code Composer Studio Version 6, MSP430 based launch pads, Wi-Fi booster pack.

REFERENCE BOOKS:

1. John H Davies, *MSP430 Microcontrollers Basics*, Newnes Publishers, 1st edition, 2008.

2. C P Ravikumar, *MSP430 Microcontrollers in Embedded Sys-tem Projects*, Elite Publishing House , 1st edition, 2012.

IV B.Tech. – I Semester
(16BT70232) **COMPREHENSIVE ASSESSMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
	100	100	-	-	-	2

COURSE DESCRIPTION: Assessment of student learning outcomes in the courses of the program.

COURSE OUTCOMES:
Comprehensive Assessment enables a successful student to demonstrate:

CO1. knowledge in the courses of the program.

CO2. analytical ability in the courses of the program.

CO3. design skills in the courses of the program.

CO4. ability to investigate and solve complex engineering problems in the courses of the program.

CO5. ability to apply tools and techniques to complex engineering activities with an understanding of limitations in the courses of the program.

CO6. ability to provide solutions as per societal needs with consideration to health, safety, legal and cultural issues in the courses of the program.

CO7. understanding of the impact of the professional engineering solutions in environmental context and need for sustainable development in the courses of the program.

CO8. ability to apply ethics and norms of the engineering practice in the courses of the program.

CO9. ability to function effectively as an individual in the courses of the program.

CO10. ability to present views cogently and precisely in the courses of the program.

CO11. ability to engage in life-long leaning in the courses of the program.

IV B.Tech. - II Semester
(16BT80231) **PROJECT WORK**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
100	100	200	-	-	-	12

PREREQUISITES: All the courses of the program.

COURSE DESCRIPTION:

Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Preparation of thesis and presentation.

COURSE OUTCOMES:

Completion of the project work enables a successful student to demonstrate:

CO1. knowledge on the project topic.

CO2. analytical ability exercised in the project work.

CO3. design skills applied on the project topic.

CO4. ability to investigate and solve complex engineering problems faced during the project work.

CO5. ability to apply tools and techniques to complex engineering activities with an understanding of limitations in the project work.

CO6. ability to provide solutions as per societal needs with consideration to health, safety, legal and cultural issues considered in the project work.

CO7. understanding of the impact of the professional engineering solutions in environmental context and need for sustainable development experienced during the project work.

CO8. ability to apply ethics and norms of the engineering practice as applied in the project work.

CO9. ability to function effectively as an individual as experienced during the project work.

CO10. ability to present views cogently and precisely on the project work.

CO11. project management skills as applied in the project work.

CO12. ability to engage in life-long leaning as experience during the project work.

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(Autonomous)

COURSE STRUCTURE (2016-2017)

ELECTRONICS AND INSTRUMENTATION ENGINEERING

I B.Tech. (I Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
I Year - I Semester										
1.	16BT1BS02	Engineering Physics	3	1	-	4	3	30	70	100
2.	16BT1BS03	Matrices and Numerical Methods	3	1	-	4	3	30	70	100
3.	16BT1BS04	Multi-Variable calculus and Differential Equations	3	1	-	4	3	30	70	100
4.	16BT10241	Network Analysis	4	1	-	5	4	30	70	100
5.	16BT10501	Programming in C	3	1	-	4	3	30	70	100
6.	16BT1BS32	Engineering Physics Lab	-	-	3	3	2	50	50	100
7.	16BT10232	Electrical and Electronics Workshop Practice	-	-	3	3	2	50	50	100
8.	16BT10251	Network Analysis Lab	-	-	3	3	2	50	50	100
9.	16BT10531	Programming in C Lab	-	-	3	3	2	50	50	100
		Total	**16**	**5**	**12**	**33**	**24**	**350**	**550**	**900**

I B.Tech. (II Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
I Year - II Semester										
1.	16BT1HS01	Technical English	3	1	-	4	3	30	70	100
2.	16BT1BS01	Engineering Chemistry	3	1	-	4	3	30	70	100
3.	16BT2BS01	Transformation Techniques and Partial Differential Equations	3	1	-	4	3	30	70	100
4.	16BT20401	Electronic Devices and Circuits	3	1	-	4	3	30	70	100
5.	16BT20541	Foundations of Data Structures	3	1	-	4	3	30	70	100
6.	16BT1HS31	English Language Lab	-	-	3	3	2	50	50	100
7.	16BT1BS31	Engineering Chemistry Lab	-	-	3	3	2	50	50	100
8.	16BT10331	Computer Aided Engineering Drawing	-	1	6	7	3	50	50	100
9.	16BT20551	Foundations of Data structures Lab	-	-	3	3	2	50	50	100
		Total	**15**	**6**	**15**	**36**	**24**	**350**	**550**	**900**

II B.Tech. (I Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits (C)	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
II Year - I Semester										
1.	16BT3HS01	Environmental Studies	3	-	-	3	3	30	70	100
2.	16BT3BS02	Special Functions and Complex Analysis	3	1	-	4	3	30	70	100
3.	16BT31001	Electrical and Electronic Measurements	3	1	-	4	3	30	70	100
4.	16BT31002	Sensors and Transducers	3	1	-	4	3	30	70	100
5.	16BT30403	Switching Theory and Logic Design	3	1	-	4	3	30	70	100
6.	16BT30241	Electrical Technology	3	1	-	4	3	30	70	100
7.	16BT30431	Basic Electronics and Digital Design Lab	-	-	3	3	2	50	50	100
8.	16BT31031	Measurements and Transducers Lab	-	-	3	3	2	50	50	100
9.	16BT30251	Electrical Technology Lab	-	-	3	3	2	50	50	100
		Total	**18**	**5**	**9**	**32**	**24**	**330**	**570**	**900**

II B.Tech. (II Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits (C)	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
II Year - II Semester										
1.	16BT50201	Control Systems	3	1	-	4	3	30	70	100
2.	16BT30401	Electronic Circuit Analysis and Design	3	1	-	4	3	30	70	100
3.	16BT41001	Industrial Instrumentation – I	3	1	-	4	3	30	70	100
4.	16BT41002	Linear and Digital ICs	3	1	-	4	3	30	70	100
5.	16BT30402	Signals and Systems	3	1	-	4	3	30	70	100
6.	16BT40406	Pulse and Digital Circuits	3	1	-	4	3	30	70	100
7.	16BT41031	Analog Electronics Lab	-	-	3	3	2	50	50	100
8.	16BT41032	Control Systems Design Lab	-	-	3	3	2	50	50	100
9.	16BT41033	Linear and Digital ICs Lab	-	-	3	3	2	50	50	100
		Total	**18**	**6**	**9**	**33**	**24**	**330**	**570**	**900**

III B.Tech. (I Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits (C)	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
III Year - I Semester										
1.	16BT3HS02	Managerial Economics and Principles of Accountancy	3	1	-	4	3	30	70	100
2.	16BT51001	Biomedical Instrumentation	3	1	-	4	3	30	70	100
3.	16BT51002	Industrial Instrumentation – II	3	1	-	4	3	30	70	100
4.	16BT51003	Principles of Communications	3	1	-	4	3	30	70	100
5.	16BT60402	Digital Signal Processing	3	1	-	4	3	30	70	100
		Interdisciplinary Elective-1								
6.	16BT51004	Computer Organization and Architecture	3	1	-	4	3	30	70	100
	16BT51241	Object Oriented Programming								
	16BT31501	Operating Systems								
	16BT60502	Soft Computing								
7.	16BT51031	Industrial Instrumentation Lab	-	-	3	3	2	50	50	100
8.	16BT51032	Signal Processing Lab	-	-	3	3	2	50	50	100
9.	16BT4HS31	Soft Skills Lab	-	-	3	3	2	50	50	100
		Total	**18**	**6**	**9**	**33**	**24**	**330**	**570**	**900**

III B.Tech. (II Semester)

<table>
<tr><th rowspan="3">S. No.</th><th rowspan="3">Course Code</th><th rowspan="3">Course Title</th><th colspan="4" rowspan="2">Contact Periods/ Week</th><th>Credits</th><th colspan="3">Scheme of Examination</th></tr>
<tr><th>(C)</th><th colspan="3">Max. Marks</th></tr>
<tr><th>L</th><th>T</th><th>P</th><th>Total</th><th></th><th>Internal Marks</th><th>External Marks</th><th>Total Marks</th></tr>
<tr><td colspan="11">III Year - II Semester</td></tr>
<tr><td>1.</td><td>16BT5HS01</td><td>Management Science</td><td>3</td><td>1</td><td>-</td><td>4</td><td>3</td><td>30</td><td>70</td><td>100</td></tr>
<tr><td>2.</td><td>16BT61001</td><td>ARM Processors and PIC Microcontrollers</td><td>3</td><td>1</td><td>-</td><td>4</td><td>3</td><td>30</td><td>70</td><td>100</td></tr>
<tr><td>3.</td><td>16BT61002</td><td>Process Control Instrumentation</td><td>3</td><td>1</td><td>-</td><td>4</td><td>3</td><td>30</td><td>70</td><td>100</td></tr>
<tr><td rowspan="5">4.</td><td colspan="2">Interdisciplinary Elective - 2</td><td rowspan="5">3</td><td rowspan="5">1</td><td rowspan="5">-</td><td rowspan="5">4</td><td rowspan="5">3</td><td rowspan="5">30</td><td rowspan="5">70</td><td rowspan="5">100</td></tr>
<tr><td>16BT60305</td><td>Hydraulics and Pneumatics</td></tr>
<tr><td>16BT50308</td><td>Mechatronics</td></tr>
<tr><td>16BT60341</td><td>Thermodynamics and Fluid Mechanics</td></tr>
<tr><td>16BT61003</td><td>Instrumentation System Design</td></tr>
<tr><td colspan="3">Program Elective – 1</td><td rowspan="5">3</td><td rowspan="5">1</td><td rowspan="5">-</td><td rowspan="5">4</td><td rowspan="5">3</td><td rowspan="5">30</td><td rowspan="5">70</td><td rowspan="5">100</td></tr>
<tr><td rowspan="4">5.</td><td>16BT70309</td><td>Industrial Robotics</td></tr>
<tr><td>16BT70404</td><td>Advanced Digital Signal Processing</td></tr>
<tr><td>16BT61004</td><td>Electromagnetic Theory</td></tr>
<tr><td>16BT61005</td><td>Opto-Electronics and Laser Instrumentation</td></tr>
<tr><td colspan="3">Program Elective - 2</td><td rowspan="5">3</td><td rowspan="5">1</td><td rowspan="5">-</td><td rowspan="5">4</td><td rowspan="5">3</td><td rowspan="5">30</td><td rowspan="5">70</td><td rowspan="5">100</td></tr>
<tr><td rowspan="4">6.</td><td>10BT60207</td><td>Advanced Control Systems</td></tr>
<tr><td>16BT50403</td><td>VLSI Design</td></tr>
<tr><td>16BT61006</td><td>Aircraft Instrumentation</td></tr>
<tr><td>16BT61007</td><td>Telemetry and Tele-control</td></tr>
<tr><td>7.</td><td>16BT61031</td><td>ARM Processors and PIC Microcontrollers Lab</td><td>-</td><td>-</td><td>3</td><td>3</td><td>2</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td>8.</td><td>16BT61032</td><td>Process Control Lab</td><td>-</td><td>-</td><td>3</td><td>3</td><td>2</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td>9.</td><td>16BT61033</td><td>Seminar</td><td>-</td><td>-</td><td>-</td><td>-</td><td>2</td><td>-</td><td>100</td><td>100</td></tr>
<tr><td>10.</td><td>16BT6MOOC</td><td>MOOC</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td></td><td></td><td></td></tr>
<tr><td colspan="3">Total</td><td>18</td><td>6</td><td>6</td><td>30</td><td>24</td><td>280</td><td>620</td><td>900</td></tr>
</table>

IV B.Tech. (I Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits	Scheme of Examination		
							(C)	Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
IV Year - I Semester										
1.	16BT71001	Analytical Instrumentation	3	1	-	4	3	30	70	100
2.	16BT71002	Biomedical Signal Processing	3	1	-	4	3	30	70	100
3.	16BT71003	Industrial Automation	3	1	-	4	3	30	70	100
		Program Elective – 3								
4.	16BT50501	Computer Networks	3	1	-	4	3	30	70	100
	16BT71004	Automotive Instrumentation								
	16BT71005	Computer Control of Process								
	16BT71006	Industrial Electronics								
		Program Elective – 4								
5.	16BT71007	Instrumentation in Petrochemical Industries	3	1	-	4	3	30	70	100
	16BT71008	Intelligent Control								
	16BT71009	Power Plant Instrumentation								
	16BT71010	System Design using Microcontrollers								
6.		**Open Elective**	3	1	-	4	3	30	70	100
7.	16BT71031	Analytical and Biomedical Instrumentation Lab	-	-	3	3	2	50	50	100
8.	16BT71032	Industrial Automation Lab	-	-	3	3	2	50	50	100
9.	16BT71033	Comprehensive Assessment	-	-	-	-	2	-	100	100
		Total	**18**	**6**	**6**	**30**	**24**	**280**	**620**	**900**

Sl. No.	Course Code	Open Elective Course Title
1	16BT6HS01	Banking and Insurance
2	16BT6HS02	Business Communication and Career Skills
3	16BT6HS03	Cost Accounting and Financial Management
4	16BT6HS04	Entrepreneurship for Micro, Small and Medium Enterprises
5	16BT6HS05	French Language
6	16BT6HS06	German Language
7	16BT6HS07	Indian Constitution
8	16BT6HS08	Indian Economy
9	16BT6HS09	Indian Heritage and Culture
10	16BT6HS10	Indian History
11	16BT6HS11	Personality Development
12	16BT6HS12	Philosophy of Education
13	16BT6HS13	Public Administration
14	16BT60112	Building Maintenance and Repair
15	16BT60113	Contract Laws and Regulations
16	16BT60114	Disaster Mitigation and Management
17	16BT60115	Environmental Pollution and Control
18	16BT60116	Planning for Sustainable Development
19	16BT60117	Professional Ethics
20	16BT60118	Rural Technology
21	16BT60308	Global Strategy and Technology
22	16BT60309	Intellectual Property Rights and Management
23	16BT60310	Managing Innovation and Entrepreneurship
24	16BT60311	Materials Science
25	16BT70412	Green Technologies
26	16BT70413	Introduction to Nanoscience and Technology
27	16BT60505	Engineering System Analysis and Design
28	16BT71011	Micro-Electro-Mechanical Systems
29	16BT61205	Cyber Security and Laws
30	16BT61505	Bio-informatics

IV B.Tech. (II Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits	Scheme of Examination		
							(C)	Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
IV Year - II Semester										
1.	16BT81031	Project Work *	-	-	-	-	12	100	100	200
Total			**-**	**-**	**-**	**-**	**12**	**100**	**100**	**200**

*Full-time project work

I B. Tech. - I Semester

(16BT1BS02) ENGINEERING PHYSICS

(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate / senior secondary Physics

COURSE DESCRIPTION:

Lasers; optical fibers; principles of quantum mechanics; band theory of solids; semiconductors; dielectric properties of materials; acoustics of buildings; superconductors; crystallography and nanomaterials.

COURSE OUTCOMES:

After completion of the course, a successful student will be able to:

CO1: Acquire basic knowledge of lasers, optical fibers, quantum mechanics, dielectrics, semiconductors, and superconductors, acoustic of buildings, crystallography and nanomaterials.

CO2: Analyze the construction and working of various laser systems, semiconductor devices, various types of optical fibers and its communication system and nano materials properties.

CO3: Gain skills in designing lasers, optical fiber cable, semiconductor devices, acoustically good halls and nanomaterials.

CO4: Develop problem solving skills in engineering context.

CO5: Use relevant techniques for assessing ball milling, pulsed laser deposition, p-n junction and Laser

DETAILED SYLLABUS:

UNIT I - LASERS AND FIBER OPTICS (11periods)

Lasers: Introduction, characteristics of lasers, spontaneous and stimulated emission of radiation, Einstein's coefficients - condition for amplification, population inversion, Nd:YAG laser, Helium-Neon laser, semiconductor laser and applications of lasers.

Fiber optics: Introduction, principle of optical fiber, acceptance angle, acceptance cone and numerical aperture, classification of optical fibers, optical fiber communication system and applications of optical fibers.

UNIT II – PRINCIPLES OF QUANTUM MECHANICS AND BAND THEORY OF SOLIDS (07 p*eriods*)

Principles of Quantum Mechanics: Introduction, de-Broglie's hypothesis, Schrödinger's one dimensional wave equation (time independent), significance of wave function, particle in a one dimensional potential box, Fermi-Dirac distribution and effect of temperature (qualitative treatment).

Band Theory of Solids: Electron in a periodic potential, Kronig-Penney model (qualitative treatment), origin of energy bands formation in solids, distinction between conductors, semiconductors and insulators based on band theory.

UNIT III – SEMICONDUCTORS AND DIELECTRIC PROPERTIES OF MATERIALS (13 periods)

Semiconductors: Introduction, types of semiconductors, intrinsic carrier concentration, electrical conductivity in semiconductors, drift and diffusion currents, Einstein's relation, Hall effect and its applications, direct and indirect band gap semiconductors, p-n junction, energy band diagram of p-n diode, LED, photo diode and Solar cell.

Dielectric Properties of Materials: Introduction, dielectric constant, electronic, ionic and orientation polarizations (qualitative treatment), local field, frequency dependence of polarizability (qualitative treatment), ferroelectricity.

UNIT IV – ACOUSTICS OF BUILDINGS AND SUPERCONDUCTIVITY (07 periods)

Acoustics of Buildings: Introduction, basic requirement of acoustically good hall, reverberation and time of reverberation, Sabine's formula for reverberation time (qualitative treatment), absorption coefficient of sound and its measurement, factors affecting the architectural acoustics and their remedies.

Superconductivity: Introduction, General properties - Meissner effect, penetration depth, Type-I and Type-II superconductors, flux quantization, Josephson effects, BCS theory (qualitative treatment), applications of superconductors.

UNIT V – CRYSTALLOGRAPHY AND NANOMATERIALS (07 p*eriods*)

Crystallography: Introduction, crystal planes, crystal directions and Miller indices, separation between successive (hkl) planes, X-ray diffraction by crystal planes, Bragg's law- powder method.

Nanomaterials: Introduction, principles of nanomaterials, properties of nanomaterials, synthesis of nanomaterials by ball milling and pulsed laser deposition and applications of nanomaterials.

Total Periods: 45

TEXT BOOK:

1. P. K. Palaniswamy, ***Engineering Physics***, Scitech Publications India Private Limited, 2nd Edition, 2009

REFERENCE BOOKS:

1. Dr. S. Mani Naidu, ***Engineering Physics***, Pearson Education, 1st Edition, 2013.

2. M.N. Avadhanulu, P.G.Kshirsagar, ***A textbook of Engineering Physics***, S.Chand & Company Ltd. Revised edition 2014.
3. K. Thyagarajan***, Engineering Physics-I***, McGraw-Hill Education (India) Pvt. Ltd. 2015.

I B. Tech. – I Semester

(16BT1BS03) MATRICES AND NUMERICAL METHODS

(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate /Senior secondary mathematics

COURSE DESCRIPTION: Fundamentals of matrix theory; numerical solutions of equations, curve fitting; interpolation; numerical differentiation and integration; numerical solutions of ordinary differential equations.

COURSE OUTCOMES: After completion of the course a successful student is able to

CO1: Acquire basic **knowledge** in
- (a) Finding the rank of matrices and analyzing them.
- (b) Solving algebraic and transcendental equations by various numerical methods.
- (c) Fitting of various types of curves to the experimental data.
- (d) Estimating the missing data through interpolation methods.
- (e) Identification of errors in the experimental data
- (f) Finding the values of derivatives and integrals through various numerical methods.
- (g) Solving differential equations numerically when analytical methods fail.

CO2: Develop skills in **analyzing** the
- (a) methods of interpolating a given data
- (b) properties of interpolating polynomials and derive conclusions
- (c) properties of curves of best fit to the given data
- (d) algebraic and transcendental equations through their solutions
- (e) properties of functions through numerical differentiation and integration
- (f) properties of numerical solutions of differential equations

CO3: Develop skills in **designing** mathematical models for
- (a) Fitting geometrical curves to the given data
- (b) Solving differential equations
- (c) Constructing polynomials to the given data and drawing inferences.

CO4: Develop numerical skills in **solving the problems** involving
- (a) Systems of linear equations
- (b) Fitting of polynomials and different types of equations to the experimental data
- (c) Derivatives and integrals
- (d) Ordinary differential equations

CO5: Use relevant numerical **techniques** for
- (a) Diagonalising the matrices of quadratic forms
- (b) Interpolation of data and fitting interpolation polynomials
- (c) Fitting of different types of curves to experimental data
- (d) obtaining derivatives of required order for given experimental data
- (e) Expressing the functions as sum of partial fractions

DETAILED SYLLABUS:

UNIT–I : MATRICES (11 periods)

Rank of a matrix, echelon form, normal form, inverse of a matrix by elementary row operations. Solutions of linear system of equations. Eigen values, Eigen vectors and properties (without proof), Diagonalization. Quadratic form (QF), reductions to canonical form using orthogonal transformation and nature of QF.

UNIT-II NUMERICAL SOLUTIONS OF EQUATIONS AND CURVE FITTING (8 periods)

Solutions of Algebraic and Transcendental equations by bisection method, Regula-Falsi method, Newton – Raphson's method. Curve fitting by the principle of least squares, fitting of a straight line, parabola and exponential curves.

UNIT- III INTERPOLATION (8 periods)

Interpolation, difference operators and their relationships, Newton's forward and backward formulae, Lagrange's interpolation formula. Partial fractions using Lagrange's interpolation formula.

UNIT-IV NUMERICAL DIFFERENTIATION AND INTEGRATION (8 periods)

Numerical differentiation using Newton's forward and backward formulae. Numerical integration using Trapezoidal rule, Simpson's $1/3^{rd}$ rule and $3/8^{th}$ rule.

UNIT- V NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS (10 periods)

Numerical solutions of first order Initial value problems using Taylor series method, Euler's method , modified Euler's method, Runge – Kutta method (4^{th} order only) and Milne's predictor – corrector method.

Total no. of periods: 45

TEXT BOOK:

1. T.K.V. Iyenger, B. Krishna Gandhi, S.Ranganadham and M.V.S.S.N.Prasad, ***Mathematical Methods,*** S.Chand and Company, 8/e, 2013

REFERENCE BOOKS:

1. B.S. Grewal, ***Higher engineering mathematics***, Khanna Publishers, 42nd Edition. 2012
2. S.S.Sastry, ***Introductory methods of Numerical Analysis***, Prentice Hall of India, 5/e, 2013

I B. Tech. - I Semester

(16BT1BS04) MULTI - VARIABLE CALCULUS AND DIFFERENTIAL EQUATIONS

(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate /Senior secondary mathematics

COURSE DESCRIPTION: First order differential equations; higher order linear differential equations; functions of several variables; applications of integration; multiple integrals; vector calculus.

COURSE OUTCOMES: After completion of the course a successful student is able to

CO1: Acquire knowledge in
- (a) Higher order Differential equations
- (b) Maximum and minimum values for the functions of several variables
- (c) Double and triple integrals
- (d) Differentiation and integration of vector functions.
- (e) Line and surface volume
- (f) transforming integrals from three dimensional surfaces and volumes on to plane surfaces

CO2: Develop skills in analyzing the
- (a) methods for differential equation for obtaining appropriate solutions,
- (b) Properties of oscillatory electrical circuits and heat transfer in engineering systems
- (c) The variations in the properties of functions near their stationary values
- (d) Flow patterns of fluids, electrical and magnetic flux and related aspects

CO3: Develop skills in designing mathematical models for
- (a) R-C and L-R-C oscillatory electrical circuits
- (b) Heat transfer and Newton's law of cooling
- (c) Engineering concepts involving lengths of curves and areas of planes, Flux across surfaces

CO4: Develop analytical skills in solving the problems involving
- (a) Newton's law of cooling
- (b) non homogeneous linear differential equations
- (c) maximum and minimum values for the functions
- (d) lengths of curves, areas of surfaces and volumes of solids in engineering
- (e) transformation of integrals from three dimensional surfaces and volumes on to plane surfaces

CO5: Use relevant mathematical techniques for evaluating
- (a) various types of particular integrals in differential equations
- (b) stationary values for multi variable functions
- (c) multiple integrals in change of variables
- (d) integrations of vector functions.

DETAILED SYLLABUS:

UNIT-I: FIRST ORDER DIFFERENTIAL EQUATIONS (6 periods)

Linear and Bernoulli type, exact equations and reducible to exact. Orthogonal trajectories (Both Cartesian and polar forms). Newton's law of cooling.

UNIT II: HIGHER ORDER LINEAR DIFFERENTIAL EQUATIONS (9 periods)

Method for solution of linear equations- Differential operator *D*, Solution of second order linear homogeneous equations with constant coefficients, Solution of Higher order homogeneous linear equations with constant coefficients, **Solution of Non homogeneous linear equations**-Operator methods for finding particular integrals- for cases – e^{ax}, sin ax, cos ax, x^n, $e^{ax}V(x)$, $xV(x)$. Method of Variation of parameters. Applications to oscillatory electrical circuits.

UNIT-III: FUNCTIONS OF SEVERAL VARIABLES (8 periods)

Functions of Two Variables: Limits, Continuity; **Partial Derivatives**: Total Differential and Derivatives, Jacobian, Functional dependence, Taylor's Theorem, maxima and minima of functions of two variables with and without constraints – Lagrange's method of undetermined multipliers.

UNIT-IV: APPLICATIONS OF INTEGRATION AND MULTIPLE INTEGRALS (10 periods)

Applications of integration to – lengths of curves, areas of surfaces of revolution, Double and Triple integrals – change of order of integration, change of variables in integrals. Area enclosed by plane curves, volumes of solids.

UNIT-V: VECTOR CALCULUS (12 periods)

Vector differentiation: Gradient of a scalar field and Directional Derivative, Divergence and Curl of a Vector field

Line integrals: Line integrals independent of path – work done.

Surface area and Surface Integrals: Surface Area, Surface Integrals, Flux across a surface.

Green's Theorem: Green's Theorem (without proof)-verification- applications

Gauss Divergence Theorem and Stoke's Theorem: Gauss Divergence theorem (without proof), Stokes's Theorem (without proof) –verifications and applications. **Total no. of periods: 45**

TEXT BOOK:

1. T.K.V. Iyengar, B. Krishna Gandhi,S.Ranganatham and M.V.S.S.N. Prasad, ***Engineering Mathematics, Vol-1***, S. Chand &Company, 13/e, 2014

REFERENCE BOOKS:

1. Grewal, B.S., ***Higher engineering mathematics***,Khanna publishers, Delhi, 42/e. 2012.
2. Kreyszig, E., ***Advanced Engineering Mathematics***,John Wiley and Sons, Inc.,9/e.2012.

I B. Tech. - I Semester

(16BT10241) NETWORK ANALYSIS

(Common to ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	4	1	0	4

PRE-REQUISITES: --

COURSE DESCRIPTION: Basic concepts of electric circuits; Voltage - Current relationship of basic circuit elements; Mesh and Nodal analysis; Network theorems; AC circuits; Two-port network parameters; Transient analysis.

COURSE OUTCOMES: After successful completion of the course, student will be able to

CO1: Demonstrate knowledge in
- voltage and current relationships for various electric elements.
- network reduction techniques.
- concepts of AC fundamentals and single phase circuits.
- concepts of two-port networks.
- various network theorems.
- transient behavior of the circuits.

CO2: Analyze
- a circuit using conventional, mesh and nodal concepts.
- a two-port network for various network parameters.
- various types of two-port networks.
- the transient behavior of the circuits.

CO3: Design circuits to meet the required specifications

CO4: Evaluate
- electrical circuits for voltage, current and power using conventional circuit analysis methods and network theorems.
- transient response.
- two-port networks.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO ELECTRICAL CIRCUITS (12 Periods)

Concepts of charge, current, voltage, power, circuit elements, Ohm's law, Kirchoff's Laws, Network reduction techniques, voltage and current division rules, Series-Parallel circuits, Star-Delta and Delta-Star transformations, Source transformation, nodal analysis, mesh analysis- Problems.

UNIT-II: SINGLE PHASE AC CIRCUITS (12 Periods)

Introduction to AC quantities and basic definitions: Cycle, Time period, Frequency, Amplitude, determination of Average value, RMS value, Form factor and Peak factor for different alternating waveforms, phasor notation, phase and phase difference, phase relation in R, L, C circuits, series and parallel circuits, impedance and power triangle, power factor. Series and Parallel resonance, Quality factor and bandwidth-Problems.

UNIT-III: NETWORK THEOREMS (10 Periods)

Superposition, Thevenin's, Norton's, Maximum power transfer, Tellegen's, Millman's, Reciprocity, Compensation theorems for D.C. and sinusoidal excitation- Problems.

UNIT-IV: TWO-PORT NETWORKS (10 Periods)

Impedance parameters, admittance parameters, transmission (ABCD) parameters, hybrid parameters, conversion of one parameter to another, conditions for reciprocity and symmetry, interconnection of two-port networks in series, parallel and cascaded configurations - Problems.

UNIT-V: TRANSIENT ANALYSIS (10 Periods)

Transient response of R-L, R-C and R-L-C for DC excitation and Sinusoidal excitation - Solution by using Differential equation and Laplace Transforms method - Problems. **Total Periods: 54**

TEXT BOOKS:

1. Sudhakar, S.P.Shyam Mohan, Circuits and Network analysis and synthesis, 5th edition, Tata McGraw Hill publishing company Ltd., New Delhi, 2007.
2. W. H. Hayt, J. E. Kemmerly, S. M. Durbin, Engineering Circuit Analysis, 6th edition, Tata McGraw Hill publishing company Ltd., New Delhi, 2008.

REFERENCE BOOKS:

1. M.E. Van Valkenberg, Network Analysis, Pearson Publications, 3rd edition, New Delhi 2006.

2. A.Chakrabarthi, Circuit Theory (analysis and synthesis), 6th edition, Dhanpat Rai & Co, New Delhi, 2014.

I B. Tech. - I Semester

(16BT10501) PROGRAMMING IN C

(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: NIL

COURSE DESCRIPTION:

Program design; Operators and Expressions; Data Input and Output; Control Statements; Functions; Arrays; Strings; Pointers; Structures & Unions and File handling Techniques;

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1: Demonstrate knowledge in:
- o Elements of C Language
- o Selection and Repetition statements.
- o Arrays, Strings and Functional statements.
- o Derived data types, Files and Pointers

CO2: Analyze complex engineering problems to develop suitable solutions

CO3: Design algorithms for specified engineering problems

CO4: Use appropriate 'C' language constructs for solving engineering problems

CO5: Write programs using 'C' language to implement algorithms

DETAILED SYLLABUS:

UNIT I – INTRODUCTION TO C PROGRAMMING, OPERATORS & EXPRESSIONS (08 periods)

Introduction to C Programming: The C Character set, Writing First Program of C, Identifiers and Keywords, Data types, Constants, Variables and Arrays, Declarations, Expressions, Statements and Symbolic Constants.

Operators and Expressions: Arithmetic Operators, Unary Operators, Relational and Logical Operators, Assignment Operators, the Conditional Operators.

UNIT II – DATA INPUT AND OUTPUT & CONTROL STATEMENTS (08 periods)

Data Input and Output: Single Character Input and Output, Input Data & Output data, The gets and puts Function.

Control Statements: Branching: The if-else Statement, Looping: The while Statement, More Looping: The do-while Statement, Still More Looping: The for Statement, Nested Control Statement, The switch Statement, The break & continue Statements, The goto Statement.

UNIT III – FUNCTIONS, PROGRAM STRUCTURES & ARRAYS (11 p*eriods*)

Functions: A Brief Overview, Defining a Function, Accessing a Function, Function Prototypes, Parsing Argument to a Function, Recursion.

Program Structure: Storage Classes, Automatic Variables, External (Global) Variables, Static Variables, Multi file Programs,

Arrays: Defining an Array, Processing an Array, Processing Array to function, Multidimensional Arrays. Linear search, Binary search, Fibonacci search, Bubble sort and Insertion sort

UNIT IV – STRINGS & POINTERS (09 periods)

Strings: Defining a String, NULL Character, Initialization of Strings, Reading and Writing a String, Processing a Strings, Character Arithmetic, Searching and Sorting of Strings, Library Functions for Strings.

Pointers: Pointer Declaration, Passing Pointers to a Function, Pointers and One-dimensional Arrays, Dynamic Memory Allocation, Operations on Pointers, Pointers and Multidimensional Arrays, Arrays of Pointers.

UNIT V – STRUCTURES AND UNIONS & FILE HANDLING (09 periods)

Structures and Unions: Defining a Structure, Processing a Structure, User-Defined Data types (typedef), Structures and Pointers, Passing Structures to Function, Self –Referential Structures, Unions

File Handling: Files introduction, Opening and Closing a Data File, Reading and Writing a Data File, Processing a Data File, Unformatted Data File, Concept of Binary Files, Accessing the File Randomly.

Total Periods: *45*

TEXT BOOK:

1. Byron Gottfried and Jitender Kumar C "*Programming with C*," Third Edition, McGraw Hill Education (India) Pvt, Ltd, New Delhi, 2016.

REFERENCE BOOKS:

1. PradipDey and Manas Ghosh, *"Programming in C",* Second Edition, Oxford University Press, NewDelhi, 2007.

2. E. Balagurusamy, "*Programming in C"*, Seventh Edition, Mc Graw Hill Education (India) Pvt, Ltd, New Delhi, 2014.

I B. Tech. I-Semester

(16BT1BS32) ENGINEERING PHYSICS LAB

(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Intermediate / senior secondary Physics.

COURSE DESCRIPTION:

Characteristics of p-n junction diode, Photodiode, LED, and semiconductor laser diode. Experimental determination of carrier concentration and energy gap of a semiconductor material, wave length of a laser source, size of fine particle, numerical aperture and acceptance angle of optical fiber. Determination of frequency of electrically vibrating tuning fork and A.C source using A.C sonometer, magnetic field along axial line of a current carrying coil and rigidity modulus of material of a wire using torsional pendulum.

COURSE OUTCOMES:

After completion of the course, a successful student will be able to:

CO1: Acquire basic knowledge about semiconductor materials, magnetic materials and lasers.

CO2: Acquire analytical skills in the estimation of carrier concentration of semiconductor materials and characterization of p-n junction.

CO3: Develop skills in designing electronic circuits using semiconductor components.

CO4: Acquire skills to use instrumental techniques in A.C sonometer and Melde's experiment.

CO5: Apply diffraction techniques for determination of size of tiny particles and wave length of lasers.

ENGINEERING PHYSICS LAB

Conduct a minimum of any **Ten** of the following experiments.

1. Determination of wavelength of a laser source using Diffraction Grating.
2. Determination of particle size by using a laser source.
3. Determination of Numerical aperture and acceptance angle of an optical fiber.
4. Melde's experiment - transverse & longitudinal modes.
5. Magnetic field along the axis of a current carrying coil- Stewart and Gee's method.
6. Calculation of A.C frequency using sonometer.
7. I-V Characteristics of a p-n Junction diode.
8. Energy gap of a material of a p-n Junction.
9. Characteristics of LED source.
10. Characteristics of Photo diode.
11. Hall Effect.
12. Determination of rigidity modulus of the material of the wire using torsional pendulum.

I B. Tech. - I Semester
(16BT10232) ELECTRICAL AND ELECTRONICS WORKSHOP PRACTICE

(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: NIL

COURSE DESCRIPTION: Identification and specifications of various Electric and Electronic devices; analysis of various series, parallel and series-parallel electrical circuits; develop various electrical circuits for domestic and industrial applications.

COURSE OUTCOMES: After successful completion of the course, student will be able to

CO1: Demonstrate knowledge on various Electrical and Electronic Devices.
CO2: Analyze various series and parallel electrical circuits.
CO3: Design and develop various electrical circuits for domestic and industrial applications.
CO4: Function effectively as individual and as a member in a team.
CO5: Communicate effectively both oral and written forms

DETAILED SYLLABUS:

PART A: (Demonstration)

1. Identification and Specifications of R, L, C Components (Colour Codes), Potentiometers, Switches (SPST, DPST and DPI), Gang Condensers, Relays, Bread Boards, PCBs, Fuses, MCBs, Earthing and Electrical Wiring accessories.
2. Identification and Specifications of Active Devices: Diodes, BJTs, Low-power JFETs, MOSFETs, Power Transistors, LEDs, LCDs, Optoelectronic Devices, SCR, UJT, DIACs, TRIACs, Linear and Digital ICs.
3. Study the operation of
   - Multimeter (Analog and Digital)
   - Function Generator
   - Regulated Power Supplies
   - CRO.

PART-B:

1. Measurement of Electrical Quantities (AC & DC) using: Voltmeter, Ammeter and Wattmeter.
2. Measurement of Resistivity of a conducting wire.
3. Circuit with one lamp controlled by one switch and provision of 2-pin or 3-pin socket PVC surface conduit system.
4. Circuit with two lamps controlled by two switches with PVC surface conduit system.
5. Circuit for Stair case wiring and Godown wiring.
6. Circuit connection for a Fluorescent tube
7. Solder simple electronic circuits.
8. B-H curve of a Magnetic material
9. I-V and P-V characteristics of a Solar panel
10. Design and Fabrication of a single-phase transformer
11. PCB preparation and design of a circuit on a PCB

I B. Tech. - I Semester

(16BT10251) NETWORK ANALYSIS LAB

(Common to ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: NIL

COURSE DESCRIPTION: Verification of KVL, KCL and network theorems; analysis of AC and DC circuits; determination of resonant frequency in series and parallel RLC circuits; evaluation of transients

COURSE OUTCOMES: After successful completion of the course, student will be able to

CO1: Demonstrate knowledge in

- Identification of various circuit elements and their values.
- Concepts of electric circuits and two-port networks.

CO2: Analyze and relate physical observations and measurements in electric circuits to theoretical perception.

CO3: Design circuit parameters to meet the required specifications.

CO4: Demonstrate skills in evaluating and interpret

- Various circuit parameters using conventional and network theorems
- Network parameters

CO5: Function effectively as individual and as a member in a team.

CO6: Communicate effectively in oral format and prepare laboratory reports.

LIST OF EXPERIMENTS:

Any TEN experiments are to be conducted

1. Verification of KVL and KCL.
2. Mesh and Nodal analysis.
3. Series and Parallel resonance.
4. Phasor analysis of RL, RC and RLC circuits.
5. Measurement of active and reactive power in a single phase circuit.
6. Steady state response of series RL and RC circuits.
7. Two-port network parameters.
8. Verification of Superposition and Reciprocity theorems.
9. Verification of Thevenin's and Norton's theorem.
10. Verification of Maximum Power transfer theorem for DC and AC excitations.
11. Verification of Millmann's and compensation theorem.
12. Transient response of RL, RC and RLC circuits.

I B. Tech. - I Semester
(16BT10531) PROGRAMMING IN C LAB
(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES:-

A course on "Programming in C"

COURSE DESCRIPTION:

Hands on practice in developing and executing simple programs using C Programming constructs– Conditional statements, Loops, Arrays, Strings, Functions, Structures, Pointers and Functions.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1: Demonstrate practical knowledge of using C language constructs:
- Selection and Repetition statements.
- Arrays, Strings and Functional statements.
- Derived data types, Files and Pointers

CO2: Analyze problems to develop suitable algorithmic solutions

CO3: Design Solutions for specified engineering problems

CO4: Use appropriate 'C' language constructs for solving engineering problems

CO5: Implement and execute programs using 'C' language

CO6: Document programs and communicate effectively while conducting Professional transactions.

List of Exercises:

1. a. Let a and b are two integer variables whose values are 10 and 13 respectively. Write a program to evaluate the following arithmetic expressions.

   i) a + b   ii) a–b   iii) a * b   iv) a/b   v) a % b

   b. Write a program to evaluate the following algebraic expressions after reading necessary values from keyword.

   i) $(ax + b)/(ax - b)$

   ii) $2.5 \log x + \cos 32^0 + | x^2 + y^2|$

   iii) $x^5 + 10 x^4 + 8$ and $x^3 + 4 x + 2$

   iv) ae^{kt}

2. a. Mr. Gupta deposited Rs.1000 in a bank. The bank gives simple interest at the rate of 15% per annum. Write a program to determine the amount in Mr. Gupta's account at the end of 5 years. (Use the formula I = P T R / 100)

   b. A cashier has currency notes of denominations Rs.10, Rs. 50 and Rs. 100. If the amount to be withdrawn is input in hundreds, find the total number of notes of each denomination the cashier will have to give to the withdrawer.

   c. In a town, the percentage of men is 52. The percentage of total literacy is 48.If total percentage of literate men is 35 of the total population; write a program to find the total number of illiterate men and women if the population of the town is 8000.

3. a. Write a program that prints the given 3 integers in ascending order using if - else.

   b. Write a program to calculate commission for the input value of sales amount.

   Commission is calculated as per the following rules:

   i) Commission is NIL for sales amount Rs. 5000.

   ii) Commission is 2% for sales when sales amount is >Rs. 5000 and <= Rs. 10000.

   iii) Commission is 5% for sales amount >Rs. 10000.

c. A character is entered through keyboard. Write a program to determine whether the character entered is a capital letter, a small case letter, a digit or a special symbol. The following table shows the range of ASCII values for various characters.

Characters	ASCII values
A - Z	65 - 90
a - z	97- 122
0 - 9	48 - 57
Special Symbols	0 - 47, 58 - 64, 91- 96, 123 - 127

4. a. If cost price and selling price of an item is input through the keyboard, write program to determine whether the seller has made profit or incurred loss. Also determine how much profit or loss he incurred in percentage.

b. An insurance company calculates premium as follows:

i. If a person's health is excellent and the person is between 25 and 35 years of age and lives in a city and is a male then premium is Rs.4 per thousand and the policy amount cannot exceed Rs.2 lakhs.

ii. If a person satisfies all the above conditions and is female then the premium is Rs.3 per thousand and the policy amount cannot exceed Rs.1 lakh.

iii. If a person's health is poor and the person is between 25 and 35 years of age and lives in a village and is a male then premium is Rs.6 per thousand and the policy cannot exceed Rs. 10000.

iv. In all other cases the person is not insured.

Write a program to determine whether the person should be insured or not, his/her premium rate and maximum amount for which he/she can be insured.

5. a. Write a program, which takes two integer operands and one operator as input from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, %. Use switch statement)

b. Write a program to find the grace marks for a student using switch. The user should enter the class obtained by the student and the number of subjects he has failed in. Use the following rules:

i. If the student gets first class and the number of subjects failed is >3, then no grace marks are awarded. If the number of subjects failed is less than or equal to '3' then the grace is 5 marks per subject.

ii. If the student gets second class and the number of subjects failed in is >2, then no grace marks are awarded. If the number of subjects failed in less than or equal to '3' then the grace is 4 marks per subject.

iii. If the student gets third class and the number of subjects failed in is >1, then no grace marks are awarded. If the number of subjects failed in is equal to '1' then the grace is 5 marks per subject.

6. a. Write a program to find the sum of individual digits of a positive integer.

b. A Fibonacci sequence is defined as follows:

The first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a program to generate the first N terms of the sequence.

Write a program to generate all the prime numbers between 1 and N, where N is a value supplied by the user.

7. a. Write a program to find the largest and smallest number in a given list of integers.

b. Write a program to perform the following:

i. Addition of two matrices.

ii. Multiplication of two matrices.

8. a. Write a program that uses functions to perform the following operations:

i. To insert a sub-string in main string at a specified position.

ii. To delete N characters from a given string from a specified position.

b. Write a program to determine whether the given string is palindrome or not.

c. Write a program to display the position or index in the main string S where the sub string T begins. Display -1 if S does not contain T.

d. Write a program to count the number of lines, words and characters in a given text.

9. a. Write a program to read list of student names and perform the following operations using functions.
   i. to print list of names
   ii. to sort them in ascending order
   iii. to print the list after sorting.
   b. Write a menu driven program to read list of student names and perform the following operations using array of character pointers.
   i. to insert a student name
   ii. to delete a name
   iii. to print the name
10. Write a program that uses functions to perform the following operations:
   i. Reading a complex number
   ii. Writing a complex number
   iii. Addition of two complex numbers
   iv. Multiplication of two complex numbers
   (**Note:** Represent complex number using a structure.)
11. a. Write a program to accept the elements of the structure as:
   Employee-name,Basic pay
   Display the same structure along with the DA, CCA and Gross salary for 5 employees.
   Note: DA=51% of Basic pay, CCA=Rs.100.consolidated.
   b. Define a structure to store employee's data with the following specifications:
   Employee-Number, Employee-Name, Basic pay, Date of Joining
   i. Write a function to store 10 employee details.
   ii. Write a function to implement the following rules while revising the basic pay.
   If Basic pay<=Rs.5000 then increase it by 15%.
   If Basic pay> Rs.5000 and <=Rs.25000 then it increase by 10%.
   If Basic pay>Rs.25000 then there is no change in basic pay.
   Write a function to print the details of employees who have completed 20 years of service from the date of joining.
12. a. Write a program which copies one 'text file' to another 'text file'.
   b. Write a program to reverse the first N characters of a given text file.

Note: The file name and N are specified through command line.

13. Write a program to print the output by giving the Customer_ID as an input.

REFERENCE BOOKS:

1. Byron Gottfried and Jitender Kumar C, "Programming with C," Third Edition, McGraw Hill Education(India) Pvt. ltd, New Delhi, 2016.
2. Pradip Dey and Manas Ghosh, "Programming in C," Second Edition, Oxford University Press, New Delhi, 2007.

I B. Tech. - II Semester

(16BT1HS01) **Technical English**

(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: English at Intermediate level

COURSE DESCRIPTION: Introduction to Communication; Active Listening; Effective Speaking; Reading; and Writing.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

CO1: Demonstrate knowledge in

- Process of communication
- Modes of listening
- Paralinguistic features
- Skimming and Scanning
- Elements of style in writing

CO2: Analyze the possibilities and limitations of language for understanding

- Barriers to Communication
- Barriers to Effective Listening
- Barriers to Speaking
- Formal and metaphorical language

CO3: Design and develop functional skills for professional practice.

CO4: Apply writing skills in preparing and presenting documents

CO5: Function effectively as an individual and as a member in diverse teams.

CO6: Communicate effectively with the engineering community and society in formal and informal situations.

DETAILED SYLLABUS:

UNIT I - INTRODUCTION TO COMMUNICATION: (9 periods)

Introduction -Language as a Tool of Communication - Communicative Skills (Listening, Speaking, Reading and Writing) - Effective Communication - Modes of Communication - Barriers to Communication (classification).

UNIT II - ACTIVE LISTENING: (9 periods)

Introduction - Reasons for poor Listening - Traits of a Good Listener - Listening Modes - Types of Listening - Barriers to Effective Listening - Listening for General Content and Specific Information.

UNIT III - EFFECTIVE SPEAKING: (9 periods)

Introduction - Achieving Confidence, Clarity and Fluency - Paralinguistic Features - Barriers to Speaking - Types of Speaking - Persuasive Speaking.

UNIT IV - READING: (9 periods)

Introduction and Reading Rates - Reading and Interpretation - Intensive and Extensive Reading - Critical Reading - Reading for Different Purposes - SQ3R Reading Technique -Study Skills.

UNIT V - WRITING: (9 periods)

Introduction - Language - Elements of Style - Techniques for Good Technical Writing - Referencing and Styling - Right Words and Phrases - Sentences.

Total Periods: 45

TEXT BOOKS:

1. Meenakshi Raman & Sangeetha Sharma, Technical Communication, Oxford University Press, New Delhi, 2012.

REFERENCE BOOKS:

1. Ashraf Rizvi, Effective Technical Communication, McGraw-Hill Education (India) Pvt.Ltd., New Delhi, 2015.
2. Sanjay Kumar & Pushp Lata, Communication Skills, Oxford University Press, New Delhi, 2013.
3. Teri Kwal Gamble and Michael Gamble, Communication Works, Tata Mc Graw-Hill, New Delhi, 2010.

4. Rajendra Pal and J.S. Korlahalli, Essentials of Business Communication, Sultan Chand and Sons (P) Ltd., New Delhi, 2010.

I B. Tech. - II Semester

(16BT1BS01): ENGINEERING CHEMISTRY

(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITE: Intermediate/Senior Secondary Chemistry

COURSE DESCRIPTION: Water technology, Chemistry of Engineering materials, Nanochemistry, Green Chemistry, Electro chemical cells, Sensors, Corrosion and Lubricants.

COURSE OUTCOMES:

After completion of the course, a successful student is able to:

CO1: Acquire basic knowledge in water technology, engineering plastics, conducting polymers, composites, Electro chemical cells, Nano Chemistry, principles of Green Chemistry, corrosion phenomenon and lubricants.

CO2: Develop analytical skills in:

a. Determination of hardness of water.

b. Determination of viscosity, flame and fire points, cloud and pour points.

CO3: Develop designing skills in:

a. Synthesis of engineering plastics.

b. Chemical methods for the synthesis of Nano materials.

CO4: Develop skills for providing solutions through:

a. Mitigation of hardness of water.

b. Newer Nanomaterials and engineering plastics for specific applications

CO5: Acquire awareness to practice engineering in compliance to modern techniques such as:

a. Nalgonda technique for defluoridation of water

b. Electroplating technique for control of corrosion.

CO6: Acquire awareness to societal issues on:

a. Quality of water.

b. Bio-diesel

c. Chemical materials utility and their impact.

DETAILED SYLLABUS:

UNIT–I: WATER TECHNOLOGY (9 periods)

Introduction: Types of water, impurities in water and their consequences, types of hardness of water, units of hardness of water, disadvantages of hardness of water, estimation of hardness of water by EDTA method, Boiler troubles: Scales and Sludges, Caustic embrittlement, Boiler corrosion and Priming and Foaming.

Softening of water: Zeolite process and Ion exchange process, advantages and disadvantages. Desalination of brackish water by Reverse Osmosis, Numerical problems on estimation of hardness of water.

Fluorides in water: Effects on human health, defluoridation method-Nalgonda method; comparison of merits and demerits of various defluoridation methods (Nalgonda, Bone Charcoal, Activated Alumina, Contact precipitation, Brick, Reverse osmosis).

UNIT – II: CHEMISTRY OF ENGINEERING MATERIALS (9 periods)

Engineering Plastics: Definition, general properties, synthesis, properties and applications of PC, PTFE, and PMMA.

Conducting polymers: Definition, types of conducting polymers: Intrinsic and extrinsic conducting polymers with examples, engineering applications of conducting polymers.

Biodegradable polymers: Definition, properties, classification, mechanism of degradation of biodegradable polymers and their applications.

Composites – Introduction, types of composites: fiber reinforced particulate and layered composites with examples, advantages of composites and applications.

UNIT– III: NANOCHEMISTRY AND GREEN CHEMISTRY (9 periods)

Nanochemistry: Introduction, classification, properties and applications of Nano materials (nano particles, nano tubes, nano wires, nano composites, dendrimers); synthesis of Nano materials – Sol-gel process.

Green Chemistry: Introduction, principles of green chemistry, Tools of Green Chemistry with Examples, Applications of Green Chemistry in science and technology.

Biodiesel: Introduction, Synthesis (Trans esterification method), advantages, disadvantages and applications.

UNIT–IV: ELECTROCHEMICAL CELLS AND SENSORS (9 periods)

Electrochemical cell: Introduction, EMF of an electrochemical cell.

Batteries: Introduction, types of Batteries: primary and secondary batteries with examples, Ni-Cd batteries, Lithium-ion batteries, Lithium- Polymer batteries, Applications of batteries.

Fuel Cells: Definition, examples: H_2 – O_2 Fuel cell, solid oxide fuel cell, Bio-fuel cell and applications of fuel cells.

Sensors - Introduction, Types of Sensors, electrochemical sensor: construction and working principle of potentiometric sensor, and applications of electrochemical sensors.

UNIT–V: CORROSION AND LUBRICANTS (9 periods)

Corrosion: Introduction, Definition, types of corrosion (dry and wet corrosion), galvanic corrosion, concentration cell corrosion, Factors influencing corrosion, Corrosion control: cathodic protection; sacrificial anodic protection and impressed current cathodic protection; protective coatings: Galvanizing and Electroplating (Nickel).

Lubricants: Definition, functions of lubricants, mechanism of lubrication, classification of lubricants, properties of lubricants – viscosity, flash and fire points, cloud and pour points, Aniline points, neutralization number and mechanical strength. **Total periods: 45 periods**

TEXT BOOKS:

1. P.C.Jain & Monika Jain, **Engineering Chemistry**, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 16th edition, 2013.
2. K.N. Jayaveera, G.V. Subba Reddy & C. Ramachandraiah **Engineering Chemistry**, Mc. Graw-Hill Higher Education, Hyderabad, 1st edition, 2015.

REFERENCE BOOKS:

1. A.K. Bandyopadhyay, **Nano Materials,** New Age international publishers, 2nd edition, 2014.
2. Paul T. Anastas and John C Warner, **Green Chemistry: Theory and practice,** Oxford University Press, 2000.

I B. Tech. - II Semester

(16BT2BS01) TRANSFORMATION TECHNIQUES AND PARTIAL DIFFERENTIAL EQUATIONS

(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITE: Intermediate /Senior secondary mathematics

COURSE DESCRIPTION: Fourier series; Fourier integrals and transforms; Laplace transforms; z – transforms; partial differential equations.

COURSE OUTCOMES:

After completion of the course a successful student is able to

CO1: Acquire basic knowledge in
- (a) Fourier series and Fourier transforms
- (b) Fourier integrals
- (c) Laplace transforms and their applications
- (d) z- transforms and their applications
- (e) solving partial differential equations

CO2: Develop skills in analyzing the
- (a) Properties of Fourier series for a given function
- (b) Partial differential equations through different evaluation methods
- (c) Difference equations through z – transforms
- (d) Engineering systems and processes involving wave forms and heat transfer

CO3: Develop skills in designing mathematical models for
- (a) Problems involving heat transfer and wave forms
- (b) Engineering concepts involving, Fourier transforms, Fourier integrals, Laplace transforms, z-transforms and difference equations

CO4: Develop analytical skills in solving the problems involving
- (a) Fourier series and Fourier transforms
- (b) Laplace transforms
- (c) Z-transforms and difference equations
- (d) Heat transfer and wave motion

CO5: Use relevant transformation techniques for
- (a) Obtaining Fourier transforms for different types of functions
- (b) Laplace transforms
- (c) Z- transforms
- (d) Partial differential equations

DETAILED SYLLABUS

UNIT- I : FOURIER SERIES **(7 periods)**

Fourier series: Determination of Fourier coefficients, convergence of Fourier series (Dirichlet's conditions), Fourier series of even and odd functions, Half-range Fourier sine and cosine expansions.

UNIT- II: FOURIER INTEGRALS AND FOURIER TRANSFORMS **(8 periods)**

Fourier integral theorem (statement only), Fourier sine and cosine integrals, Fourier transform, Fourier sine and cosine transforms –properties, Inverse transform and finite Fourier transforms.

UNIT-III: LAPLACE TRANSFORMS **(12 periods)**

Laplace transforms of standard functions. Properties of Laplace transforms. First and second shifting Theorems. Laplace transforms of derivatives and integrals. Inverse transforms. Convolution theorem (without proof), inverse Laplace transforms by convolution theorem. Laplace transform of periodic functions, Applications of Laplace transforms to ordinary differential equations of first and second order with constant coefficients.

UNIT-IV: Z- TRANSFORMS **(9 periods)**

Z – transforms, inverse Z– transforms, damping rule, shifting rule, initial and final value theorems. Convolution theorem (without proof), solution of difference equations by Z– transforms.

UNIT – V: PARTIAL DIFFERENTIAL EQUATIONS **(9 periods)**

Formation of Partial differential equations – Solutions of first order linear equations by method of grouping. First and second order equations by method of separation of variables – Solutions of one dimensional Wave equation, Heat equation. **Total no. of periods: 45**

TEXT BOOKS:

1. T.K.V. Iyengar, B. Krishna Gandhi,S.Ranganadham and M.V.S.S.N. Prasad,***Engineering Mathematics, vol-1***, S. Chand & Company 13/e,2014.
2. T.K.V. Iyenger, B. Krishna Gandhi, S.Ranganadham and M.V.S.S.N.Prasad, ***Mathematical Methods***,S.Chand and Company, 8/e,2013.

REFERENCE BOOKS:

1. Grewal, B.S., ***Higher Engineering Mathematics***,Khanna publishers, Delhi, 42/e,2012.
2. Kreyszig, E., ***Advanced Engineering Mathematics***,John Wiley and Sons, Inc.,9/e,2013.

I B. Tech. - II Semester

(16BT20401) ELECTRONIC DEVICES AND CIRCUITS

(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A Course on Engineering Physics.

COURSE DESCRIPTION:

Characteristics of general and special purpose electronic devices; Rectifiers; filters and regulators; Biasing and small signal analysis of BJT and FET.

COURSE OUTCOMES:

On successful completion of this course the students will be able to:

CO1: Demonstrate knowledge in
- p-n junction diode and its characteristics
- Zener diode and its characteristics
- Rectifiers, Filters and Regulators
- Characteristics of BJT, FET, MOSFET and special purpose electronic devices.

CO2: Analyze numerical and analytical problems in
- Rectifiers using Filters
- Regulated Power Supplies
- Transistor biasing circuits and stabilization
- Transistor amplifiers
- FET biasing circuits and amplifiers

CO3: Design electronic circuits such as
- Rectifiers with and without filters
- Voltage regulators
- BJT and FET biasing circuits
- BJT and FET amplifiers

CO4: Solve engineering problems and arrive at solutions pertaining to electronic circuits.

CO5*:* Select appropriate technique for transistor modeling.

DETAILED SYLLABUS:

UNIT-I: P-N JUNCTION DIODE, RECTIFIERS AND REGULATORS (11 Periods)

P-N Junction Diode:

p-n Junction as a diode, *p-n* Junction diode equation, Volt-Ampere (V-I) characteristics, temperature dependence of *p-n* characteristics, diode resistance-static and dynamic resistances, transition and diffusion capacitances, break down mechanisms in semiconductor diodes, Zener diode characteristics.

Rectifiers and Regulators:

Half-Wave rectifier and Full-Wave rectifiers (Qualitative and quantitative analysis), Harmonic components in a rectifier circuit, Inductor filter, Capacitor filter, L - section filter, ð- section filter, comparison of various filter circuits in terms of ripple factors. Simple circuit of a regulator using Zener diode. Problems on rectifier circuits.

UNIT-II- *BIPOLAR JUNCTION TRANSISTOR, BIASING AND STABILIZATION*: (10 Periods)

Transistor construction, BJT Operation, Transistor currents and their relations, Input and Output Characteristics of a Transistor in Common Emitter, Common Base and Common Collector Configurations, BJT specifications, Transistor Operating Point, DC and AC Load Lines, Importance of Biasing, Fixed Bias, Emitter Feedback Bias, Collector to Base Feedback Bias, Voltage Divider Bias, Bias Stability, Transistor as an amplifier, Thermal Runaway, Problems on biasing circuits.

UNIT-III- *SMALL SIGNAL ANALYSIS OF BJT AMPLIFIERS*: (08 Periods)

BJT Modeling, Hybrid Modeling, Determination of h-Parameters from Transistor Characteristics, Measurement of h-Parameters, Miller's Theorem, Analysis of CE, CB and CC configurations using simplified Hybrid Model, Comparison of CB, CE and CC configurations.

UNIT-IV- *FIELD EFFECT TRANSISTORS*: (10 Periods)

Construction, Principle of operation and characteristics of JFET and MOSFET (Enhancement & Depletion), Biasing of FET, Small Signal Model of JFET, Common Source and Common Drain Amplifiers using JFET, Generalized FET Amplifier, FET as Voltage Variable Resistor, Comparison of BJT and FET.

UNIT-V- *SPECIAL PURPOSE ELECTRONIC DEVICES*: (06 Periods)

Principle of Operation and Characteristics of Tunnel Diode, Uni-Junction Transistor (UJT), Varactor Diode, Silicon Control Rectifier (SCR). Principle of operation of Schottky Barrier Diode. **Total Periods: *45***

TEXT BOOK:

1. J. Millman, Christos C. Halkias and SatyabrataJit, *Electronic Devices and Circuits,* TMH, 3rd Edition, 2010.

REFERENCE BOOKS:

1. R.L. Boylestad and Louis Nashelsky, *Electronic Devices and Circuits,* PHI, 10thEdition, 2009.
2. David A. Bell, *Electronic Devices and Circuits,* Oxford University press, 5thEdition, 2014.

3. S. Salivahanan, N. Suresh Kumar, *Electronic Devices and Circuits*, Mc-Graw Hill, 3rd Edition 2013.
4. Ben G. Streetman, Sanjay Banerjee , Solid State Electronic Devices, Pearson Prentice Hall, 2006.

I B. Tech. - II Semester

(16BT20541) Foundations of Data Structures

(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:

A course on "Programming in C"

COURSE DESCRIPTION:

Concepts of sorting: sorting by exchange, sorting by distribution, sorting by merging and data structures: stacks, queues, linked lists, trees, graphs, and hash table.

COURSE OUTCOMES:

On successful completion of this course the students will be able to:

CO1: Gain knowledge in Sorting techniques, Linear and Non- linear Data Structures.

CO2: Analyze the performance of sorting techniques and their relationship to Data Structures.

CO3: Design appropriate hashing function for a given application and develop programs to implement Linear and Non-Linear data structures

CO4: Apply appropriate data structure to provide solutions for real time problems using C Language.

DETAILED SYLLABUS:

UNIT I – SORTING (9 periods)

SORTING - Sorting by Exchange-Shell Sort, Quick sort. Sorting By Distribution-Counting Sort, Bucket Sort, Radix Sort. Sorting By Merging-Merge Sort.

UNIT II– STACKS AND QUEUES (9 periods)

STACKS -Introduction, Stack Operations, Applications.

QUEUES - Introduction, Operations on Queues, Circular Queues and Applications.

UNIT III –LINKED LISTS (9 periods)

LINKED LISTS –Introduction, Single Linked List, Circular Linked List, Doubly Linked List, Multiply Linked List and Applications.

LINKED STACKS AND LINKED QUEUES - Introduction, Operations on Linked Stack and Linked Queues, Dynamic Memory Management and Linked Stacks.

UNIT IV – TREES AND BINARY TREES (9 periods)

TREES– Introduction, Definition and Basic Terminologies, Representation of Trees.

BINARY TREES – Basic Terminologies and Types, Representation of Binary Trees, Binary Tree Traversals, Binary Search Trees: Definition and Operations and Applications.

UNIT V – Graphs and Hashing (9 periods)

Graphs – Introduction, Definitions and Basic Terminologies, Representation of Graphs, Graph Traversals, Applications.

Hashing – Introduction, Hash Table Structure, Hash Functions, Linear Open Addressing, Chaining and Applications.

Total Periods: *45*

TEXT BOOK:

1. G.A.V. Pai, *"Data Structures and Algorithms",* Tata McGraw Hill, Second Edition, 2009.

REFERENCE BOOK:

1. Debasis Samanta, “Classic Data Structures”, PHI Learning, Second Edition, 2009.

I B. Tech. - II Semester

(16BT1HS31) ENGLISH LANGUAGE LAB

(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: English at intermediate or equivalent level.

COURSE DESCRIPTION: Phonetics; Vocabulary Building; Functional Grammar; Just a Minute; Elocution/Impromptu; Giving Directions/Conversation Starters; Role Play; Public Speaking; Describing People, Places, Objects and Events; Reading Comprehension; Listening Comprehension; Information Transfer.

COURSE OUTCOMES:

On successful completion of this course the students will be able to:

CO1: Demonstrate knowledge in
- Phonetics
- Information Transfer

CO2: Analyze the situations in professional context by using
- Vocabulary
- Grammar

CO3: Design and develop functional skills for professional practice.

CO4: Apply the techniques of Listening and Reading skills to comprehend Listening and Reading comprehension.

CO5: Function effectively as an individual and as a member in diverse teams through
- Extempore talk and
- Role Play

CO6: Communicate effectively in public speaking in formal and informal situations.

CO7: Recognize the need to engage in lifelong learning to upgrade competence of knowledge and communication.

LIST OF EXERCISES:

1. Phonetics
2. Vocabulary Building
3. Functional Grammar
4. Just a Minute
5. Elocution/Impromptu
6. Giving Directions/Conversation Starters
7. Role Play
8. Public Speaking
9. Describing People, Places, Objects and Events.
10. Reading Comprehension
11. Listening Comprehension
12. Information Transfer

Total Lab Slots: 10

TEXT BOOK:

1. Department Lab Manual

REFERENCE BOOKS:

1. D. Sudha Rani, *A Manual for English Language Laboratories*, Pearson Education.
2. D. Sudha Rani, *Advanced Communication Skills Laboratory Manual*, Pearson Education.
3. R. Manivannan and G. Immanuel, *Communication Skills Laboratory*, VK Publications, Sivakasi, 2013
4. Nira Kumar*, English Language Laboratories*, PHI Learning Pvt. Ltd., New Delhi, 2011.

SUGGESTED SOFTWARE: (16BT1HS31)

1. ETNL Language Lab Software Version 4.0
2. GEMS - Globarena E- Mentoring System.
3. Speech Solutions.
4. English Pronunciation Dictionary by Daniel Jones.
5. Learn to Speak English 8.1, The Learning Company - 4 CDs.
6. Mastering English: Grammar, Punctuation and Composition.
7. English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
8. Dorling Kindersley Series - Grammar.
9. Language in Use 1, 2 & 3.
10. Cambridge Advanced Learner's Dictionary - 3rd Edition.

11.Centronix - Phonetics.
12.Let's Talk English, Regional Institute of English South India.
13.The Ultimate English Tutor.

I B. Tech. - II Semester

(16BT1BS31): ENGINEERING CHEMISTRY LABORATORY

(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE REQUISITE: Intermediate/Senior Secondary Chemistry

COURSE DESCRIPTION: Estimation of hardness, alkalinity, dissolved oxygen of water samples and estimation of Iron by volumetric methods, determination of effect of P^H on rate of corrosion, measurement of viscosity of lubricants; Instrumental methods like potentiometer, conductivity meter, P^H meter and colorimeter; synthesis of Polymers and Nano materials.

COURSE OUTCOMES:

After completion of the course, a successful student is able to:

CO1: Acquire basic Knowledge about the volumetric analysis and synthesis of materials used for engineering applications.

CO2: Acquire analytical skills in the estimation of hardness of water, alkalinity of water, dissolved oxygen in water and estimation of Iron through wet laboratory methods.

CO3: Develop designing skills for the synthesis of polymers and Nanomaterials.

CO4: Acquire skills to use instrumental techniques for the determination of Electrical conductance of electrolytes, EMF of a cell, PH of a solution, determination of viscosity of lubricants and estimation of iron in cement.

CO5: Provide solutions for environmental issues through determination of quality of water.

List of Experiments:

A minimum of any **Ten** experiments are to be conducted among the following:.

1. Estimation of Hardness of water by EDTA method.
2. Estimation of alkalinity of Water.
3. Estimation of Dissolved Oxygen in water.
4. Estimation of Ferrous Iron by Dichrometry.
5. Preparation of Novalac Resin.
6. Synthesis of Nano metal-oxide using sol– gel process.
7. Conductometric titration of strong acid Vs strong base
8. Estimation of Ferrous ion by Potentiometry.
9. Determination of amount of corrosion of metals in different medium
10. Measurement of viscosity of lubricants by Ostwald viscometer.
11. Determination of P^H of a given solution by P^H metry.
12. Estimation of Ferric iron in cement by Colorimetric method.

Total Time Slots: 12

I B. Tech. - II Semester
(16BT10331) COMPUTER AIDED ENGINEERING DRAWING

(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	1	6	3

PRE-REQUISITES: *None*

COURSE DESCRIPTION:

Engineering drawing conventions; importance of engineering drawing; fundamental concepts of sketching; computed aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.

COURSE OUTCOMES:

After completion of the course, a successful student is able to:

- CO1: Understand, write and read the language of engineering drawing in industry through International System of Standards.
- CO2: Develop the imagination and mental visualization ability for interpreting the geometrical details of engineering objects.
- CO3: Produce different views and projection in drawing.
- CO4: Use modern CAD software for design and drafting of drawings.
- CO5: Create multi-view drawings suitable for presentation to Engineering community.
- CO6: Introduce and communicate universally accepted conventions and symbols for their usage in technical drawing.

DETAILED SYLLABUS:

UNIT : I - BASICS OF ENGINEERING DRAWING PRACTICE, GEOMETRICAL CONSTRUCTIONS, CONICS AND SPECIAL CURVES (18 periods)

Introduction, drawing instruments and its uses, sheet layout, BIS conventions, lines, lettering and dimensioning practices. Geometrical constructions: Construction of regular polygons: Pentagon, Hexagon, Heptagon and Octagon. Conic sections**:** Introduction, construction of ellipse: rectangular method, eccentricity method. Construction of parabola: rectangular method, eccentricity method. Construction of hyperbola: eccentricity method. Special curves***:*** cycloid, involute.

UNIT: II – INTRODUCTION TO COMPUTER AIDED SKETCHING (18 periods)

Computer screen, layout of the software, creation of 2D/3D environment, selection of drawing size and scale, Standard tool bar/menus, Coordinate system, description of most commonly used toolbars, navigational tools: commands and creation of lines, Co-ordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination and perpendicularity.

UNIT: III – PROJECTION OF POINTS, STRAIGHT LINES AND PLANES (21 periods)

Introduction, method of projection, planes of projection, reference line and notations. Projection of points: Points in all the four quadrants. Projection of straight lines**:** lines inclined to HP / VP plane, inclined to both HP and VP planes (straight lines are assumed to be in first quadrant only)**.** Projection of planes**:** projection of triangle, square, rectangle, rhombus, pentagon, hexagon and circular plane for the condition inclined to HP / VP by change of position method.

UNIT IV –PROJECTION OF SOLIDS AND SECTION OF SOLIDS (21 Periods)

Projections of Solids: Introduction, projection of solids: prisms, pyramids, cylinders and cones with axis perpendicular to VP/HP and axis inclined to VP/HP only. Sections of solids**:** Introduction, Cutting plane, sectional views of right regular solids resting with base on HP: prisms, pyramids, cylinder and cone and true shapes of the sections.

UNIT V –ORTHOGRAPHIC AND ISOMETRIC PROJECTIONS AND DEVELOPMENT OF SURFACES (22 periods)

Orthographic projection: simple exercises. Isometric projection: Simple exercises.

Development of surfaces: prisms, pyramids, cylinders, cone and miscellaneous surfaces

Total Periods: *100*

Note: *Student shall practice Unit-I using sketch book only and remaining units using sketch book first and later CAD package.*

TEXT BOOKS:

1. D.M.Kulkarni, A.P.Rastogi, A.K.Sarkar, Engineering Graphics with AutoCAD, PHI Learning Private Limited, New Delhi, Revised Edition, 2010.
2. N D Bhat & V M Panchal, Engineering Drawing, Charotar Publishing House, Gujarat, 51st edition, 2013.

REFERENCE BOOKS:

1. Sham Tickoo, AutoCAD 2013 for Engineers and Designers, Dreamtech Press, 2013.
2. M.H.Annaiah & Rajashekar Patil, Computer Aided Engineering Drawing, New Age International Publishers, 4th Edition, 2012.
3. T.Jeyapoovan, Engineering Drawing and Graphics Using AutoCAD, Vikas Publishing House, 3rd Edition, 2010.
4. Jolhe, Engineering Drawing, Tata McGraw Hill Education Private Limited, 1st Edition, 2007.

5. Basant Aggarwal, Engineering Drawing, Tata McGraw Hill Education Private Limited, 1st Edition, 2008.

I B. Tech. - II Semester

(16BT20551) **Foundations of Data Structures Lab**

(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES:

A course on "Foundations of Data Structures"

COURSE DESCRIPTION:

Hands on programming to implement data structures - Linked lists, Stacks, Queues, Trees, Search trees, Sorting, and Hashing in C Language.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1: Gain practical knowledge on stacks, queues, trees, graphs and Hashing Techniques

CO2: Identify suitable data structure to solve engineering problems.

CO3: Design solutions for complex engineering problems using linear and non-linear data structures.

CO4: Develop algorithms leading to multiple solutions by conducting investigations of complex problems.

CO5: Apply 'C' language as a tool for implementing linear and non linear data structures

CO6: Communicate effectively by writing Programs and document practical work.

LIST OF PRACTICAL EXERCISES:

1. Implement the following sorting techniques
   (a) Quick Sort (b) Radix Sort (c) Merge Sort
2. Implement the following data structures using arrays
   (a)Stack (b) Queue (c) Circular Queue
3. Implement the following operations on a single linked list.
   (a) Creation (b) Insertion (c) Deletion (d) Display
4. Implement the following operations on a double linked list.
   (a) Creation (b) Insertion (c) Deletion (d) Display
5. Implement the following operations on a circular linked list.
   (a) Creation (b) Insertion (c) Deletion (d) Display
6. Implement the following data structures using linked list.
   (a) Stack (b) Queue (c) Circular Queue
7. Implement the following tree traversals on a binary tree
   (a) Preorder (b) Inorder (c) Postorder
8. Implement the following operation on binary search tree
   (a) Creation (b) Insertion (c) Deletion (d) Inorder
9. Implement the following graph traversal techniques
   (a) Breadth First traversal (b) Depth First Traversal
10. Implement the following Hashing Techniques
    (a) Separate Chaining (b) Open addressing methods

Reference Books:

1. G.A.V. Pai, *"Data Structures and Algorithms",* Tata McGraw Hill, Second Edition, 2009.
2. Debasis Samanta, *"Classic Data Structures",* PHI Learning, Second Edition, 2009.

II B. Tech. – I Semester

(16BT3HS01) ENVIRONMENTAL STUDIES

(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: A course on Engineering Chemistry

COURSE DESCRIPTION: Multidisciplinary nature of environment; Natural resources; Ecosystems; Biodiversity; Environment pollution and control; Social issues and environment; Human population and environment; Field studies.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Acquire knowledge on nature of environment, natural resources, ecosystems, biodiversity, environmental pollution and control, social issues and human population.

CO2. Analyze natural resources, ecosystems, biodiversity, environmental pollution and control, social issues and human population.

CO3. Develop strategies for environmental pollution control and natural resource management.

CO4. Solve environmental problems through proper analysis and interpretation of environmental data.

CO5. Choose appropriate techniques in environmental pollution control and natural resource management.

CO6. Understand the impact of social issues and population on environment.

CO7. Provide solutions to individuals, industries and government for environmental sustainable development.

CO8. Follow environmental protection laws for sustainable development.

CO9. Communicate effectively on environmental issues in the form reports.

DETAILED SYLLABUS:

UNIT - I: MULTIDISCIPLINARY NATURE OF ENVIRONMENT AND NATURAL RESOURCES (11 Periods)

Multidisciplinary Nature of Environment: Multidisciplinary nature of environment, Segments of environment - Lithosphere, Hydrosphere, Atmosphere, Biosphere; Need for public awareness.

Natural Resources: Renewable and non-renewable resources and associated problems - (a) Forest resources: Use and over exploitation, Deforestation-causes, effects and remedies, Case studies, (b) Water resources: Use and over utilization of surface and groundwater, Conflicts over water, Benefits and problems of large dams, Case studies, (c) Mineral resources: Mining, Adverse effects, Case studies, (d) Food resources: World food problems, Changes caused by agriculture and overgrazing, Effects of modern agriculture, Water logging and salinity, Case studies, (e)Energy resources: Growing needs, Renewable energy resources – Solar, Wind, Hydropower, Hydrogen fuel; Non-renewable energy resources - Coal, Natural gas, Nuclear energy, Role of an individual in conservation of natural resource and equitable use of resources for sustainable lifestyles.

UNIT - II: ECOSYSTEMS AND BIODIVERSITY (10 Periods)

Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem - Producers, Consumers, Decomposers; Food chains, Food webs, Ecological pyramids – Types; Characteristic features, Structure and functions of forest ecosystem, Desert ecosystem, Aquatic ecosystem, Energy flow in the ecosystem, Ecological succession.

Biodiversity: Concept and value of biodiversity, Role of biodiversity in addressing new millennium challenges, Hot spots of biodiversity, Threats to biodiversity, Man-wild life conflicts, Endemic, Endangered and extinct species of India, Conservation of biodiversity – In-situ and ex-situ.

UNIT - III: ENVIRONMETAL POLLUTION AND CONTROL (8 Periods)

Causes, Adverse effects and control measures of pollution - Air pollution, Water pollution, Soil pollution, Noise pollution, Thermal pollution, Nuclear pollution; Solid waste management – Causes, Effects and control measures of urban and industrial wastes; Hazards and disaster management – Floods, Earthquakes, Tsunamis, Case studies.

UNIT - IV: SOCIAL ISSUES AND THE ENVIRONMENT (8 Periods)

Sustainable development, Urban problems related to energy, Environmental ethics –Issues, Solutions; Global warming, Acid rain, Ozone layer depletion, Nuclear accidents and case studies, Wasteland reclamation, Consumerism and waste products, Concept of green technologies, Environment protection act, Air act, Water act, Wildlife protection act, Forest conservation act, Issues involved in enforcement of environmental legislation, Public environmental awareness.

UNIT - V: HUMAN POPULATION AND THE ENVIRONMENT (8 Periods)

Population growth, Population characteristics and variation among nations, Population explosion, Family welfare programme, Environment and human health, Human rights, Value education, HIV/AIDS, Women and child welfare, Role of information technology in environment and human health, Case studies, **Field Work/Assignment/Seminar:** Environmental assets – Pond/Forest/Grassland/Hill/ Mountain/Environment impact assessment procedures for local environmental issues.

Total Periods: 45

TEXT BOOKS:

1. A. Kaushik and C. P. Kaushik, *Environmental Studies*, New Age International (P) Ltd Publications, 4th Edition, 2014.
2. Erach Barucha, *Environmental Studies*, Orient Blackswan, 2nd Edition, 2013.

REFERENCE BOOKS:

1. R. Rajagopalan, *Environmental Studies*, Oxford University Press, 2nd Edition, 2011.
2. Benny Joseph, *Environmental Studies*, Tata McGraw-Hill, 2nd Edition, 2009.
3. B. S. Chauhan, *Environmental Studies*, University Science Press, 2008.

4. M. Anji Reddy, *Text Book of Environmental Sciences and Technology*, BS Publications, 2007.

II B.Tech. - I semester

(16BT3BS02) SPECIAL FUNCTIONS AND COMPLEX ANALYSIS

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate/senior secondary Mathematics

COURSE DESCRIPTION: Beta, Gamma functions and their properties; Limits continuity and analyticity of complex functions; Integration, power series, singularities, residues; conformal mapping.

COURSE OUTCOMES: On successful completion of the course, studentswill be able to:

CO1. Acquire knowledge in
- Beta and Gamma functions
- Expressing complex functions in power series
- Differentiation and integration of complex functions
- Conformal mappings and bilinear transformations
- Expressing complex functions in terms of graphs and power series

CO2. Develop skills in analyzing the
- The properties exhibited by complex functions in Argand plane
- Properties of real integrals through complex variable techniques
- The properties of improper integrals through residue theory
- Conformal transformations of complex valued functions for inferences
- The properties of complex functions by expressing them in power series and graphs

CO3. Develop skills in designing mathematical models involving
- Integrals of complex variable functions
- Improper integrals using beta and gamma functions
- Residue theory of complex functions
- Power series expansions of complex variable functions
- Transformations of complex variable functions
- Fluid flow patterns and flux functions.

CO4. Develop analytical skills in providing solutions for problems involving
- Fluid, Electrical and Magnetic Potential functions
- Integration of complex functions
- Improper real integrals

CO5. Use relevant Complex variable techniques for
- Residues and integrals of complex functions.
- Improper real integrals through complex functions
- Techniques of Beta and Gamma functions to improper integrals

DETAILED SYLLABUS

UNIT-I: SPECIAL FUNCTIONS **(9 Periods)**

Beta and Gamma functions - Properties - Relationship between Beta and Gamma functions- Evaluation of improper integrals using Beta and Gamma functions. Bessel function -Generating function (without proof) - Recurrence relations.

UNIT-II: ANALYTIC FUNCTIONS **(9 Periods)**

Function of a Complex Variable - Limits and Continuity of functions, uniform continuity, Differentiability and Analyticity – Cauchy Riemann equations (both Cartesian and polar) - Conjugate and harmonic conjugate functions - Milne Thomson method-Potential functions.

UNIT-III: COMPLEX INTEGRATION AND POWER SERIES **(9 Periods)**

Line integral - Evaluation of line integrals along curves and closed contours - Cauchy's Integral theorem - Cauchy's integral formula - Generalized integral formula- Evaluation of integrals using integral formula. Taylor's theorem (without proof) - Laurent's theorem (without proof) - Power series expansion of complex functions.

UNIT-IV: RESIDUE THEOREM **(9 Periods)**

Zeros, Singularities – Types of singularities- poles - Residues – Evaluation of residues at simple poles and poles of order m - Residue theorem - Evaluation of integrals using residue theorem – Evaluation of improper and real integrals of the type:

i) $\int_{0}^{2\pi} f(\cos\theta, \sin\theta)\, d\theta$ **ii)** $\int_{-\infty}^{\infty} f(x)\, dx$ **iii)** $\int_{-\infty}^{\infty} e^{imx} f(x)\, dx$

UNIT-V: CONFORMAL MAPPING **(9 Periods)**

Conformal mappings, Translation, Rotation, Inversion.Special transformations:
Bilinear transformation - Properties - Fixed points - Cross ratio - Invariance of circles under bilinear transformation - Determination of bilinear transformation using three given points. **Total Periods: 45**

TEXT BOOK:

1. T.K.V. Iyengar, B. Krishna Gandhi S., Ranganatham and M.V.S.S.N. Prasad, *Text book of Engineering Mathematics, Vol-III*, S. Chand & Company, 9th Edition 2012.

REFERENCE BOOKS:

1. Grewal, B.S, *Higher Engineering Mathematics*, Khanna Publishers, Delhi, 42nd Edition 2012.
2. Shahnaz Bathul, *Special Functions and Complex Variables*, PHI Learning, 2nd Edition 2010.

II B. Tech. – I Semester

(16BT31001) ELECTRICAL AND ELECTRONIC MEASUREMENTS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Network Analysis, Engineering Physics.

COURSE DESCRIPTION: Construction and principle of operation of Ammeters, Voltmeters, Ohmmeters; Potentiometers; Power meter; Power Factor meter; Energy Meters; Design of Bridges - AC, DC, Frequency and Time measurements.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge in construction and Principle of operation of different instruments used for measurement of
- Voltage
- Current and Resistance
- Power
- Power factor
- Energy measurement
- Frequency and time

CO2. Analyze the performance characteristics of various mea suring instruments.

CO3. Design instruments and circuits for measurement of Power, Energy, Power factor, Voltage, Current, Resistance, Capacitance and Inductance.

CO4. Interpret and synthesize data obtained from measuring systems to provide valid conclusions.

CO5. Select appropriate technique to measure Power, Energy, Power factor, Voltage, Current, Resistance, Capacitance and Inductance.

CO6. Apply contextual knowledge to develop measuring instruments used in domestic and industries.

DETAILED SYLLABUS:

UNIT -I: AMMETERS AND VOLTMETERS (12 Periods)

Classification of analog instruments, Principle of operation of analog instruments, operating forces of electromechanical indicating instruments: deflecting, control and damping; Permanent Magnet Moving Coil (PMMC): Construction, working principle, Expression of torque equation, Errors in PMMC Instruments, Advantage and Disadvantages of PMMC Instruments; Moving Iron Instruments: Classification of Moving Iron Instruments, Construction, working principle and Expression of torque equation; Ammeter: Ammeter shunt, Effect of Temperature Change in Ammeter, Multi-range Ammeters; Voltmeter: Voltmeter Multipliers, Effect of Temperature Change in Voltmeters, Multi-range Voltmeter, Analog voltmeter: AC voltmeter using rectifiers, true RMS Voltmeter.

UNIT-II: OHMMETERS, POTENTIOMETERS AND ENERGY METER (9 Periods)

Ohmmeters: Series type ohmmeter, shunt type ohmmeter, Multimeter. Potentiometers: Standardization, Compton's Potentiometers, Types of AC Potentiometers: Polar types, Coordinate types. Power in D.C Circuits, Power in A.C Circuits. Electrodynamometer wattmeter: Construction, working principle, Torque equation. Single Phase Induction Type Energy Meter: Construction, Working Principle.

UNIT-III: BRIDGES (9 Periods)

Measurement of Resistance: Medium Resistance Measurement- Wheatstone bridge, Kelvin Bridge; Low Resistance Measurement- Kelvin double bridge; High Resistance Measurement- Direct deflection methods, Meggar.

Measurement of Inductance: Maxwell Bridge, Hay's Bridge and Anderson Bridge.

Measurement of capacitance: De Sauty's Bridge and Schering bridge, Q-meter.

UNIT-IV: FREQUENCY AND TIME MEASUREMENTS (8 Periods)

Digital Frequency Meter - Basic Circuit, Time Base Selector, Start and Stop gate; Circuit for Measurement of Frequency; Simplified Composite Circuit for a Digital Frequency Meter; High Frequency Measurement, Frequency synthesizer; Period Measurement; Ratio and Multiple Ratio Measurements; Time Interval Measurements; Universal Counter Timer.

UNIT - V: ANALYZERS AND RECORDERS (7 Periods)

Introduction, Wave analyzers - Frequency selective wave analyzer, Heterodyne wave analyzer; Harmonic Distortion Analyzers, Total Harmonic Distortion; Spectrum analyzers; Recorders - Strip Chart recorders, x-y recorders, Magnetic tape recorders, CD/DVD Recorders; LCD, Digital Storage Oscilloscopes.

Total Periods: 45

TEXT BOOK:

1. A.K.Sawhney, *A Course in Electrical and Electronics Measurements and Instrumentation*, Dhanpat Rai and Sons, New Delhi, 19th Edition, 2011.

REFERENCE BOOKS:

1. E.W. Golding & F.C. Widdis, *Electrical Measurements and Measuring Instruments*, Wheeler Publishing, 5th Edition, 2011.

2. Doeblin, E.O., *Measurement Systems: Applications and Design*, TMH, 4th Edition, 2003.
3. H.S. Kalsi, *Electronic Instrumentation*, TMH, 2002.

II B. Tech. – I Semester
(16BT31002) SENSORS AND TRANSDUCERS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Engineering Physics.

COURSE DESCRIPTION: Units and standards; Static and dynamic characteristics of transducers; Working principle of resistive, inductive, capacitive, self-generating and other sensors; Applications of sensors.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on principles of sensors and transducers with their characteristics.
CO2. Apply analytical skills to determine the response of sen sors for change in physical parameters.
CO3. Solve the problems pertaining to RTD, Thermistors, piezoelectric, capacitive and inductive sensors.
CO4. Select an appropriate sensor to measure the physical parameter for specific application.
CO5. Apply the principles of resistive, inductive, capacitive, self-generating and other sensors for measuring real time physical parameters in industries.
CO6. Follow the ethical standards while using measuring in struments.

DETAILED SYLLABUS:

UNIT - I: MEASUREMENTS AND STANDARDS (9 Periods)

Significance of Measurements, Classification of Instruments: Deflection and Null Type instruments, Elements of a Generalized Measurement System, Types of errors: Gross Error, Systematic Error, Random Error, Statistical analysis of measurement data.

Units: Fundamental and Derived Units, CGS System of Unit, Practical Units, M.K.S System, S.I. Units; Standards and their Classification: Electrical Standards, Resistance Standards, Current Standards, Inductance Standards and Capacitance Standards.

UNIT - II: CHARACTERISTICS OF TRANSDUCERS (9 Periods)

Principle of transducer, Classification of transducer, Static Characteristics: Calibration, accuracy, precision, sensitivity, linearity, threshold, resolution, hysteresis, dead space, reproducibility, span. Dynamic characteristics: Dynamic error, Fidelity, Measuring lag, Speed of response, Numerical problems on static and Dynamic characteristics. Mathematical model of measuring system, Transfer function of Zero order system, First order system and Second order system, Step response of First order and second order system.

UNIT - III: RESISTIVE AND CAPACITIVE SENSORS (9 Periods)

Resistive Sensors: Potentiometers, Metal and Semiconductor Strain gauges, Resistance temperature detectors, Thermistors, Light dependent resistors, Hot-wire resistive transducer.

Capacitive Sensors: Change in overlapping area, dielectric constant and distance between the plates of variable and differential capacitor. Frequency response of capacitive sensors.

UNIT - IV: INDUCTIVE AND SELF-GENERATING SENSORS (9 Periods)

Inductive sensors: Variable reluctance sensors, Eddy current sensors, Linear variable differential transformers, Synchros, Hall Effect sensors.

Self-generating sensors: Piezoelectric sensors: piezoelectric effect, deformation modes, equivalent circuit, materials. Thermoelectric effect, photovoltaic effect and its materials. Electrochemical sensors: Ion selective electrodes, Solid state electrodes.

UNIT – V: DIGITAL AND OTHER SENSORS (9 Periods)

Digital transducers: Incremental encoder, absolute encoder. Photodiode, Phototransistors, Fiber optic sensors: Basics, sensor technology. Ultrasonic sensors: Basics, sensing methods. Biosensors, Basics of SMART sensors, Microsensor Technology: Thick-film, Thin-film, Micromachining.

Total Periods: 45

TEXT BOOKS:

1 Ramon Pallas-Areny and John G. Webster, *Sensors and Signal Conditioning*, John Wiley & Sons, Inc., 2nd edition, 2001.
2 A.K.Sawhney, A Course in Electrical and Electronic Measurements and Instrumentation, Dhanpat Rai & Co., 19th edition, 2013.

REFERENCE BOOKS:

1. D. V. S Murty, *Transducers and Instrumentation*, PHI Learning Private Limited, 2nd edition, 2011.
2. D. Patranabis, *Sensors and Transducers*, PHI Learning Private Limited, 2nd edition, 2003.

3. John P. Bentley, *Principles of Measurement Systems*, Pearson Education, 4th edition, 2005.
4. Doebelin E.O, *Measurement Systems - Application and Design*, Tata McGraw-Hill, 4th edition, 2003.

II B. Tech. – I Semester

(16BT30403) **SWITCHING THEORY AND LOGIC DESIGN**

(Common to ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Number system and Boolean algebra; Minimization; Analysis and synthesis of digital circuits; Asynchronous Sequential Logic & Programmable Memories.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate the knowledge in
- Conversion of number systems, Binary Codes.
- Basic theorems, properties and postulates of Boolean algebra.
- Minimization of switching functions using Map method and Tabular method.
- Combinational and sequential circuits.
- Realization of Boolean functions using PLDs.

CO2. Analyse combinational and sequential circuits.

CO3. Design and develop various combinational, sequential circuits and PLDs.

CO4. Solve problems and arrive at solutions pertaining to Digital Electronics.

CO5. Apply minimization techniques to asynchronous and syn chronous designs and suggest appropriate design for engineering solutions.

CO6. Apply appropriate logic functions to obtain optimized de signs useful for the society.

DETAILED SYLLABUS:

UNIT -I: NUMBER SYSTEM & BOOLEAN ALGEBRA (10 Periods)

Introduction, Binary Numbers, Number base conversions, Complements of numbers, Signed binary numbers, Binary codes, Error detection and correction codes. Boolean Algebra-Basic definition, Basic theorems and properties, Boolean Functions, Canonical & Standard forms, logic operations & Logic gates.

UNIT- II: GATE LEVEL MINIMIZATION (8 Periods)

Introduction, the map method, four variable, Five variable K-map, POS & SOP Simplification, Don't care conditions, NAND & NOR Implementation, Other two level Implementation, Ex-or Function, Quine-McCluskey Technique-simplification of Boolean function using tabulation Method.

UNIT- III: ANALYSIS AND SYNTHESIS OF COMBINATIONAL CIRCUITS (10 Periods)

Combinational circuits, Analysis & Design procedure, Binary Adder-subtractor, Decimal Adder, Binary Multiplier, Magnitude comparator, Decoder, Encoders, Multiplexers, Demultiplexers-1-Line to 4-Line and 1-Line to 8-Line Demultiplexers.

UNIT- IV: ANALYSIS AND SYNTHESIS OF SEQUENTIAL CIRCUITS (10 Periods)

Sequential Circuits, Latches, Flip-Flops, Analysis of Clocked sequential circuits, State Reduction & Assignment, Design procedure, Registers-Shift Registers, Counters- Synchronous counters and Asynchronous counters.

UNIT- V: ASYNCHRONOUS SEQUENTIAL LOGIC & PROGRAMMABLE MEMORIES (7 Periods)

Introduction, Analysis procedure, Design Procedure, Reduction of State and flow tables, Hazards, Programmable Memories-ROM, PLA, PAL. **Total Periods: 45**

TEXT BOOK:

1. M. Morris Mano, *Digital Design*, Pearson, 5th Edition, 2013.

REFERENCE BOOKS:

1. A. Anand Kumar, *Switching Theory and Logic Design*, PHI, 2008.
2. ZviKohavi and NirahK.Jha, *Switching Theory and Finite Automata Theory*, Tata McGraw-Hill, 2nd Edition, 1978.
3. Charles H. Roth, *Fundamentals of Logic Design*, Thomson Publications, 5th Edition, 2004.

II B. Tech. – I Semester
(16BT30241) ELECTRICAL TECHNOLOGY
(Common to ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Network Analysis, Engineering Physics.
COURSE DESCRIPTION: Analysis of phase & line quantities and measurement of power in three phase system; Constructional details, operation, performance evaluation and applications of DC & AC machines; Testing of DC machines and Transformers; Special machines and single phase transformers.
COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on
- Construction and operation of various electrical machines
- Measurement of power in three-phase system
- Applications of various types of electrical machines

CO2. Analyze
- The operation and performance of various electrical machines
- The polyphase circuit for measurement of power

CO3. Design suitable accessories / controllers for various machines to meet the nominal specifications.
CO4. Solve engineering problems pertaining to various machines and provide feasible solutions.
CO5. Select appropriate control techniques for various electrical machines used in domestic and industrial applications.
CO6. Apply the conceptual knowledge of various electrical machines in relevance to industry and society.

DETAILED SYLLABUS:

UNIT-I: DC MACHINES (13 Periods)
DC Generator: Construction and working principle, types, EMF equation, losses, open circuit and load characteristics, applications.
DC Motor: Working principle, types, torque equation, characteristics and applications. Speed control of DC shunt motor. Necessity of starter, three-point starter. Swinburne's test.

UNIT-II: SINGLE PHASE TRANSFORMER (8 Periods)
Construction and working principle, EMF equation, losses, equivalent circuit, OC and SC tests on single phase transformer, predetermination of efficiency and regulation.

UNIT-III: THREE PHASE SYSTEMS (7 Periods)
Introduction and advantages of polyphase system, generation of three phase voltages, phase sequence, star and delta connections, relationship between phase and line quantities in three phase balanced circuits, power measurement in three phase balanced and unbalanced systems using two wattmeter method.

UNIT-IV: THREE PHASE INDUCTION MOTOR AND ALTERNATOR (9 Periods)
Induction motor: Principle of operation, constructional details, slip, rotor frequency, starting and running torques, torque-slip characteristics.
Alternators: Principle of operation, constructional details, types, interrelation between speed and number of poles and EMF equation.

UNIT-V: SPECIAL MACHINES (7 Periods)
Construction of single phase induction motor, double field revolving theory, resistance start, capacitor start and capacitor start & run split phase induction motors operation and applications, Constructional details, operation and applications of shaded-pole motor, universal motor and stepper motor (VR and PM type only).
Total Periods: 44

TEXT BOOKS:
1. V.K. Mehta, Rohit Mehta, *Principles of Electrical Engineering,* S.Chand& Company Pvt. Ltd, New Delhi, 2016.
2. B.L. Theraja and A.K. Theraja, *AText Book of Electrical Technology in S. I. Units,* Vol.2, S.Chand & Company Ltd, Multicolour illustrative Edition, New Delhi, 2014.

REFERENCE BOOKS:
1. A.Sudhakar and Shyammohan, *Principles of Electrical Engineering*, Tata McGraw Hill Education Private Limited, New Delhi. 2012.

2. M.S. Naidu and S. Kamakshaiah, *Introduction to Electrical Technology*, Tata McGraw Hill publishing company Ltd, New Delhi, 2007.

II B. Tech. – I Semester

(16BT30431) BASIC ELECTRONICS AND DIGITAL DESIGN LAB

(Common to ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Courses on Electronic Devices and Circuits, Switching Theory and Logic Design.

COURSE DESCRIPTION: Diode characteristics; Rectifiers; BJT and FET characteristics; UJT and SCR characteristics; BJT Amplifiers; Combinational Circuits; Realization of Flip-flops; Sequential Circuits; Demonstration on VHDL Programme.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge in different electronic devices, analog and digital circuits.

CO2. Analyze the characteristics of different electronic devices and circuits like

- Diodes-PN Junction Diodes, Zener Diodes, SCR
- Transistors-BJT,FET,UJT
- Combinational Circuits-HA, FA
- Flip Flops-JK FF, D FF
- Sequential Circuits -Counters

CO3. Design electronic circuits like FET Amplifiers, Combinational Circuits and Sequential Circuits.

CO4. Solve engineering problems with better Electronic circuits.

CO5. Work individually and also in a group in the area of Analog and Digital circuits.

CO6. Communicate verbally and in written form in the area of Electronic Devices and circuits.

LIST OF EXPERIMENTS:

PART A

ANALOG DEVICES AND CIRCUITS (Minimum SIX experiments to be conducted)

1. PN Junction and Zener diodes characteristics.
2. Ripple Factor and Load Regulations of Rectifier with and without filters (Full wave or Half wave).
3. Input and Output characteristics of Transistor in CE configuration.
4. Drain and Transfer Characteristics of JFET.
5. Design a Common Source Amplifier Stage and Plot its Frequency response.
6. UJT Characteristics.
7. SCR characteristics.

PART B

DIGITAL CIRCUITS (Minimum FOUR experiments to be conducted)

Design and Realization of

1. Basic gates using universal gates.
2. Half Adder and Full Adder using logic gates.
3. Multiplexer and Demultiplexer using logic gates.
4. Flip Flops using logic gates.
5. Asynchronous Counter using ICs.
6. Synchronous Counter using ICs.

Demonstration of

7. VHDL Programme

II B. Tech. – I Semester
(16BT31031) MEASUREMENTS AND TRANSDUCERS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Courses on Sensors and Transducers, Electrical and Electronic Measurements.

COURSE DESCRIPTION: Measurement of parameters like voltage, resistance, inductance, capacitance, displacement, pressure, force, temperature and weight.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on
- Measuring instruments
- Principles of Sensors and transducers
- AC and DC bridges

CO2. Analyze the operation and performance of measuring instruments and transducers.
CO3. Design circuits for measurement of Voltage, Current, resistance, capacitance and Inductance.
CO4. Interpret and synthesize the data obtained from measurements and provide valid conclusions.
CO5. Select and apply appropriate sensor and measuring technique to measure the physical parameter.
CO6. Understand the working of various sensors and transducers and provide engineering solutions for societal use.
CO7. Follow ethical principles in designing circuits for measurement of physical parameters.
CO8. Do experiments related to measurement of electrical and physical parameters effectively as an individual and as a member in a group.
CO9. Communicate verbally and in written form in the area of measurements and instrumentation.

LIST OF EXPERIMENTS:

Minimum of 11 Experiments to be conducted

1. Calibration of D'Arsonval Galvanometers for measurement of Voltage & Current.
2. Calibration of D'Arsonval Galvanometers for measurement of Resistance (shunt &series).
3. Design of Wheatstone bridge and Kelvin Bridge for measurement of Resistance.
4. Design of Schering Bridge and Desauty Bridge for measurement of Capacitance.
5. Design of Maxwell's bridge and Andersons Bridge for measurement of Inductance.
6. Measurement of resistance, inductance, capacitance and quality factor of the coil using Q meter.
7. Calibration and testing of single phase energy meter.
8. Design and Calibration of LVDT for linear displacement measurement.
9. Study and analyze the characteristics of temperature sensors.
10. Study and analyze the characteristics of strain gauge and load cell.
11. Study and analyze the characteristics of proximity sensors.
12. Study and analyze the characteristics of radiation detectors.
13. Determination of time constant of a RC circuit.

II B. Tech. – I Semester
(16BT30251) ELECTRICAL TECHNOLOGY LAB
(Common to ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on Electrical Technology.
COURSE DESCRIPTION: Construction, operation, types, performance evaluation of DC & AC machines and transformers; Necessity of starter for DC motors; Three phase power measurement.
COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on
- Construction, operation of DC & AC machines and transformers.
- Starting and speed control of DC motors.
- Testing of DC & AC machines and transformers.
- Characteristics of DC & AC machines and transformers.
- Measurement of three phase power.
- Applications of DC & AC machines and transformers.

CO2. Analyze the operation and performance of DC & AC machines, transformers and three phase system for various operating conditions.

CO3. Design the circuit with suitable accessories / controllers for desired operation conditions of DC & AC machines.

CO4. Interpret and synthesize the data obtained from experimentation on DC & AC machines, transformers and three phase system and provide valid conclusions.

CO5. Select and apply appropriate technique for testing and control of DC & AC machines and transformers useful in industry.

CO6. Apply the conceptual knowledge of electrical machines in relevance to industry and society.

CO7. Commit to ethical principles and standards while exercising the practical investigations on electrical machines.

CO8. Work individually or in a group while exercising practical investigationsin the field of electrical machines.

CO9. Communicate effectively in verbal and written form in relevance to electrical machines.

LIST OF EXPERIMENTS:

PART – A

1. Construction of DC machines, transformers, synchronous machines,induction motors and DC motor starters.

PART – B

Any NINE experiments are to be conducted

1. Magnetization characteristics of a DC generator.
2. Load characteristics of DC shunt generator.
3. Swinburne's test on a DC shunt machine.
4. Brake test on a DC shunt motor.
5. Speed control of DC shunt motor by
   a. Field flux control method b. Armature voltage control method.
6. OC and SC tests on a single phase transformer.
7. Load test on a single phase transformer.
8. Measurement of power using two wattmeter method
9. Brake test on a three phase induction motor.
10. Regulation of a three phase alternator by synchronous impedance method.

11. Brake test on single phase induction motor.

II B. Tech. – II Semester

(16BT50201) CONTROL SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Multivariable Calculus and Differential Equations, Transformation Techniques and Partial Differential Equations.

COURSE DESCRIPTION: Concepts of control system; transfer function of various physical systems; time response analysis; frequency response analysis; controller design; state space analysis.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on
- The concepts of open and closed loop control systems.
- Stability analysis in time and frequency domain.
- Controllers and compensators to meet the desired specifications.
- State variable techniques.

CO2. Analyze
- Time and frequency response of second order systems.
- Stability analysis using root-locus, bode and Nyquist plots.
- Controllers and compensators to meet the desired response.
- State space representation from transfer function.

CO3. Design a compensator to meet the design specifications of control system.

CO4. Solve problems pertaining to control systems to provide feasible solutions in real time environment.

CO5. Select appropriate techniques to solve control system problems in relevance to industry.

CO6. Apply the conceptual knowledge of control systems in domestic and industrial applications.

DETAILED SYLLABUS:

UNIT-I: MATHEMATICAL MODELING OF SYSTEMS (11 Periods)

Introduction to control systems. Basic elements of control system – open loop and closed loop systems. Effect of feedback.Modeling of physical systems - electrical systems, mechanical systems, analogous systems, armature control and field control of DC motor, DC servomotor. Transfer function - block diagram reduction techniques, signal flow graph.

UNIT-II: TIME RESPONSE AND STABILITY ANALYSIS (13 Periods)

Various test signals and its importance. Time response of first and second order systems, Time-domain specifications, steady state response, steady state error and error constants, static and generalized error coefficients. Routh-Hurwitz stability criterion, Root locus technique- root locus diagram, rules to construct root loci, effect of pole zero additions on the root loci.

UNIT-III: FREQUENCY DOMAIN ANALYSIS (8 Periods)

Performance specifications in the frequency domain. Stability Analysis - Bode plot, Polar plot and Nyquist plot.

UNIT-IV: CONTROLLERS AND COMPENSATORS (6 Periods)

Introduction to controllers, effect of P, PI and PID controllers. Compensators - lag, lead, lead-lag compensator design using Bode plot.

UNIT-V: STATE SPACE ANALYSIS (7 Periods)

Transfer function Vs state space representation. Concepts of state, state variables and state model. Modeling of physical system in state space. Transfer function to state model and vice-versa. State transition matrix and its properties. Controllability and Observability using Kalman's test.

Total Periods: 45

TEXT BOOKS:

1. A. Anand Kumar, *Control Systems*, PHI learning Pvt Ltd., 2nd Edition, 2014.
2. Katsuhiko Ogata*, Modern Control Engineering,* Pearson Education Publishers, 5th Edition, 2010.

REFERENCE BOOKS:

1. Nagrath I.J. and Gopal M, *Control Systems Engineering*, New Age International Publications, 5th edition, 2010.
2. Richard C. Dorf and Robert H. Bishop, *Modern Control Systems*, Prentice Hall, 12th Edition, 2010.
3. Benjamin C.Kuo and FaridGolnaraghi, *Automatic Control Systems*, John Wiley & Sons Publications, 8th Edition, 2002.
4. A.Nagoorkani, *Control Systems*, RBA Publications, 2nd Edition, 2006.

II B. Tech. – II Semester

(16BT30401) ELECTRONIC CIRCUIT ANALYSIS AND DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Electronic Devices and Circuits.

COURSE DESCRIPTION: Single Stage Amplifiers; Multi-Stage amplifiers; Frequency Response; Feedback Amplifiers; Oscillators; Large Signal Amplifiers; Tuned Amplifiers.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge in
- Single Stage Amplifiers
- Multi Stage Amplifiers.
- BJT Frequency Response.
- Feedback Amplifiers.
- Power Amplifiers.
- Tuned Amplifiers.

CO2. Perform analysis of electronic circuits for meeting de fined specifications.

CO3. Design and develop electronic circuits such as Feedback Amplifiers, Oscillators and Poweramplifiers with given specifications.

CO4. Solve problems pertaining to electronic circuit design.

CO5. Select an Amplifier circuit for a specific electronic sub- system.

CO6. Apply course knowledge to assess societal issues and understand the consequent responsibilities relevant to the professional engineering practice using electronic circuits.

DETAILED SYLLABUS:

UNIT-I: BJT AMPLIFIERS (10 Periods)

Single Stage Amplifiers: Introduction, Classification of Amplifiers, Analysis of CE amplifier with an Emitter Resistance.

Multistage Amplifiers: Distortion in amplifiers, Cascading Transistor amplifiers, Methods of inter-stage coupling, RC Coupled Amplifier, Direct and Transformer Coupled Amplifier, Multistage Frequency Effects, Darlington Pair, Bootstrapped Darlington circuit, Cascode amplifier.

UNIT- II: HIGH FREQUENCY RESPONSE (9 Periods)

BJT: Frequency response of BJT amplifier, Analysis at low and high frequencies, Effect of coupling and bypass capacitors, Hybrid-ð Common Emitter transistor model, Hybrid-ð conductance, Hybrid-ð capacitances, validity of Hybrid-ð model, CE short circuit current gain, CE current gain with resistive load, Gain-Bandwidth Product.

FET: Analysis of Common Source and Common Drain Amplifier circuits at High frequencies.

UNIT-III: FEEDBACK AMPLIFIERS (10 Periods)

Negative feedback amplifiers: Feedback Concept, Classification, General characteristics, Effect of feedback on amplifier characteristics, Voltage series, Current series, Current shunt and Voltage shunt feedback configurations.

Oscillators: Conditions for oscillations, types of oscillators, RC-phase shift oscillators with BJT and FET with the relevant analysis, Wein bridge oscillator, Hartley oscillator, Colpitts oscillator, Piezoelectric crystal oscillator, Frequency Stability.

UNIT-IV: POWER AMPLIFIERS (8 Periods)

Classification, Class A large-signal amplifiers- Series Fed and Transformer-coupled Audio power amplifier, Efficiency**;** Second harmonic Distortions, Higher order harmonic Distortion, Class B amplifier-Transformer coupled Push-pull amplifier, Complementary symmetry Push-pull amplifier, Efficiency, MOSFET power amplifier, Thermal stability and Heat sinks.

UNIT-V: BJT TUNED AMPLIFIERS (8 Periods)

Introduction, Q-Factor, Small Signal Tuned Amplifiers, Effect of Cascading Single Tuned Amplifiers on Bandwidth, Double-tuned amplifier, Effect of Cascading Double Tuned Amplifiers on Bandwidth, Stagger Tuned Amplifiers, Stability of Tuned Amplifiers, Class-C Tuned amplifier. **Total Periods: 45**

TEXT BOOKS:
1. Jacob Millman and Christos C. Halkias, *Integrated Electronics,* Tata McGraw-Hill, 2nd Edition, 2010.
2. S Salivahanan, N.Suresh Kumar, A. Vallavaraj, Electronic Devices and Circuits, Tata McGraw Hill, 3rd Edition, 2008.

REFERENCE BOOKS:
1. Robert L. Boylestad and Louis Nashelsky, *Electronic Devices and Circuits Theory*, Pearson Education, 10th Edition, 2009.
2. David A. Bell, *Electronic Devices and Circuits,* Oxford University press, 5th Edition, 2014.

3. Donald A. Neamen, *Electronic Circuit Analysis and Design*, Tata McGraw-Hill, 3rd Edition, 2007.

II B. Tech. – II Semester

(16BT41001) INDUSTRIAL INSTRUMENTATION - I

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Sensors and Transducers, Electrical and Electronic Measurements.

COURSE DESCRIPTION: Measurement of Force, Weight, Torque, Pressure, Velocity, Acceleration, Sound and Temperature.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge of construction and working principles of different sensors for use in industrial instruments.

CO2. Identify, formulate and analyze different types of sensors for various industrial applications.

CO3. Design suitable sensors for desired parameter measure ment in industry.

CO4. Solve engineering problems pertaining to measurement of Force, Torque, Velocity, Acceleration, Pressure and Temperature to provide feasible solutions.

CO5. Select appropriate sensor and measuring techniques for the measurement of industrial parameters.

DETAILED SYLLABUS:

UNIT - I: FORCE AND TORQUE MEASUREMENT (8 Periods)

Force Measurement: Spring Balance, Load cell types, Hydrostatic, Pneumatic, Magnetoelastic, Piezoelectric, Elastic, Analysis and selection of Force sensors.

Torque Measurement: Load Cell method, Strain gauge method, Weidman Magnetostrictive, Relative angular twist, Analysis and selection of torque sensors.

UNIT - II: VELOCITY AND ACCELERATION MEASUREMENT (9 Periods)

Velocity Measurement: Electromagnetic Type, Revolution counter, Tachometers – Capacitive type, Drag cup type, Tachogenerators - AC, DC, Stroboscope, Analysis and Selection of Velocity sensors.

Acceleration Measurement: Reluctance type, Potentiometric type, Photo cell type, piezoelectric type, Null Balance, Analysis and selection of Acceleration sensors.

Gyroscopes: Principle, Single axis Restrained Gyro and Two axis free Gyro, Three axis Gyro.

UNIT - III: PRESSURE MEASUREMENT (10 Periods)

Dead weight gauges, Manometer and its Types, Elastic transducers – Bourdon tube, Diaphragm, Bellows, Electrical Types, Resistive, Inductive and Capacitive, Force balance & Vibrating Cylinder, High pressure measurement – Very high pressure transducer (Bulk modulus Gage), Low Pressure (Vacuum) measurement – McLeod Gauge, Knudsen Gauge, Momentum transfer gauge, Thermal conductivity gauge, Ionization gauge, Sound level meter, Microphone. Analysis and selection of pressure sensors.

UNIT - IV: TEMPERATURE MEASUREMENT – I (9 Periods)

Definition, Temperature vs Heat, Temperature measurement using change in physical properties – Solid expansion type, Fluid expansion type (Filled-in system), Resistance temperature detector (RTD), principle and types, construction requirements for industry, measuring circuits, 3-Lead Method, 4-Lead arrangement. Thermistors, principle and sensor types, manufacturing techniques, measuring circuits, linearization methods and applications. Thermocouples: thermoelectric effects, Laws, Thermoelectric characteristics of thermocouple, types, Processing and preparation, construction, installation and protection, measuring circuits, Cold junction Compensation, thermocouple burn out detection and high temperature measurement methods, thermopiles.

UNIT – V: TEMPERATURE MEASUREMENT – II (9 Periods)

Calibrators and simulators, Color Indicators, Crayons, Pellets, Fiber optic thermometers, Integrated circuit transistors & diodes; Radiation measurement: Radiation thermometers, introduction, definition of terms, general form of radiation measurement system, radiation thermometer types, Pyrometric cones, Pneumatic and suction pyrometers, Radiation & Infrared Pyrometers; Quartz crystal thermometry, temperature switches and thermostats, ultrasonic thermometers, Miscellaneous temperature sensors: Fluidic sensors, Johnson noise thermometer, liquid crystals, Paramagnetic salts, spectroscopic temperature measurement, Thermography, Analysis and selection of Temperature sensors.

Total Periods: 45

TEXT BOOKS:

1. D. Patranabis, *Principles of Industrial Instrumentation*, TMH, 3rd Edition, 2010.
2. Ramon Pallás Areny, John G. Webster, *Sensors and Signal Conditioning*, John Wiley and Sons, 2nd Edition, 2000.

REFERENCE BOOKS:

1. Bela G Liptak, *Instrument Engineers' Handbook: Process Measurement and Analysis*, CRC Press - Butterworth Heinemann, 4th Edition, 2003.
2. Jon Wilson, *Sensor Technology Handbook*, Newnes, 2004.
3. B. C. Nakra, K. K. Chaudhry, *Instrumentation Measurement And Analysis*, TMH, 2nd Edition, 2003.

4. Ernest Doebelin, Dhanesh Manik, *Measurement Systems*, McGraw Hill International, 6th Edition, 2011.

II B. Tech. – II Semester

(16BT41002) LINEAR AND DIGITAL ICs

(Common to EEE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Electronic Devices and Circuits, Switching Theory and Logic Design.

COURSE DESCRIPTION: Differential Amplifier; Characteristics of Operational Amplifiers; Linear & Non-Linear Applications of Op-Amp; IC 555 timer and phase locked loops; Application of PLL; A-D & D-A Converters; CMOS and Bipolar Logic Interfacing; HDL with combinational and sequential logic design.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge in
- Op-amp operation and applications.
- Timer & PLL circuits.
- A-D & D-A Converters
- CMOS and Bipolar logic Interfacing.
- HDL design and programming.

CO2. Analyze
- Op-amp based circuits.
- Timers for various circuits.
- Different logic families.

CO3. Design
- Circuits using Op-amps.
- Logic gates using CMOS.
- Combinational and sequential circuits.

CO4. Solve problems in
- Evaluating parameters of Op-amp based circuits.
- Programming of various combinational and sequential logic design.

CO5. Apply appropriate modeling technique to suit IC Design.

CO6. Understand the impact of design and use of Linear and Digital ICs in the development of efficient and cost effective products.

DETAILED SYLLABUS:

UNIT –I: OPERATIONAL AMPLIFIER (11 periods)

Op-amp internal circuit - Differential Amplifier, Transfer Characteristics, Level Translator, Output stage;Basic information of Op-Amp, Ideal & Practical operational Amplifier-Inverting, non-Inverting & Differential Amplifier, Voltage follower, DC Characteristics- Input Bias Current, Input Offset Current, Input Offset Voltage, Total Output Offset Voltage, CMRR, PSRR, Thermal Drift.

AC Characteristics- Frequency Response, Frequency Compensation, Slew Rate, Features and characteristics of 741 Op-Amp.

UNIT – II: LINEAR AND NON LINEAR APPLICATIONS, FILTERS (10 Periods)

Linear Applications - Integrator and differentiator, Instrumentation amplifier, AC amplifier, Non - Linear Applications - Comparators & its applications, Multivibrators: monostable and astable, RC phase shift oscillator, Log and Antilog amplifiers.

Filters: First - order LPF, HPF, Butterworth Filters, Second order LPF, HPF.

UNIT – III: IC 555 TIMER, PLL AND CONVERTERS (8 Periods)

Introduction to 555 timer, functional diagram, monostable and astable operations and applications. PLL - Introduction, block schematic, principles and description of individual blocks, Voltage Controlled Oscillator (IC 566).

D-A Converters: R-2R ladder & Inverted R-2R ladder, A-D converters: Sample and hold circuit, Flash type, Successive Approximation type and Dual slope ADC.

UNIT – IV: CMOS LOGIC AND HDL Programming (8 Periods)

CMOS logic, CMOS steady state electrical behavior, CMOS dynamic electrical behavior.

Introduction to Verilog: HDL based design flow, program structure, language elements, operators, User defined primitives, data flow modeling, behavioral modeling, structural modeling.

UNIT–V: MODELING AND DESIGN OF DIGITAL CIRCUITS USING VERILOG (8 Periods)

Introduction to 74x283 adder, 74x151 multiplexer, 74x541, 74x245 three state devices, 74x138 decoder, 74x148 encoder, Flip-flops- SR & JK, 74x163 Counter. Design and programming of Digital IC applications using the above components. **Total Periods: 45**

TEXT BOOKS:

1. D. Roy Chowdhury, *Linear Integrated Circuits*, New Age International Pvt. Ltd., 4th Edition, 2010.
2. John F. Wakerly, *Digital Design Principles & Practices*, Pearson Education, 4th Edition, 2009.

REFERENCE BOOKS:

1. Ramakanth A. Gayakwad, *Op-Amps & Linear ICs*, PHI, 3rd Edition, 1987.
2. J. Bhasker, *VERILOG Primer*, BS Publications, 2nd Edition, 2001.
3. Stephen Brown, Zvonko Vranesic, *Fundamentals of Digital Logic with VERILOG Design*, TMH, 2nd Edition, 2007.

4. T.R. Padmanabhan, B. Bala Tripura Sundari, *Design through Verilog HDL*, Wiley India, 2004.

II B. Tech. – II Semester

(16BT30402) SIGNALS AND SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Transformation Techniques and Partial Differential Equations.

COURSE DESCRIPTION: Analysis of signals and systems; Representation of signals using Fourier series and Fourier transforms; Time-Domain and Frequency-Domain aspects of signals and systems; concept of convolution and correlation; Sampling and types of sampling; Laplace transform of signals; Z-Transform of sequences.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge in
- Representation of signals and systems.
- Fourier series representation of periodic signals
- Fourier transform of signals
- Convolution and correlation of functions
- Laplace transform
- Sampling Process
- Z-Transform

CO2. Analyze various continuous and discrete time signals and systems in time and frequency domains.

CO3. Develop solutions to stable and causal systems.

CO4. Solve problems pertaining to transforms and signal processing.

CO5. Select and apply appropriate transformation techniques for understanding of the frequency content of signals at the input and output of the systems.

DETAILED SYLLABUS:

UNIT- I: SIGNALS AND SYSTEMS (10 periods)

Elementary signals- Unit Impulse and Unit Step Functions, Exponential and Sinusoidal Signals. Classification of Continuous-Time and Discrete-Time Signals, Basic operations on signals, Classification of Continuous-Time and Discrete-Time Systems, Basic System Properties, Linear Time-Invariant Systems - Discrete-Time LTI Systems- The Convolution Sum, Continuous-Time LTI Systems - The Convolution Integral, Properties of Linear Time-Invariant Systems.

UNIT -II: FOURIER SERIES & FOURIER TRANSFORM (12 periods)

Fourier series: Representation of Fourier series, Continuous time periodic signals, Dirichlet's conditions, Properties of CT Fourier Series, Trigonometric Fourier Series and Exponential Fourier Series with examples. Complex Fourier spectrum. Fourier series representation of a periodic signals.

Fourier Transforms: Deriving Fourier Transform from Fourier series, Fourier Transform of standard signals, Fourier Transform of Periodic Signals, Properties of CT Fourier Transform, Systems characterized by Linear constant coefficient differential equations. The Magnitude-Phase Representation of the Fourier Transform, The Magnitude-Phase Representation of the Frequency Response of LTI Systems.

UNIT- III: CORRELATION OF SIGNALS (7 periods)

Cross correlation and auto correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function. Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

UNIT- IV: LAPLACE TRANSFORMS (7 periods)

The Laplace Transform, The Region of Convergence for Laplace Transforms, The Inverse Laplace Transform, Relationship between Fourier and Laplace Transforms, Properties of the Laplace Transform, Some Laplace Transform Pairs, Analysis and Characterization of LTI Systems Using the Laplace Transform.

UNIT- V: SAMPLING AND Z-TRANSFORMS (9 periods)

Sampling: Representation of a Continuous-Time Signal by its Samples - Sampling Theorem, Reconstruction of a Signal from Its Samples Using Interpolation. Effect of under sampling - Aliasing, Discrete-Time Processing of Continuous-Time Signals.

Z-Transforms: Region of Convergence for the z-Transform, The Inverse z-Transform, Relation between Fourier and Z-Transforms, Properties of the z-Transform, Some Common z-Transform Pairs, Analysis and Characterization of LTI Systems Using z-Transforms. **Total Periods: 45**

TEXT BOOK:

1. Alan V. Oppenheim, Alan S. Willsky, & S. Hamid, *Signals and Systems*, Pearson Higher Education, 2nd Edition, 2008.

REFERENCE BOOKS:

1. Simon Haykin and B. Van Veen, *Signals & Systems*, John Wiley, 2nd Edition, 2010.
2. A. Anand Kumar, *Signals & Systems*, PHI, 2011.

3. B.P. Lathi, *Principles of Linear Systems and Signals*, Oxford University Press, 2nd Edition, 2013.

II B. Tech. – II Semester

(16BT40406) PULSE AND DIGITAL CIRCUITS

(Common to ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Electronic Devices and Circuits, Network Analysis.

COURSE DESCRIPTION: Linear and non-linear Wave shaping circuits; Switching characteristics of Diode and Transistor; Design of multivibrators; Sweep circuits; Sampling and logic gates.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Apply the knowledge in
- Responses of High-pass and low-pass RC circuits for different inputs
- Clipping and clamping operations.
- Multivibrators.
- Methods of generating the Time-base waveforms
- Operating Principles of of Sampling gates
- Realization of logic gates using Diodes and Transistors

CO2. Analyze theperformance of Linear and non-linear Wave shaping Circuits.

CO3. Design and develop different Multivibrator Circuits, Sweep circuits, clipper and clamper circuits.

CO4. Solve engineering problems pertaining to pulse and Digital circuits to provide valid conclusions.

CO5. Apply appropriate techniques to obtain optimum solution in the field of pulse and digital circuits.

CO6. Apply contextual knowledge in pulse and digital circuits to assess propagation delay and power dissipation parameters to the Professional engineering practice for societal use.

DETAILED SYLLABUS:

UNIT-I: LINEAR WAVE SHAPING (9 Periods)

High-pass, Low-pass RC circuits, Their response for Sinusoidal, Step, Pulse, Square and Ramp inputs. High pass RC network as a Differentiator and Low pass RC network as an Integrator, Ringing circuit, Attenuators and its application as a CRO probe.

UNIT-II: NONLINEAR WAVE SHAPING (9 Periods)

Diode clippers, Transistor clipper, Clipping at two independent levels, Comparators, Clamping operation, Clamping circuit taking source and Diode resistances into account, Clamping circuit theorem, Practical clamping circuits, Effect of Diode characteristics on Clamping voltage, Synchronized Clamping.

UNIT-III: MULTIVIBRATOR CIRCUITS (9 Periods)

Transistor as a switch, Analysis and Design of Fixed-Bias Bistable, Monostable, Astable Multivibrators (Collector-Coupled), Symmetrical and Asymmetrical triggering, Schmitt trigger Circuit.

UNIT-IV: TIME-BASE GENERATORS (10 Periods)

Voltage Time-Base Generators: General features of a Time-Base signal, Exponential Sweep Circuit, Constant Current Sweep Circuit, UJT Sweep Circuit, Miller and Bootstrap Time-Base generators - basic principles, Transistor Miller Time-Base generator, Transistor Bootstrap Time-Base generator.

Current Time-Base Generators: A Simple Current Sweep, Linearity Correction through Adjustment of Driving Waveform, Transistor Current Time-Base generator.

UNIT-V: SAMPLING GATES AND DIGITAL LOGIC CIRCUITS (8 Periods)

Samplig Gates: Basic operating principles of sampling gates, Unidirectional and Bi-directional sampling gates, Reduction of pedestal in gate circuits, Four Diode Sampling gate, Applications of sampling gates.

Digital Logic Circuits: Realization of Logic gates (OR, AND & NOT) using diodes & transistors, Introduction to DTL, TTL, ECL and CMOS Logic. **Total Periods: 45**

TEXT BOOKS:

1. Jacob Millman, Herbert Taub and Suryaprakash Rao Mothiki, *Pulse, Digital and Switching Waveforms*, TMH, 3rd Edition,2011.
2. David A. Bell, *Solid State Pulse Circuits*, PHI, 4th Edition, 2009.

REFERENCE BOOKS:

1. A. Anand Kumar, *Pulse and Digital Circuits*, PHI, 2nd Edition, 2008.
2. R.Venkataraman, *Pulse Digital Circuits and Computer Fundamentals*, Dhanapat Rai Publications, 3rd Edition, 1994.

II B. Tech. – II Semester
(16BT41031) ANALOG ELECTRONICS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Courses on Electronic Devices and Circuits, Pulse and Digital Circuits, Electronic Circuit Analysis and Design.

COURSE DESCRIPTION: Diode characteristics; Rectifiers; BJT and FET characteristics; UJT and SCR characteristics; BJT Amplifiers; Non-linear and Linear Wave shaping circuits; Feedback Amplifiers; Design of Multi-vibrator circuits; Power Amplifiers.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Apply the knowledge in

- Diodes-PN Junction Diodes, Zener Diodes, SCR
- Transistors-BJT,FET,UJT
- Feedback amplifiers and oscillators
- Clipping and Clamping Circuits
- RC High Pass and Low Pass Circuits
- Multi-vibrators

CO2. Analyze different types of amplifier, oscillator and pulse circuits.

CO3. Design different types of Electronic circuits like feedback amplifiers, Oscillators, Multi -vibrators, Schmitt Trigger.

CO4. Provide solutions through the design and conduct of experiments, analysis and synthesis.

CO5. Apply biasing technique for design of amplifiers.

CO6. Function effectively as an individual and as a member in a group in the area of analog electronic circuits.

CO7. Communicate effectively in oral and written form in the area of analog electronic circuits.

LIST OF EXPERIMENTS:

(Minimum of Twelve experiments to be conducted)

PART-I: DESIGN AND SIMULATE THE FOLLOWING CIRCUITS USING ANY SIMULATION software (Minimum of Six experiments to be conducted)

1. Common Emitter (CE) amplifier.
2. Common Source (CS) amplifier.
3. A two stage RC coupled amplifier.
4. Cascode amplifier.
5. Voltage series feedback amplifier.
6. RC phase shift oscillator using transistors.
7. Class - A power amplifier (transformer less).

PART-II: IMPLEMENTATION OF THE FOLLOWING CIRCUITS THROUGH HARDWARE

(Minimum of Six experiments to be conducted)

1. Design and Verify the Linear Wave Shaping circuit - Differentiator and Integrator.
2. Design and Verify the Non Linear Wave Shaping circuits-Clippers and Clampers.
3. Implementation of a Transistor as a Switch.
4. Implementation of Schmitt Trigger.
5. Implementation of Bootstrap Sweep Circuit.
6. Implementation of UJT Relaxation Oscillator.

7. Implementation of Astable Multivibrator using Transistors.

II B. Tech. – II Semester
(16BT41032) CONTROL SYSTEMS DESIGN LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A Course on Control Systems.

COURSE DESCRIPTION: Open and closed loop systems; DC and AC servo motor; stability analysis electrical systems; P, I, D parameters.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on the effect of feedback and different controllers.

CO2. Develop skills to analyze
- The characteristics of servomotors
- The stability of the system using root-locus bode and Nyquist plots
- The time domain and frequency specifications of second or der system

CO3. Design a transfer function of given model.

CO4. Develop programming skills to solve open and closed loop control systems.

CO5. Select and apply modern tools for solving complex problems in control systems.

CO6. Function effectively as individual and as member in team.

CO7. Communicate effectively both oral and written in relevance to control systems.

LIST OF EXPERIMENTS:

Conduct any TEN experiments:
1. Transfer function of DC machine.
2. Find Torque transfer function of synchros.
3. Transfer function from the block diagram using MATLAB.
4. Unit step response of given second order transfer function using MATLAB. Determination of peak overshoots, peak time, rise time and delay time.
5. Time response of second order system (hard ware).
6. Stability analysis of a linear time invariant system using Root Locus.
7. Stability analysis of a linear time invariant system using Bode plot and Nyquist plot.
8. Design lead & Lag compensator using Bode plots.
9. Effect of P, PD, PI and PID controllers on a second order system (Hardware/Software).
10. Effect of PID controllers for the given transfer function using MATLAB SIMULINK.
11. Transfer function from state model and Vice-versa.
12. Controllability and observability test using MATLAB.

II B. Tech. – II Semester

(16BT41033) LINEAR AND DIGITAL ICs LAB

(Common to EEE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on Linear and Digital ICs.

COURSE DESCRIPTION: Op-Amp characteristics; Applications of Op-Amp; 555 timer; PLL; Digital logic families and interfacing; Digital IC Applications; Programming of digital IC's in HDL.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on analog and digital circuits.
CO2. Apply analytical skills to determine the op-amp parameters.
CO3. Design of analog and digital circuits for Linear & Non linear applications.
CO4. Provide valid conclusions through analysis and synthesis of analog and digital circuits.
CO5. Apply appropriate simulation tools for programming of analog and digital circuits.
CO6. Work individually and also in a group to develop applications using linear and digital ICs.
CO7. Communicate effectively with engineering community to design analog circuits.

DETAILED SYLLABUS:

LIST OF EXPERIMENTS:
(Minimum of Eleven experiments to be conducted)

PART: A (Minimum of THREE experiments to be done using any simulation software)

1. Design and Simulate an Active filter (LPF / HPF) for given cut off frequency.
2. Design and Simulate D-A converter (R-2R ladder) with required voltage levels.
3. Design and Simulate an Instrumentation Amplifier with required gain.
4. Design and Simulate Op-Amp applications – (Integrator /Differentiator)for given cut-off frequency.
5. Design and Simulate applications of 555 timer (Monostable /Astable Multivibrator) with given duty cycle and frequency.

PART – B: Linear IC's (Minimum of FOUR experiments to be done using hardware)

1. (a) Design and Verify Op-Amp based comparator with given reference voltage.
   (b) Design and Verify Op-Amp based Schmitt Trigger with given Duty cycle and frequency.
2. Design and Verify the Applications of Op-Amp (Integrator/Differentiator) for given cut-off frequency.
3. Design and Verify the Applications of 555 timer (Monostable /Astable Multivibrator) with given Duty cycle and frequency.
4. Design and Verify and R-2R Ladder DAC circuit using op-amp-741.
5. Design and Verification of active filter (LPF / HPF) for given cut off frequency.
6. Design and Verify an Instrumentation Amplifier with required Gain.

PART: C (Minimum of FOUR experiments to be done using Verilog HDL)

1. Simulate the Model of Adder and Subtractor with different flow(Structural, Data and behavioral).
2. Simulate the Model of 3x8 using 2x4 Decoder & 8x3 using 4x2 Encoder.
3. Simulate the Model of 8x1 using 4x1 using 2x1 Multiplexer.
4. Simulate the Model of J-K, T, D Flip-flops using Logic gates.
5. Simulate the Model of 4-Bit Universal shift register.
6. Simulate the Model of Mod-8 Counter.

III B. Tech. – I Semester

(16BT3HS02) MANAGERIAL ECONOMICS AND PRINCIPLES OF ACCOUNTANCY

(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Managerial Economics; Demand and Elasticity of Demand; Production Functions; Markets and Pricing Policies; Formation of different types of Business Organizations; Basic concepts of Accounting (Journal, Ledger and Trial balance); Trading Account, Profit and Loss Account and Balance sheet with simple adjustments; Computerized Accounting.

COURSE OUTCOMES: On Successful completion of the course, students will be able to

CO1. Acquire Knowledge in
- Tools and concepts of Micro Economics.
- Basic Principles and concepts of Accountancy.
- Provides life skills for effective utilization of scarce resources.
- Financial Accounting.
- Significance of Economics and Accountancy

CO2. Develop skills in managerial decision making of an organization.
CO3. Apply the Economic theories i.e., Demand, Production, Cost, Markets and Price.
CO4. Develop effective communication in Business and Accounting transactions.
CO5. Ascertain the profitability and soundness of an organization.
CO6. Practice Financial Accounting.

DETAILED SYLLABUS:

UNIT–I: INTRODUCTION TO MANAGERIAL ECONOMICS, DEMAND ANALYSIS (9 Periods)

Definition, Nature and Scope of Managerial Economics. **Demand:** Determinants of demand – Demand function - Law of demand, assumptions and exceptions - Elasticity of demand – Types of elasticity of demand - Demand forecasting and methods of demand forecasting.

UNIT – II: THEORY OF PRODUCTION AND COST ANALYSIS (9 Periods)

Production Function: Isoquants and Isocosts – Input-output relationship - Law of returns. **Cost Concepts:** Total, Average and Marginal Cost **-** Fixed vs. Variable costs – Opportunity Costs Vs Outlay Costs– Separable Costs Vs Joint Costs, Urgent Costs Vs Postponable Costs- Avoidable Costs Vs Unavoidable Costs.

Break Even Analysis (BEA) – Assumptions, Merits and demerits - Determination of Break Even Point (Simple problems).

UNIT – III: INTRODUCTION TO MARKETS AND PRICING (9 Periods)

Market Structure: Types of Markets - Features of perfect competition - Monopoly and monopolistic competition - Price and Output determination in perfect competition, monopoly and monopolistic Markets.

Pricing: Objectives and policies of pricing – Sealed bid pricing - Marginal cost pricing - Cost plus pricing - Going rate pricing – penetration Pricing –skimming Pricing - Block pricing – Peak load pricing - Cross subsidization.

UNIT – IV: INTRODUCTION TO PRINCIPLES OF ACCOUNTING AND CAPITAL (9 Periods)

Accountancy: Introduction – Concepts – Conventions – Double Entry Book Keeping – Journal – Ledger - Trial Balance (Simple problems).

Capital: Significance - Types of capital – Sources of Capital.

UNIT–V: FINAL ACCOUNTS - COMPUTERIZATION OF ACCOUNTING SYSTEM (9 Periods)

Introduction to Final Accounts - Trading account - Profit and Loss account and Balance Sheet with simple adjustments (Simple problems).

Computerization of Accounting System: Manual Accounting *Vs* Computerized Accounting – Advantages and Disadvantages of Computerized Accounting.

Total Periods: 45

TEXT BOOKS:

1. A.R. Aryasri, *Managerial Economics and Financial Analysis*, Tata Mc- Graw Hill, New Delhi, 3rd Edition, 2007.
2. R.Cauvery, U.K. Sudhanayak, M. Girija and R. Meenakshi, *Managerial Economics*, S. Chand and Company, New Delhi, 2nd Edition, 2010.

REFERENCE BOOKS:

1. Varshaney and Maheswari, *Managerial Economics,* Sultan Chand and Sons, New Delhi, 19th Edition, 2005.
2. Ms. Samba Lalita, *Computer Accouting Lab Work*, 1st Edition, Kalyani Publishers, Ludhiana, 2009.

3. S.P. Jain and K.L. Narang, *Financial Accounting*, Kalyani Publishers, Ludhiana, 6th Edition, 2002.

III B. Tech. – I Semester

(16BT51001) BIOMEDICAL INSTRUMENTATION

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A Course on Electrical and Electronic Measurements.

COURSE DESCRIPTION: Human Anatomy & Physiology; Bio-signals; Cardiovascular and Neuro-muscular Instrumentation; Therapeutic Equipment; Advanced Imaging techniques.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on human anatomy and physiology, ECG, EMG and EEG measuring systems, medical imaging and therapeutic equipment.

CO2. Analyze various bio signals like ECG, EMG, EEG.

CO3. Design and develop suitable interfaces for real time applications in the field of biomedical instrumentation.

CO4. Solve problems related to extraction of bio signals.

CO5. Choose appropriate device to solve biomedical engineering problems.

CO6. Apply ethical principles and commit to professional ethics, responsibilities and norms of the biomedical engineering practice.

DETAILED SYLLABUS:

UNIT – I: BIOELECTRIC POTENTIALS AND ELECTRODES (9 Periods)

Block diagram biomedical instrumentation system, Problems encountered in measuring a living system, Structure of cell, Resting and Action Potentials, Propagation of Action Potentials, Propagation of action potentials nerve to neuro-muscular junction, sources of Bioelectric Potentials, Electrode theory: Biopotential electrodes, Biochemical transducers.

UNIT–II: CARDIOVASCULAR INSTRUMENTATION (9 Periods)

Physiology of cardiovascular system, electrical conduction system of the heart, interpretation of ECG waveform, standard 12-lead configurations, Einthoven triangle, specifications of ECG Machine; Blood pressure, blood flow and heart sound measurements; Relation between electrical and mechanical activities of the heart.

UNIT – III: NEURO-MUSCULAR AND RESPIRATORY INSTRUMENTATION (9 Periods)

Physiology of nervous system, electrode placement for EEG and EMG recording, Specification of EEG and EMG machines, Interpretation of EEG and EMG.

Respiratory Instrumentation: Mechanism of respiration, Spirometry, Pneumotachograph Ventilators.

UNIT – IV: THERAPEUTIC EQUIPMENT (10 Periods)

Pacemakers: Need for Cardiac pacemakers, pacing modes, Ventricular asynchronous Pacemaker (Fixed rate Pacemaker), Ventricular inhibited Pacemaker (demand Pacemaker), Atrial Synchronous pacemaker, Comparision between internal & external Pacemakers; Defibrillators: AC Defibrillator, DC Defibrillator, Synchronised DC Defibrillator; Diathermy: Shortwave and microwave, Dialysis: Hemodialysis, Peritonal Dialysis.

UNIT – V: MEDICAL IMAGING SYSTEM (8 Periods)

Ultrasonic Imaging: Doppler principle, Modes of Display: A-Mode, B-Mode and Echocardiography. Computed Tomography: Block diagram of CT scanner, Applications of Computed Tomography. MRI System, Cine angiogram, Endoscope.

Total Periods: 45

TEXT BOOKS:

1. Leslie Cromwell, Fred. J. Weibell and Erich. A. Pfeiffer, *Biomedical Instrumentation and Measurements*, PHI, 2nd Edition, 2003.
2. M. Arumugam, *Biomedical Instrumentation*, Anuradha Publications, 1992.

REFERENCE BOOKS:

1. John G.Webster, *Medical Instrumentation Application and Design*, Wiley India Pvt. Ltd., 3rd Edition, 2004.
2. R.S. Khandpur, *Hand Book of Biomedical Instrumentation*, Tata McGraw Hill, 2nd Edition, 2002.

III B. Tech. – I Semester

(16BT51002) INDUSTRIAL INSTRUMENTATION – II

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Industrial Instrumentation - I.

COURSE DESCRIPTION: Measurement of Flow, Level, Moisture, Viscosity, Density; Electrical and intrinsic safety; Design of signal conditioning circuits.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge of construction and working principles of different instruments used in industry.

CO2. Identify, formulate and analyze different types of instruments for various industrial applications.

CO3. Design suitable sensors and signal conditioning circuits for desired parameter measurement in industrial applications.

CO4. Solve engineering problems pertaining to measurement of Density, Viscosity, Moisture, Flow, Level and signal conditioning circuits to provide feasible solutions.

CO5. Select appropriate sensor and measuring technique for the measurement of industrial parameters.

CO6. Apply the knowledge of safety issues while designing measuring instruments used in industries.

DETAILED SYLLABUS:

UNIT - I: DENSITY, VISCOSITY and HUMIDITY MEASUREMENT (11 Periods)

Density: Introduction, Pressure head type, Float type, Displace type, Buoyancy effect densitometer method, Hot wire gas bridge type, Vibration type, Radioactive method. Analysis and selection of density sensors.

Viscosity: Introduction, Friction tube viscometer, Saybolt's viscometer, Rotameter viscometer, Searle's rotating cylinder, Cone and Plate viscometer. Consistency meter – Rotating vane type and Oscillating type. Analysis and selection of viscosity sensors.

Humidity: Psychrometer, hygrometer & Types, Dew point device. Analysis and selection of humidity sensors.

UNIT – II: LEVEL MEASUREMENT (7 Periods)

Introduction, Gauge Glass technique, Float Types – Float–and– tape method, Float–and–shaft method, Magnetic float types. Displacer types, Hydrostatic types – Air-Purge type, Bubbler type. Thermal effect types, Electrical types – Resistance switch type, Inductive and Capacitance type. Ultrasonic method, bellow element type, Fibre - optic type, level transmitters, Analysis and selection of level sensors.

UNIT – III: FLOW MEASUREMENT (10 Periods)

Introduction, Head types – Orifice, Venturi, Flow Nozzle, Dahl Tube, Pitot tube, Area flow meter - Rotameter & types, Mass flow meters – Turbine Mass flow meter, Coriolis flow meter, Gyroscopic flow meter, Liquid bridge mass flow meter, Calorimetric flow meter. Positive displacement type flow meters - Nutating Disc, Rotary Vane, Lobed impeller, Reciprocating Piston type, Fluted Rotor. Electrical type flow meter – Turbo magnetic flow meter, Electromagnetic flow meter, Ultrasonic flow meter, Hotwire anemometer type, Vertex shedding type. Flow transmitters, Analysis and selection of flow sensors.

UNIT - IV: SIGNAL CONDITIONING (9 Periods)

Voltage Dividers: Potentiometers, Application to thermistors, Dynamic measurements, Amplifiers for voltage dividers; Wheatstone Bridge – Compensation & Sensitivity.

Signal conditioning for Self generating sensors: Chopper and low drift amplifiers Composite amplifier, charge amplifier and electrometer amplifier.

Design of I to V, V to I converters, Range conversion of current, voltage, Design of instrumentation amplifier.

UNIT – V: SAFETY INSTRUMENTS (8 Periods)

Proximity Switches - Capacitive, Inductive, Magnetic, Hall-Effect.

Limit switches – Mechanical, Optical, Pneumatic, Ultrasonic, Digital outputs & Encoders.

Electrical & Intrinsic Safety: NEMA types, Fuses & Circuit breakers.

Explosion hazards & intrinsic safety – Protection methods, Purging, pressurization, ventilation.

Grounding and Shielding: Introduction - concept of earth ground, examples of current return path symbols, shock hazard protection using Earth Ground, grounding considerations, basic grounding practices and examples. Practical guide lines for shielding and examples. **Total Periods: 45**

TEXT BOOKS:

1. *D. Patranabis, Principles of Industrial Instrumentation*, 3rd Edition, TMH, 2010.
2. A. K. Sawhney, *A Course in Electrical and Electronics Measurements and Instrumentation,* Dhanpat Rai and Sons, 19th Edition, 2011.

REFERENCE BOOKS:

1. *Bela G Liptak, Instrument Engineers' Handbook: Process Measurement and Analysis, CRC Press - Butterworth Heinemann, 4th Edition, 2003.*
2. M.M.S.Anand., *Electronic Instruments and Instrumentation Technology*, PHI, 2005.

3. *B. C. Nakra, K. K. Chaudhry, Instrumentation Measurement And Analysis,* 2nd Edition, TMH, 2003.
4. Ramon Pallas-Areny and John G. Webster, *Sensors and Signal Conditioning*, John Wiley & Sons, Inc., 2nd Edition, 2001.

III B. Tech. – I Semester

(16BT51003) PRINCIPLES OF COMMUNICATIONS

(Common to EEE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Signals and Systems**.**

COURSE DESCRIPTION: Fundamentals of Communications; Analog and digital communications - modulation and Demodulation Techniques; Information theory and coding.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate fundamental knowledge in
- Elements of communication systems.
- Amplitude, Frequency, and Phase Modulators and Demodulators.
- Data transmission and detection of digital signals.
- Information theory and coding techniques.

CO2. Perform analysis of different modulation techniques and calculate various performance parameters

CO3. Design and develop modulators and demodulators for communication systems.

CO4. Solve engineering problems for feasibility and provide optimal solutions in the area of Analog and Digital Communication Systems.

CO5. Select the appropriate modulation and demodulation techniques for transmission and reception of signals.

CO6. Follow standards while developing the communication systems.

DETAILED SYLLABUS:

UNIT - I: AMPLITUDE MODULATION (10 Periods)
Block diagram of Electrical Communication System, Types of Communications, Need for Modulation, Types of Amplitude Modulation: AM, DSBSC, SSBSC, Power and BW requirements, generation of AM, DSBSC, SSBSC, Demodulation of AM: Diode detector, Product demodulation for DSBSC & SSBSC.

UNIT - II: ANGLE MODULATION (9 Periods)
Frequency & Phase Modulations, Advantages of FM over AM, Bandwidth consideration, Narrowband and Wideband FM, generation and demodulation of FM, Comparison of FM & PM.

UNIT - III: PULSE MODULATION (8 Periods)
Elements & Advantages of Digital communication systems, PAM, Regeneration of Base band Signal, PWM and PPM, Time Division Multiplexing, Frequency Division Multiplexing, Asynchronous Multiplexing.

UNIT - IV: DIGITAL TRANSMISSION (10 Periods)
Pulse Code Modulation: Advantages, Block diagram of PCM, Quantization, effect of Quantization, Quantization error, DM, ADM and Comparison.
Digital Modulation: ASK, FSK, PSK, QPSK, DPSK, Modulation and Demodulation - Coherent and Non-coherent techniques.

UNIT - V: INFORMATION THEORY AND CODING (8 Periods)
Concept of Information, Entropy and Rate of Information, Coding efficiency, Shannon-Fano and Huffman Coding, Error Control Coding, Error Detection and Correction Codes, Block Codes, Convolutional Codes.

Total Periods: 45

TEXT BOOKS:
1. R.P. Singh and S D Sapre, *Communication Systems - Analog and Digital,* TMH, 2nd Edition 2007.
2. Simon Haykin, *Communication Systems,* John Wiley, 2nd Edition 2007.

REFERENCE BOOKS:
1. H. Taub and D. Schilling, *Principles of Communication Systems,* TMH, 2nd Edition, 1991.

2. Sam Shanmugam, *Digital and Analog Communication Systems*, John Wiley, 2006.

III B. Tech. – I Semester
(16BT60402) DIGITAL SIGNAL PROCESSING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Signals and Systems.
COURSE DESCRIPTION: Continuous and discrete signals and sequences; systems; DFT and FFT algorithms for the analysis of discrete sequences; design and realization of Digital IIR and FIR filters; DSP processors and architectures.
COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Apply the knowledge of fundamentals in
- Frequency analysis of signals and systems.
- DFT and FFT transforms.
- Analog & Digital Filter Design.
- Digital Filter Realization.
- DSP Processors.

CO2. Analyze numerical and analytical problems of discrete time signals and systems in frequency domain using Transforms.
CO3. Design and develop digital filters to optimize system performance and their realization.
CO4. Interpret and synthesize the response of Digital filters to validate their characteristics.
CO5. Apply appropriate techniques and algorithms to design digital signal processing systems with an understanding of limitations.

DETAILED SYLLABUS:
UNIT –I: INTRODUCTION TO DIGITAL SIGNAL PROCESSING (10 Periods)
Discrete-time signals and systems, Linear shift invariant, Stability and Causality, Linear constant coefficient difference equations, solution for difference equations using Z-transforms, Frequency analysis of signals - Fourier series and Fourier transform of Discrete time signals; Frequency domain representation of Discrete Time Systems.
UNIT- II: DISCRETE AND FAST FOURIER TRANSFORMS (9 Periods)
Discrete Fourier Transform, properties of DFT, linear filtering methods based on DFT, Relationship of FT to Z Transform.
Fast Fourier transforms (FFT): Radix-2 Decimation in time (DIT) and Decimation in frequency (DIF) FFT algorithms, Inverse FFT.
UNIT- III: IIR DIGITAL FILTERS (10 Periods)
Design of IIR digital filters from analog filters-IIR filter design by approximation of derivatives, impulse invariance and bilinear transformation. Characteristics of common use analog filters, Frequency transformations. Structural realization of IIR systems-direct, cascade and parallel form structures, Transposed form.
UNIT- IV: FIR DIGITAL FILTERS (9 Periods)
Symmetric and anti-symmetric FIR filters, Design of linear phase FIR digital filters using windowing techniques, Frequency sampling technique, Comparison of IIR and FIR filters. Structural realization of FIR filters-direct, cascade-form structures and linear phase structures.
UNIT –V: INTRODUCTION TO DSP PROCESSORS (8 Periods)
Introduction to programmable DSPs: Multiplier and Multiplier Accumulator (MAC), Modified Bus Structures and Memory Access schemes in P-DSPs, Multiple access memory, multi-ported memory, VLIW Architecture, Pipelining, Special addressing modes, On-Chip Peripherals.
Architecture of TMS 320C6X: Introduction, Features of 'C6X Processors, Internal Architecture, CPU, General-Purpose Register Files, Functional Units and Operation, Data Paths, Control Register File.

Total Periods: 46

TEXT BOOKS:
1. John G. Proakis, Dimitris G. Manolakis, *Digital Signal Processing, Principles, Algorithms and Applications*, Pearson Education/PHI, 4th Edition, 2007.
2. B.Venkataramani, M. Bhaskar, *Digital Signal Processors – Architecture, programming and Applications,*, TATA McGraw Hill, 2nd Edition, 2010

REFERENCE BOOKS:
1. Alan.V. Oppenheim, Ronald.W. Schafer, John R Buck, *Discrete Time Signal Processing*, Prentice Hall, 2nd Edition, 2006.

2. Tarun Kumar Rawat, *Digital Signal Processing*, Oxford University Press, 1st Edition, 2015.

III B. Tech. – I Semester
(16BT51004) COMPUTER ORGANIZATION AND ARCHITECTURE
(Interdisciplinary Elective – 1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Switching Theory and Logic Design.

COURSE DESCRIPTION: Basic structure of computers; computer arithmetic operations; register transfer and organization; 8085 architecture, programming and interfacing of 8085 microprocessor; Concepts of micro programmed control, pipelining and memory system.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on
- Internal organization of a computer.
- Various memories and hierarchy in a computer.
- Architecture, instruction set and addressing modes of 8085 microprocessor.

CO2. Analyze the performance of a computer.
CO3. Design microprocessor based systems for real time applications.
CO4. Solve engineering problems and arrive at solutions by developing embedded products.
CO5. Choose appropriate hardware, algorithm and program using suitable IDE.
CO6. Practice professional engineering to deliver efficient and cost effective embedded based products for society.

DETAILED SYLLABUS:

UNIT-I: STRUCTURE OF COMPUTERS AND COMPUTER ARITHMETIC (9 Periods)
Structure of Computers: Computer Types, Functional Units, Basic Operational concepts, Bus Structures, Software, Performance, Multiprocessors and Multicomputers, Historical perspective.
Computer Arithmetic: Addition and Subtraction, Multiplication and Division Algorithms.

UNIT-II: REGISTER TRANSFER AND ORGANIZATION (8 Periods)
Register Transfer, Bus and memory transfers, 4-bit arithmetic circuit, Arithmetic logic shift unit, Instruction codes, Computer registers, Timing and control, Instruction cycle.

UNIT - III: 8085 ARCHITECTURE (10 Periods)
Microprocessor evolution and types, introduction to 8085 architecture, Pin description, Register Organization, Timing Diagram, Instruction Set: Data transfer, arithmetic and logic, branch control, I/O and machine control instructions.

UNIT-IV: 8085 PROGRAMMING & INTERFACING (8 Periods)
Addressing modes, Interrupts of 8085, Simple programs, Interfacing – Memory, I/O devices - memory mapped I/O and I/O mapped I/O.

UNIT-V: MICROPROGRAMMED CONTROL, PIPELINING AND MEMORY SYSTEM (10 periods)
Microprogrammed Control: Control memory; address sequencing, design of control unit.
Pipelining: Basic concepts, Data Hazards, Instruction Hazards, Out of order execution.
Memory System: Semiconductor RAM memories: Internal organization of memory chips, SRAM, DRAM, ROM, cache memory: mapping functions, replacement algorithms, virtual memory.

Total Periods: 45

TEXT BOOKS:
1. M. Moris Mano, *Computer System Architecture*, Pearson/PHI, 3rd Edition, 2008.
2. Ramesh S Gaonkar, *Microprocessor – Architecture, Programming and Applications with the 8085*, Penram International Publishing Private Limited, 5th Edition, 2007.

REFERENCE BOOKS:
1. Carl Hamacher, Zvonks Vranesic, SafeaZaky, *Computer Organization*, McGraw Hill, 5th Edition, 2002.
2. William Stallings, *Computer Organization and Architecture*, Pearson/PHI, 6th Edition, 2003.

III B. Tech. – I Semester
(16BT51241) OBJECT ORIENTED PROGRAMMING
(Common to ECE and EIE)
(Interdisciplinary Elective – 1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Introduction of Java, Classes and Objects; Inheritance, Packages, Interfaces; Exception handling, Multithreading; Event handling, AWT, Collection Classes; Applets, Servlets.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on:
- Object Oriented Programming concepts - classes, objects, inheritance, polymorphism, encapsulation and abstraction.
- Packages, interfaces, multithreading, exception handling, event handling.

CO2. Analyze complex engineering problems using object oriented concepts.
CO3. Design and develop reusable code to provide effective solutions for real world problems using inheritance and polymorphism.
CO4. Apply AWT and Applets to create interactive Graphical User Interfaces.
CO5. Use advanced programming languages to develop web applica tions.
CO6. Build Java Applications suitable for societal requirements.

DETAILED SYLLABUS:
UNIT-I: INTRODUCTION OF JAVA LANGUAGE (12 Periods)
Data types, Variables, Arrays, Operators, Control statements.
Classes and Objects: Concepts of Classes, Objects, Constructors, Methods, this keyword, Garbage collection, Overloading Methods and Constructors, Parameter passing, Access control, Recursion, String Class.
UNIT-II: INHERITANCE, PACKAGES AND INTERFACES (7 Periods)
Inheritance: Inheritance basics, Super Keyword, Multi-level hierarchy, Abstract classes, final Keyword with inheritance.
Packages: Definition, Creating and Accessing a package, Understanding CLASSPATH, Importing packages.
Interfaces: Definition, implementing interfaces, Nested interfaces, Applying interfaces, Variables in interface and Extending interfaces.
UNIT-III: EXCEPTION HANDLING AND MULTITHREADING (9 Periods)
Exception Handling: Concepts of exception handling, Exception Types, Usage of try, catch, throw, throws and finally, Built in exceptions, Creating own exception sub classes.
Multithreading: Java thread model, Creating threads, Thread priority, Synchronizing threads, Inter-thread communication.
UNIT-IV: COLLECTION CLASSES, THE APPLET CLASS AND AWT (9 Periods)
The Collection Classes: ArrayList Class, LinkedList Class, HashSet Class, Linked HashSet Class, TreeSet Class, PriorityQueue Class, EnumSet Class.
The Applet Class: Types of applets, Applet Basics, Applet Architecture, Applet Skeleton, Passing Parameters to Applets.
The AWT Control Fundamentals, User interface components, Layout managers.
UNIT-V: EVENT HANDLING AND SERVLETS (8 Periods)
Delegation event model: Event Classes, Event Listener Interfaces – Mouse and Key; Adapter classes.
Servlets: Life Cycle of a Servlet, Using Tomcat for Servlet Development, Create and compile the servlet source code, Servlet API, Javax.Servlet package. **Total Periods: 45**

TEXT BOOK:
1. Herbert Schildt, *Java the Complete Reference***,** Oracle Press, 9th Edition, 2014.

REFERENCE BOOK:

1. Sachin Malhotra, Saurab Choudhary, *Programming in Java,* Oxford University Press, 2nd Edition, 2014.

III B. Tech. – I Semester

(16BT31501) OPERATING SYSTEMS

(Common to EEE and EIE)

(Interdisciplinary Elective – 1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Operating systems operations, scheduling; Critical section problem, deadlocks; Paging, segmentation; File Concept, Disk scheduling; I/O interface; concepts of protection.

COURSE OUTCOMES: On Successful completion of the course, students will be able to

CO1. Demonstrate knowledge on Operating system operations, services, file management, disk management, I/O management and protection.

CO2. Identify the functionality involved in process management concepts like scheduling and synchronization.

CO3. Design models for handling deadlock and perform memory management.

CO4. Synthesize and apply programming API's to perform Process management.

CO5. Use appropriate protection tools to provide access control to Operating system users.

DETAILED SYLLABUS:

UNIT-I: OPERATING SYSTEMS OVERVIEW AND PROCESS MANAGEMENT (8 periods)

Operating systems, operations, Distributed systems, Special purpose systems, Operating systems services, Systems calls, Operating system structure.

Process Management: Process scheduling, Process Control Block, Inter process communication, Signals, Forks, Multithreading models, Threading issues, Scheduling criteria, Scheduling algorithms, Multilevel queue, Multilevel feedback queue.

UNIT - II: SYNCHRONIZATION AND DEADLOCKS (10 Periods)

Synchronization: The critical-section problem, Peterson's Solution, Synchronization hardware, Semaphores, Classic problems of synchronization, Monitors.

Deadlocks: System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock detection, Deadlock avoidance, Deadlock recovery.

UNIT - III: MEMORY MANAGEMENT (9 Periods)

Memory-Management Strategies: Swapping, Contiguous memory allocation, Paging, Structure of the page table, Segmentation.

Virtual Memory Management: Demand paging, Copy-on-Write, Page replacement Algorithms, Thrashing.

UNIT - IV: STORAGE MANAGEMENT (10 Periods)

File System: File Concept, Access methods, Directory structure, File system structure, i-node, File Descriptors, File system implementation, Directory implementation, Allocation methods.

Secondary Storage Structure: Disk structure, Disk attachment, Disk scheduling, Swap-space management, Stable-storage implementation, Tertiary storage structure.

UNIT - V: I/O SYSTEMS AND PROTECTION (8 Periods)

I/O Systems: I/O Hardware, Application I/O interface, Kernel I/O subsystem.

Protection: Goals of protection, Principles of protection, Domain of protection, Access matrix, Implementation of access matrix, Access control, Revocation of access rights.

Total Periods: 45

TEXT BOOK:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, *Operating System Principles,* Wiley India Edition, 7th Edition, 2011.

REFERENCE BOOKS:

1. William Stallings, *Operating Systems, Internals and Design Principles,* Pearson Education, 7th Edition, 2013.
2. Andrew S. Tanenbaum, *Modern Operating Systems*, PHI, 3rd Edition, 2009.

III B. Tech. – I Semester
(16BT60502) SOFT COMPUTING
(Interdisciplinary Elective – 1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Concepts on Soft Computing Techniques; Artificial Neural Networks; Supervised Learning; Unsupervised Learning; Fuzzy logic; Genetic Algorithms.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge in
- Artificial Neural Networks
- Supervised Learning Networks
- Unsupervised Learning Networks
- Fuzzy sets, relations and measures
- Genetic Operators

CO2. Analyze neural network architectures, Fuzzy systems and Genetic algorithms.
CO3. Design soft computing solutions for real life computational problems.
CO4. Use soft computing techniques to solve complex computational problems.
CO5. Create algorithms using soft computing techniques.
CO6. Apply contextual knowledge to solve problems related to societal issues like Business Intelligence, Forecasting.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO SOFT COMPUTING & ARTIFICIAL NEURAL NETWORKS (8 Periods)

Soft Computing: Neural networks, Application scope of neural networks, Hybrid systems, Soft computing, Applications of soft computing.

Artificial Neural Networks: Fundamentals, Evolution, Basic Models, Terminologies, Hebb network.

UNIT-II: SUPERVISED LEARNING NETWORKS (10 Periods)

Perceptron Networks: Theory, Perceptron learning rule, Architecture, Flowchart for training process, Perceptron training algorithm for single and multiple output classes, Perceptron network testing algorithm.

Back-Propagation Networks: Theory, Architecture, Flow chart for training process, Training algorithm, Learning factors of back-propagation networks, Testing algorithm for back-propagation networks.

UNIT-III: UNSUPERVISED LEARNING NETWORKS (9 Periods)

Unsupervised Learning Networks: Fixed weight competitive nets, Kohonen self-organizing feature maps, Learning vector quantization, Counter-propagation networks, Adaptive response theory network.

UNIT-IV: FUZZY LOGIC (10 Periods)

Classical Sets and Fuzzy Sets: Classical sets- Operations, Properties, Function mapping; Fuzzy sets- Operations, Properties.

Classical Relations and Fuzzy Relations: Cartesian product of relation, Classical relations, Fuzzy relations, Tolerance and equivalence relations, Non-interactive fuzzy sets.

UNIT-V: FUZZY SYSTEMS AND GENETIC ALGORITHMS (8 Periods)

Fuzzy Arithmetic and Fuzzy Measures: Fuzzy arithmetic, Extension principle, Fuzzy measures, Measures of fuzziness.

Genetic Algorithms: Genetic operators, Working principle, Fitness function, Reproduction.

Total Periods: 45

TEXT BOOK:
1. S. N. Sivanandan and S. N. Deepa, *Principles of Soft Computing,* Wiley India, 2nd Edition, 2011.

REFERENCE BOOKS:
1. Jyh-Shing Roger Jang, Chuen-Tsai Sun and Eiji Mizutani, *Neuro-Fuzzy and SoftComputing,* Prentice Hall India, 2003.
2. S. Rajasekaran and G. A. Vijayalakshmi Pai, *Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and Applications*, PHI Learning Private Ltd, 2011.

III B. Tech. – I Semester

(16BT51031) **INDUSTRIAL INSTRUMENTATION LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A Course on Industrial Instrumentation -II.

COURSE DESCRIPTION: Measurement of Force, Torque, Velocity, Acceleration, Pressure, Temperature, Flow Level, Moisture, Viscosity, Density; Electrical and intrinsic safety.

COURSE OUTCOME: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge for measurement of different industrial process parameters.
CO2. Analyze the functionality of different types of instruments used for various industrial applications.
CO3. Design suitable signal conditioning circuits for measuring instruments.
CO4. Solve engineering problems pertaining to measurement of industrial process parameters to provide feasible solutions.
CO5. Select appropriate sensor and measuring technique for the measurement of industrial parameters.
CO6. Practice professionalism in engineering and deliver efficient & cost effective, maintainable products by understanding the needs of society, safety for sustainable development.
CO7. Follow ethics while developing industrial instruments.
CO8. Function effectively as an individual and work as part of a group in developing industrial instruments.
CO9. Communicate effectively among people about the effects of materials, mechanical design on electrical parameters and vice versa.

LIST OF EXPERIMENTS:
Minimum of Eleven experiments to be conducted.

1. Measurement & Calibration of liquid level & analysis of different techniques.
2. Measurement of speed & analysis of different techniques.
3. Measurement of Viscosity.
4. Measurement of Density.
5. Measurement of Humidity.
6. Measurement of Torque.
7. Design of V to I converter.
8. Design of I to V converter.
9. Design of circuit to measure resistance and calibrate to respective voltage.
10. Measurement of temperature using Thermocouple.
11. Calibration and verification of discharge coefficient of orifice plate.
12. Calibration & measurement of pressure.
13. Basic Programming in LabVIEW.
14. Data Acquisition, calibration and analysis using LabVIEW.
15. Data logging and analysis.

III B. Tech. – I Semester
(16BT51032) **SIGNAL PROCESSING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on Digital Signal Processing.

COURSE DESCRIPTION: Basics of programming using any simulation software; Operations on Signals & sequences; Convolution and correlation; Pole-zero mapping; Power Spectral Density; Filter designing; Study architecture of DSP processor kits and performing basic operations on it; Real-time signal processing like digital filter design (FIR, IIR) and FFT implementation using DSP processor kits.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate fundamental Knowledge in simulation of basic concepts and algorithms such as convolution, Correlation, Digital filters, pole-zero mapping, DFT and FFT in signal processing.

CO2. Analyze signals and Sequences using various processing techniques like Gaussian noise generation, DFT and FFT implementation.

CO3. Design and simulation of IIR and FIR filters.

CO4. Analyze various filter characteristics and interpret data from signal processing systems to provide valid conclusions.

CO5. Use appropriate simulation and hardware tools to solve the complex engineering problems in the domain of signal processing.

CO6. Function effectively as individual and as member in a team to perform operations on signals and design filters.

CO7. Communicate effectively in verbal and written forms while processing signals and designing filters.

LIST OF EXPERIMENTS:

Part – I (Minimum of seven experiments to be conducted)

1. Generation of Various signals and Sequences (Periodic and Aperiodic), Such as Unit Impulse, Unit Step, Square, Saw Tooth, Sinusoidal, Ramp, Sinc function.
2. Operations on Signals and Sequences such as Addition, Multiplication, Scaling, Shifting, Folding.
3. Convolution and correlation of signals and sequences.
4. Locating the zeros and poles and plotting the pole zero maps in s-plane and z-plane for the given transfer function.
5. Generation of Gaussian Noise(real and complex), computation of its mean, M.S. Value and its skew, kurtosis, and PSD, probability distribution function
6. Implement N-point DFT & IDFT
7. Design of FIR filter using windowing method.
8. Design of Butterworth filter.
9. Design of Chebyshev filter.
10. Design of Digital Filter from Analog filters (Bilinear Transformation and Impulse Invariant Transformation).

Part – II (Minimum of four experiments to be conducted))

1. Study of TMS 320C 5X/6X DSP Processor architecture, Study of DSK6713 Hardware and Software API
2. To blink on board LEDs in TMS 320C 5X/6X, to observe the operation of Line-In Line-Out.
3. Sine Wave Generation using Look up Table Method.
4. FFT Implementation of given discrete sequence.

5. FIR Filter Implementation for given specifications.
6. IIR Filter Implementation for given specifications

III B. Tech. – I Semester

(16BT4HS31) SOFT SKILLS LAB

(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on English Language Lab.

COURSE DESCRIPTION: This course covers Body Language; Assertiveness; Goal Setting; Creative Thinking; Interpersonal Skills; Team Work; Conflict Management; Etiquette; Report Writing; Group Discussions; Interviewing Skills.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Acquire knowledge in
- Goal Setting
- Creative Thinking
- Leadership Skills and
- Team Work

CO2. Analyse the situations and develop skills for
- Body Language
- Personality Development and
- Stress Management

CO3. Apply the techniques of soft skills in a problem situation enhanced through multimedia software.

CO4. Function effectively as an individual and as a member in diverse teams.

CO5. Communicate effectively in public speaking in formal and informal forums.

LIST OF EXERCISES:
1. Body Language
2. Assertiveness
3. Goal Setting
4. Creative Thinking
5. Interpersonal Skills
6. Team Work
7. Conflict Management
8. Etiquette
9. Report Writing
10. Resume Writing
11. Group Discussions
12. Interviewing Skills

Total Lab Slots: 10

REFERENCE BOOKS:

1. R. C. Sharma & Krishna Mohan, *Business Correspondence and Report Writing*, Tata McGraw-Hill Publishing Company Limited, Third Edition, New Delhi, 2012.
2. Gopalswamy Ramesh and Mahadevan Ramesh, *The Ace of Soft Skills*, Pearson, Noida, 2010.
3. Jeff Butterfeild, *Soft Skills for Everyone*, Cengage learning, Delhi, 2011.
4. Barun K. Mitra, *Personality Development and Soft Skills*, Oxford University Press, Noida, 2012.

SUGGESTED SOFTWARE:
1. ETNL Language Lab Software Version 4.0
2. GEMS – Globarena E- Mentoring System
3. Speech Solutions.
4. English Pronunciation Dictionary by Daniel Jones.
5. Learning to Speak English 8.1, The Learning Company – 4 CDs.
6. Mastering English: Grammar, Punctuation and Composition.
7. English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
8. Dorling Kindersley Series of Grammar, Punctuation, Composition etc.
9. Language in Use 1, 2 & 3.
10. Cambridge Advanced Learner's Dictionary - 3rd Edition.
11. Centronix – Phonetics.
12. Let's Talk English, Regional Institute of English South India.

13. Ultimate English Tutor.

III B. Tech. –II Semester
(16BT5HS01) MANAGEMENT SCIENCE
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:—

COURSE DESCRIPTION: Concepts of Management; Environmental Scanning; Concepts Related to Organization; Operations Management; Work Study; Statistical Quality Control; Inventory Management; Marketing; Human Resource Management; Project Management; Project Crashing; Entrepreneurship; Contemporary Management Practices.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate the concepts of operations management, human resources management, project management and contemporary management practices in managerial context.

CO2. Identify and analyse management problems in the business organizations reaching substantiated conclusions using principles of management.

CO3. Design appropriate organization structure for meeting the needs of the organization with consideration of the employees of the organization.

CO4. Competently employ broad based analytical tools for decision making, system design, analysis and performance.

CO5. Provide solution to organizations for sustainable development.

CO6. Apply knowledge of engineering and management principles to manage the projects in multidisciplinary environments.

DETAILED SYLLABUS:

UNIT- I: INTRODUCTION TO MANAGEMENT AND ORGANIZATION (09 Periods)

Concepts of management and Administration, Nature and Importance of management, Evolution of management thought, Functions of management, Contributions of F.W. Taylor and Henry Fayol to the management, Systems approach to management, Managerial skills, Elements of corporate planning process, Environmental scanning, SWOT Analysis, Social responsibilities of management.

Basic concepts related to organization, Objectives and Principles, Types of organizations- Line Organization, Line and Staff Organization, Functional Organization, Matrix Organization, Network organization.

UNIT- II: OPERATIONS MANAGEMENT (12 Periods)

Plant location- Factors and Principles; Plant Layout- Principles and Types; Methods of production, Work study- Basic procedure involved in method study and work measurement; Statistical Quality Control- Factors affecting quality, Control charts for variables and attributes, Acceptance sampling; Materials management- objectives, Inventory- Types of inventory, Classical EOQ model, ABC analysis; Purchase procedure, Stores management, Marketing- Functions, Channels of distribution.

UNIT-III: HUMAN RESOURCE MANAGEMENT (HRM) (06 Periods)

Nature and scope of HRM, Functions of HRM, Role of HR Manager in an organization, Job evaluation, Merit rating, Maslow's hierarchy of human needs, McGregor's theory X and theory Y, Herzberg's two-factor theory of motivation.

UNIT-IV: PROJECT MANAGEMENT (PERT/CPM) AND ENTREPRENEURSHIP (09 Periods)

Network analysis - Critical path method (CPM), Program evaluation and review technique (PERT); Project cost analysis - Project crashing.

Introduction to Entrepreneurship, Entrepreneurial Traits, Entrepreneur vs. Manager, Role of Entrepreneurship in Economic Development, Women as an Entrepreneur.

UNIT-V: CONTEMPORARY MANAGEMENT PRACTICES (09 Periods)

Basic concepts of Material Requirements Planning, Enterprise resource planning (ERP), Just In Time (JIT) system, Total Quality Management (TQM), Value Chain Analysis, Business Process Outsourcing (BPO), Globalization, Management Challenges, Supply Chain Management (SCM), Role of Information Technology in managerial decision making, Six Sigma Concept, Maintenance Strategies- Preventive, Periodic and Breakdown Maintenance.

Total Periods: 45

TEXT BOOKS:

1. O.P. Khanna, *Industrial Engineering and Management*, Dhanpat Rai and Sons, 2010.
2. Martand T.Telsang, *Industrial Engineering and Production Management*, S. Chand, 2nd Edition, 2006.

REFERENCE BOOKS:

1. Koontz and Weihrich, *Essentials of Management*, TMH, 6th Edition, New Delhi, 2007.

2. N.D. Vohra, *Quantitative Techniques in Management*, TMH, 2nd Edition, New Delhi.

III B. Tech. – II Semester
(16BT61001) ARM PROCESSORS AND PIC MICROCONTROLLERS
(Common to EEE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Switching Theory and Logic Design.

COURSE DESCRIPTION: ARM Processors architecture, Programming, PIC microcontroller architecture, Interrupts and timers of PIC microcontroller, Interfacing.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge in ARM Processors architecture, PIC architecture, Pin out, Instruction set.

CO2. Analyze various design issues regarding usage of on chip resources and Low power modes.

CO3. Design embedded systems using ARM Processors and PIC microcontrollers to suit market requirements.

CO4. Solve engineering problems and arrive at solutions in designing embedded Systems.

CO5. Use on-chip resources to design embedded systems with an understanding of limitations.

CO6. Practice professional engineering to deliver efficient and cost effective microcontroller based products.

DETAILED SYLLABUS:

UNIT I: PIC MICROCONTROLLER ARCHITECTURE (10 Periods)

Microcontrollers vs general purpose microprocessor, Overview of PIC18 family, WREG register in PIC, PIC file register, Default access bank, PIC status register, Data formats and directives, Program counter and program ROM space, Arithmetic, Logic instructions, Branch, call and time delay instructions, I/O port programming, PIC18 pin description, Bit addressability of data RAM, bank switching, Macros and modules.

UNIT- II: TIMERS, SERIAL PORT AND INTERRUPTS (9 Periods)

Programming timers 0 and 1, Counter programming, Programming timers 2 and 3, Basics of serial communication, PIC18 connection to RS232, Serial port programming in assembly, PIC18 interrupts, Programming timer interrupts, Programming serial interrupts.

UNIT- III: PERIPHERALS AND INTERFACING (7 Periods)

7 segment LED and LCD interfacing, keyboard interfacing, interfacing ADC, DAC, Interfacing stepper motor, DC motor interfacing and PWM.

UNIT- IV: INTRODUCTION TO ARM PROCESSORS (9 Periods)

Introduction to ARM Cortex M3 processor, Background of ARM and ARM architecture, Cortex M3 Processor applications, Cortex M3 fundamentals, registers, Operation modes, Memory system, memory map, Memory system attributes, ARM Pipeline, Exception types.

UNIT -V: ARM PROGRAMMING (10 Periods)

Data transfer instructions, Pseudo Instructions, Data Processing Instructions, Call & unconditional Branch Instructions, Decisions & conditional Branch instructions, Several useful instructions in Cortex M3, ARM Assembly Language Programming, Thumb Instruction Set, ARM Mode & Thumb mode Programming, ARM Programming in C.

Total Periods: 45

TEXT BOOKS:

1. Muhammad Ali Mazidi, Rolin D. McKinlay, Danny causey, *PIC Microcontroller and Embedded Systems: Using C and PIC18*, Pearson Education, 2008.
2. Joseph Yiu, *The Definitive Guide to the ARM Cortex-M3 & M4*, Elsevier, 3rd Edition, 2013.

REFERENCE BOOKS:

1. Andrew Sloss, Dominic Symes, Chris Wright, *ARM System Developer's Guide: Designing and Optimizing System Software (The Morgan Kaufmann Series in Computer Architecture and Design*), 2004.

2. John.B. Peatman, *Design with PIC Microcontroller*, Pearson Education, 1988.

III B. Tech. –II Semester
(16BT61002) PROCESS CONTROL INSTRUMENTATION

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Control Systems, Sensors and Transducers.

COURSE DESCRIPTION: Mathematical modeling of processes; different types of controllers; characteristics of controllers; design of controllers; tuning of controllers; characteristics of control valves; multi loop controllers.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on process control terminology and understand about Single loop and multi loop control systems.
CO2. Analyze the dynamic behavior of a process by developing the mathematical model.
CO3. Design and tune the PID controllers.
CO4. Solve the problems by interpreting the data of a process control system.
CO5. Select and suggest to use appropriate final control elements for different process industries.
CO6. Apply the process control concepts to real time industrial and domestic applications.

DETAILED SYLLABUS:

UNIT - I: PROCESS CHARACTERISTICS (10 Periods)

Elements of process control, Process variables, Degree of freedom, Characteristics of electric system, liquid system, gas system and thermal system, Elements of process dynamics, Mathematical model of liquid process, gas process and thermal processes, Servo operation, Regulatory operation, Self regulation.

UNIT - II: CONTROL SCHEMES AND CONTROLLERS (10 Periods)

Discontinuous controller modes: Two position, Multi-position, Floating control modes; Continuous controller modes: Proportional, Integral, Derivative; Composite controller modes: PI, PD, PID; Electronic controllers: Design of discontinuous, continuous and composite controller modes; Displacement type Pneumatic controllers.

UNIT – III: CONTROLLER TUNING (8 Periods)

One-Quarter decay ratio criteria, Time integral performance criteria, Process loop tuning: open-loop transient response method, Ziegler-Nichol's method, Cohen- Coon method, Direct synthesis method, Frequency response method.

UNIT - IV: FINAL CONTROL ELEMENTS (9 Periods)

Pneumatic actuators: Spring actuator, Hydraulic actuators: Piston actuator, Electrical actuators: Solenoid, Electro-pneumatic actuators, Control valves: Types of control valves and its characteristics, Sliding-stem control valves, Rotating-shaft control valves, Selection of control valves, Pneumatic valve positioner.

UNIT - V: MULTI LOOP CONTROL SCHEMES (8 Periods)

Cascade control, Ratio control, Feed forward control, Over-ride, Split range, Case study on distillation column: principle, control schemes-constant top product, constant bottom product and reflex rate, constant reflex rate and steam rate.

Total Periods: 45

TEXT BOOKS:

1. Donald P.Eckman, *Automatic Process Control*, Wiley India Ltd., 2011.
2. Curtis D. Johnson, *Process Control Instrumentation Technology*, Pearson Education, Ltd, 8th Edition, 2014.
3. G. Stephanopoulis, *Chemical Process Control,* PrenticeHall, 1990.

REFERENCE BOOKS:

1. D. Patranabis, *Principles of Process Control*, TMH, 1996.
2. Peter Harriott, *Process Control*, TMH, 1972.

III B. Tech. – II Semester
(16BT60305) HYDRAULICS AND PNEUMATICS
(Common to ME and EIE)
(Interdisciplinary Elective – 2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Industrial Instrumentation - II.

COURSE DESCRIPTION: Basic fluid power system; Hydraulic components and its use; Hydraulic circuits and its application; Fundamentals of pneumatics; Pneumatic components and its use; Pneumatic circuits; application; Design of hydraulic and pneumatic systems for various applications; Electro Pneumatics; Logic gates.

COURSE OUTCOMES: On successful completion of this course, students will be able to

CO1. Demonstrate the basic mechanism of fluid power systems and automation.
CO2. Identify and analyze engineering problems in automated environment.
CO3. Design the pneumatic and hydraulic circuits for domestic and industrial problems.
CO4. Investigate the issues related to the design and manufacture of pneumatic and hydraulic systems.
CO5. Use modern tools available in automation to enhance the productivity.
CO6. Deploy the best way of implementing the automation to have eco-friendly environment and sustainable development.

DETAILED SYLLABUS:

UNIT - I: FUNDAMENTALS OF HYDRAULIC POWER SYSTEMS (8 Periods)

Fluid Power Fundamentals, Advantages and Application. Pascal's law, Viscous oils, properties. Components of hydraulic systems- Pumps, Gear pump, Vane pump, and Piston pump; Pumping theory, Actuators – Single acting, Double acting, Tandem, Rod less; Accumulators, Intensifiers.

UNIT - II: HYDRAULIC CONTROL COMPONENTS AND DESIGN OF CIRCUITS (9 Periods)

Directional control valves (DCVs), Pressure control valves, Flow control valves, Shuttle valve, Check valve, Sequence valve, Solenoid valve, and Relay, ISO/ANSI symbols, Simple hydraulic circuits, ladder diagram.

UNIT - III: FUNDAMENTALS OF PNEUMATICS (9 Periods)

Pneumatic system components, Compressors, Filters, Regulator, Lubricator unit (FRL UNIT), Driers, Valves, Pressure control valve, Flow control valve, Quick exhaust valve, direct control valves, Time delay valve, Memory valve, Shuttle valve, Twin pressure valve, Solenoid valves and Pneumatic cylinders, ISO/ANSI symbols.

UNIT - IV: DESIGN OF PNEUMATIC CIRCUITS (10 Periods)

Pneumatic circuits, Speed control circuits, Multi- Cylinder Application by Coordinated and sequential motion control, Motion and control diagrams, Cascading method- principle, and Practical application (up to two cylinders)

UNIT - V: ELECTRO PNEUMATICS AND LOGIC GATES (9 Periods)

Electro- Pneumatic: Principles - Signal input and output, Pilot assisted solenoid control of directional control valves, Use of relay and contactors.

Logic Gates: Introduction and use of Logic gates in pneumatic applications, Practical Examples.

Total Periods: 45

TEXT BOOKS:

1. Srinivasan.R, *Hydraulic and Pneumatic controls*, McGraw Hill Education, 2nd Edition, 2006.
2. Shanmuga Sundaram.K, *Hydraulic and Pneumatic Controls*, S. Chand & Co, 1st Edition, 2006.

REFERENCE BOOKS:

1. Majumdar S.R., *Oil Hydraulics Systems- Principles and Maintenance*, McGraw Hill Education, 1st Edition, 2000.
2. Majumdar S.R., *Pneumatic systems – Principles and Maintenance*, McGraw Hill Education, 2nd Edition, 2001.

III B. Tech. – II Semester
(16B50308) **MECHATRONICS**
(Interdisciplinary Elective – 2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Industrial Instrumentation – II.

COURSE DESCRIPTION: Mechatronics system; Sensors; Transducers; Actuating systems; DC Motors; Micro controller; Signal Conditioning; Programmable Logic Controllers; Programmable Motion Controllers; Design Approach; Case Studies.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate the knowledge on integrative nature of Mechatronics and different components of mechatronics systems.

CO2. Select the appropriate sensors and actuators required for a system by identifying and analyzing real life engineering problems thoroughly.

CO3. Design signal conditioning circuits for mechatronics systems and establish the controlling methods required for that system to meet the specified needs.

CO4. Select, and apply appropriate programmable motion con troller techniques and adaptive controllers to complex mechatronics systems with an understanding of the limitations.

CO5. Exhibit the knowledge on design approach, keeping in view of environmental contexts, to reflect the sustainable devel opment.

CO6. Perform under a standard of professional behavior that requires adherence to the highest principles of ethical conduct.

DETAILED SYLLABUS:

UNIT - I: MECHATRONICS SYSTEM (7 Periods)

Definition, Elements of mechatronics System, Mechatronics design process, System-Measurements system, Control systems; Examples of Automatic control systems, Advantages and Disadvantages.

UNIT - II: SENSORS AND ACTUATORS (11 Periods)

Sensors: Introduction, Types of transducers and sensors, Characteristic Parameters- static and dynamic; Displacement sensors- Potentiometer, Strain gauge, Linear Variable Differential Transformer; Position sensors- Hall effect sensor, Optical Encoder; Proximity- Inductive, Capacitive; Acceleration- Piezoelectric accelerometer; Temperature- Bimetallic strips, Resistance Temperature Detectors (RTD); Light sensors- photo diodes, photo electric transducer; Selection of Sensors.

Actuators: Hydraulic systems, Pneumatic systems, Control valves, Linear and Rotary actuators, Electrical Actuation systems - Switches, Solenoids, Relays, DC motors, AC motors, Stepper motors.

UNIT - III: SIGNAL CONDITIONING (10 Periods)

Signal conditioning: Elements of signal conditioning, Types- Analog,Amplification,Operation Amplifiers; Noise Filters, Bridge circuits, Current-voltage converters, Voltage-frequency converters; Digital signals - Nyquist Sampling theorem, Analog to digital converter, Digital to analog Converter, Data Acquisition System.

UNIT - IV: PROCESS CONTROLLERS (10 Periods)

Programmable Motion Controllers: Controller principles, Two position controller, Proportional (P) controllers, Integral (I) controllers, Derivative (D) controllers; Composite controller Modes – Proportional Integral (PI), Proportional Derivative (PD), Three mode controller (PID); Selection of controllers, Controller tuning, Adaptive controllers.

UNIT - V: DESIGN OF MECHATRONICS SYSTEMS (7 Periods)

Mechatronics approach to design, Case Studies, Future trends, Ethics as design constraint.

Total Periods: 45

TEXT BOOKS:

1. K.P.Ramachandran, *Mechatronics Integrated Mechanical Electronic Systems*, Wiley, 2012.
2. W. Bolton, *Mechatronics Electronics Control Systems in Mechanical and Electrical Engineering,* Pearson, 4th Edition, 2005.

REFERENCE BOOKS:

1. N.P. Mahalik, *Mechatronics Principles Concepts and Applications*, McGraw Hill Education (India) Private Limited, 2012.

2. Devdas Shetty, Richard, *Mechatronic System Design*, Cengage learning, 2nd Edition, 2012.

III B. Tech. –II Semester
(16BT60341) THERMODYNAMICS AND FLUID MECHANICS
(Interdisciplinary Elective – 2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A Course on Engineering Physics.

COURSE DESCRIPTION: Thermodynamic system; Energy interactions; Work transfer and Heat Transfer in flow and non- flow systems; Laws of thermodynamics; Entropy; Air cycles; Refrigeration; Properties of Fluids; Pressure Measurements; Types of flow; One-dimensional steady flow energy & momentum Equations; Flow measurements; Hydraulic turbines and its performance; Pumps.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate the knowledge on the concepts of thermodynamic, Heat transfer, refrigeration and fluid flow systems.

CO2. Identify, formulate and analyze various processes in thermodynamic, Heat transfer, refrigeration and fluid flow systems.

CO3. Design the thermodynamic and fluid flow systems to achieve the required physical process parameters.

CO4. Conduct investigations and address the complex problems on thermodynamics and fluid flow systems.

CO5. Use dimensional analysis tool to develop empirical formulae for the fluid flow and heat transfer systems.

CO6. Use standard engineering norms and practices in developing thermodynamic and fluid systems for societal requirements.

DETAILED SYLLABUS:

UNIT-I: LAWS OF THERMODYNAMICS AIR CYCLES AND COMPRESSOR (11 Periods)

Laws of Thermodynamics: Basic concept, Thermodynamic systems and processes, Zeroth law of Thermodynamics: Concept of temperature, First law of Thermodynamics: Concept of internal energy and enthalpy, applications to open and closed systems, Second law of Thermodynamics.

Air Cycles: Thermodynamic Air Cycles: Otto and Diesel cycles , Comparison of cycles,

Compressors: Classification, Working principles of Reciprocating and Rotary compressors, Single stage and Multistage compressors.

UNIT-II: THERMODYNAMICS, REFRIGERATION AND HEAT TRANSFER (10 Periods)

Thermodynamic vapour power cycles and steam boilers: Properties of steam, Rankine cycle, Steam boilers, Functions of Boiler Mountings and Accessories, Types of Calorimeters.

Refrigeration and Heat Transfer: Basic concepts of refrigeration, Methods of producing refrigerating effects-Vapour Compression and Vapour Absorption refrigeration systems; Basic concepts of Heat Transfer, One dimensional heat conduction- Plain wall and composite walls.

UNIT-III: FLUID PROPERTIES, FLUIDS KINEMATICS AND DYNAMICS (9 Periods)

Basic Concepts of Fluid Mechanics, Types of fluids, Properties, Laws of pressure, Atmospheric Pressure, Gauge Pressure, Pressure Measurement- Piezometer, Manometers and Mechanical Gauges; Analysis of Flow of Fluids, Stream line, path line and streak lines, classification of various fluid flows, Equation of Continuity for one dimensional flow, Euler’s and Bernoulli’s equations for flow along a stream line.

UNIT-IV: DIMENSIONAL ANALYSIS (8 Periods)

Introduction, Dimensions, Dimensional Homogeneity, Methods of Dimensional analysis, Model analysis, Similitude, Dimensionless Numbers and their significance, Model or Similarity laws.

UNIT-V: HYDRAULIC MACHINES (7 Periods)

Turbines: Basic concepts, Classifications, Working Principles of turbines-Pelton wheel, Francis, Efficiencies.

Pumps: Basic concepts, Classifications, Working principles of Centrifugal and Reciprocating pumps.

Total Periods: 45

TEXT BOOKS:

1. P. K. Nag, *Engineering Thermodynamics*, TMH, 5th Edition, 2013.
2. R.K.Rajput, *Fluid Mechanics and Hydraulic Machines*, S.Chand and company Ltd., 2nd Edition, 2002.

REFERENCE BOOKS:

1. R.K.Rajput, *Thermal Engineering*, Laxmi Publications (P) Ltd, 10th Edition, 2017.

2. R.K.Bansal, *Fluid Mechanics and Hydraulic Machines*, Laxmi Publications (P) Ltd, 10th Edition, 2017.
Note: Steam Tables with mollier diagram should be supplied during examination.

III B. Tech. – II Semester

(16BT61003) INSTRUMENTATION SYSTEM DESIGN

(Interdisciplinary Elective – 2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Industrial Instrumentation - II.
COURSE DESCRIPTION: Field instruments; Switches, Pushbuttons, Keyboards; Control valves: application and selection; Pumps and control elements; Reliability.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge on

- Field Instruments
- Switches and Pushbuttons
- Control valves
- Pumps and control elements
- Flow regulators

CO2. Analyze the functionality of field instruments, control elements & regulators.
CO3. Design field Instruments such as Orifice, Rotameter, Bourdon tube, PID controllers and measuring circuits for RTD, Thermocouple, D/P transmitters.
CO4. Provide solution to problems & design requirements related to instrumentation systems.
CO5. Select appropriate field instrument to furnish an Instrumentation system.
CO6. Provide optimal instrumentation solution for societal and indus trial use.

DETAILED SYLLABUS:
UNIT-I: DESIGN OF FIELD INSTRUMENTS (9 Periods)
Orifice meter – Flow through the orifice plate, Location of pressure taps, Orifice bore calculations. Rotameters – Sizing, Characteristics, types. Pressure Gauges – Cases, Dials and Pointers, Diaphragm Vacuum Gauges, Special features. Differential Pressure Instruments: Measurement Error, Pressure differential detector – Dry Force balance, Design variations, Dry Motion balance Torque tube sensors, Low differential Transmitters. Capacitance Level Sensors, Bare capacitance probe, Probe sizing, Selection of probe configurations.
UNIT -II: SWITCHES, PUSHBUTTONS, KEYBOARDS (10 Periods)
Principles of Operation, switching action, Contact arrangements, Switching element and circuits, Types and Grades – Pushbuttons, panel pushbuttons, Industrial Pushbuttons, Keyboard pushbuttons, Hall-Effect Pushbuttons, Membrane Pushbuttons, Toggle switches, Rotary switches, Thumbwheel Switches, Application and Selection Considerations – Human factors, Display movement, Error Prevention, Electrical Rating and Performance, Mechanical Features, Environmental Considerations.
Annunciators and Alarms: History and Development, Principles of Operation, Operating Sequences, Audiovisual Annunciators- Integral Annunciator, Remote Annunciator, Semi graphical Annunciator. Annunciator cabinets.
UNIT-III: CONTROL VALVES: APPLICATION AND SELECTION (9 Periods)
Introduction, Collecting Process data, Control valve performance- characteristics and gain, Valve rangebility, Control Valve Sizing, Valve Actuator Selection, Positioners, Process Application considerations – High-pressure services, Vacuum Service, High Temperature service, Low temperature service, Corrosion, Small flow valves, Control valve specification form.
UNIT-IV: PUMPS AND CONTROL ELEMENTS (9 Periods)
Pumps: Introduction, Centrifugal Pumps, Positive Displacement Pumps, Air pimps and Air lifts, Design of Pumping systems: Head requirement, NPSH calculation, Installation considerations; Metering pumps: Plunger pumps, Diaphragm pumps, Pneumatic metering pumps, NPSH and Pulsation Dampening; Opposed Centrifugal Pumps.
Flow Regulators: Purge flow regulator, variable orifice flow regulators, water flow regulators for HVAC balancing, Oil flow regulators, Industrial flow regulators and thermal mass flowmeters.
UNIT -V: RELIABILITY (8 Periods)
Reliability of Measurement systems: Fundamental Principles of reliability, Practical Reliability definitions, Instantaneous failure rate and its relation to reliability, Failure rate function, Reliability of systems, Failure rate data and models, Design and maintenance for reliability; Choice of measurement systems, Total life time operating cost. **Total Periods: 45**

TEXT BOOKS:
1. Bela G.Liptak, *Instrumentation Engineers' Handbook: Process Control*, Butterworth-Heinemann Ltd., 3rd Edition, 1995.
2. John P.Bentley, *Principles of Measurement Systems*, Pearson Education Ltd., 4th Edition, 2005.

REFERENCE BOOKS:

1. D.M.Considine, *Process/Industrial Instruments and Controls Handbook*, McGraw-Hill, Inc., 4th Edition, 1993.
2. N.A.Anderson, *Instrumentation for Process Measurement and Control*, CRC Press, 3rd Edition, 2005.

III B. Tech. – II Semester
(16BT70309) INDUSTRIAL ROBOTICS
(Program Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A Course on Matrices and Numerical Methods.
COURSE DESCRIPTION: Introduction of Robots classifications; Components; Robot drive mechanisms; Mechanical transmission methods aided in functioning of robots; Forward kinematics; inverse kinematics; Manipulator dynamics; Trajectory planning and avoidance of obstacles; Robot programming; Robot Application in Industry; Future Application and Challenges and Case Studies.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate the knowledge on concepts of robot, Kinematics and dynamics, Trajectory planning and programming of robot.
CO2. Identify, analyze and interpret various methods and review the contemporary problems of robotics.
CO3. Optimize various robotic configuration parameters to analyze the reverse and forward kinematics.
CO4. Investigate the performance parameters on the complex robotic designs.
CO5. Apply appropriate functional techniques, resources, and programming tools to robotic engineering activities.
CO6. Consider safety issues in designing robots for societal applications.
DETAILED SYLLABUS:
UNIT - I: INTRODUCTION (9 Periods)
Robot, Brief History, Classifications, Joint notation schemes, Work volume, Degrees of freedom, Components, End effectors - Classification of End effectors, Tools as end effectors; Drive system for grippers - Mechanical, Adhesive, Vacuum, Magnetic; Hooks & scoops, Gripper force analysis and gripper design, Active and Passive grippers.
UNIT - II: ROBOT DRIVES AND POWER TRANSMISSION SYSTEMS (8 Periods)
Robot Drive Mechanisms - Hydraulic, Electric-Servomotor, Stepper Motor; Pneumatic drives, Mechanical transmission method - Gear transmission, Belt drives; Cables, Roller chains, Link Rod systems, Rotary-to-Rotary motion conversion, Rotary-to-Linear motion conversion, Rack and Pinion drives, Lead screws, Ball Bearing screws.
UNIT - III: MANIPULATOR KINEMATICS AND DYNAMICS (10 Periods)
Manipulator kinematics: Mathematical Preliminaries on Vectors & Matrices, Homogeneous transformations as applicable to rotation and translation, (D-H) notation, Forward kinematics, Inverse kinematics, Manipulators with two, Three degrees of freedom.
Manipulator dynamics: Introduction, Inertia of a Link, Lagrangian formulation for a planar 2R manipulator.
UNIT - IV: TRAJECTORY PLANNING AND SENSORS (10 Periods)
Trajectory planning: Trajectory planning and avoidance of obstacles, Path planning, Skew motion, Joint integrated motion, straight line motion.
Sensors: Position sensors, Velocity sensors, Tactile sensors, Proximity sensors, Machine vision sensors, Fail safe hazard sensor systems and Compliance mechanism
UNIT - V: ROBOT PROGRAMMING AND APPLICATIONS (8 Periods)
Robot programming: Types, Features of languages and Software packages.
Robot application: Robot Application in Industry, Task programming, Goals of AI Research, AI Techniques, Robot Intelligence and Task Planning, Modern Robots, Future Application and Challenges, and Case Studies.

Total Periods: 45

TEXT BOOKS:
1. M.P.Groover, *Industrial Robotics: Technology, Programming, and Applications*, Tata McGraw-Hill, 2008.
2. John. J. Craig, *Introduction to Robotics: Mechanics and Control*, Pearson/Prentice Hall, 3rd Edition, 2005.

REFERENCE BOOKS:
1. Richard. D.Klafter, *Robotics Engineering: an integrated approach*, Prentice-Hall publisher, 1st Edition, 1988.
2. K. S. Fu., R. C. Gonzalez, C. S. G. Lee, *Robotics: Control Sensing, Vision and Intelligence,* International Edition, Tata McGraw Hill, 2008.

3. Ashitav Ghosal, Robotics*, Fundamental Concepts and Analysis*, Oxford Press, 2006.
4. Mittal R.K & Nagrath IJ, *Robotics and Control*, Tata McGraw Hill, 6th Edition, 2007.

III B. Tech. – II Semester
(16BT70404) ADVANCED DIGITAL SIGNAL PROCESSING
(Program Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A Course on Digital Signal Processing
COURSE DESCRIPTION: Digital filter banks; Parametric and Non-Parametric Power Spectrum Estimation methods; Computationally efficient algorithms; Applications of DSP.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Apply knowledge in
- Filter banks and Wavelets
- Linear Prediction
- Efficient power Spectral Estimation Techniques.
- Applications of Multirate signal processing

CO2. Analyze complex engineering problems in the Power Spectrum Estimation, Sampling rate conversion and Linear Prediction.
CO3. Design optimum filters, multirate DSP systems and computationally efficient DSP algorithms.
CO4. Solve Engineering problems pertaining to Digital Signal Processing.
CO5. Apply DSP Algorithms, and algorithms related to Forward and Backward Predictionin digital system design with an understanding of the limitations.
CO6. Apply computationally efficient DSP Algorithms, Optimum Filters and perfect reconstruction filters to address societal issues in multirate signal processing and communications.

DETAILED SYLLABUS:
UNIT-I: MULTIRATE FILTER BANKS (10 Periods)
Decimation, Interpolation, Sampling rate conversion by a rational factor I/D, Multistage Implementation of sampling rate conversion.
Digital Filter Banks: Two-Channel Quadrature-Mirror Filter Bank, Elimination of aliasing, condition for Perfect Reconstruction, Polyphase form of QMF bank, Linear phase FIR QMF bank, IIR QMF bank, Perfect Reconstruction Two-Channel FIR QMF Bank.
UNIT-II: POWER SPECTRAL ESTIMATIONS (9 Periods)
Estimation of spectra from finite duration observation of signals.
Non-Parametric Methods: Bartlett, Welch, Blackman & Tukey methods. Performance Characteristics of Non parametric Power Spectrum Estimators, Computational Requirements of Non parametric Power Spectrum Estimates.
Parametric Methods of Power Spectral Estimation:
Autocorrelation & Its Properties, Relationship between autocorrelation & model parameters, Yule-walker & Burg Methods, MA & ARMA models for power spectrum estimation.
UNIT-III: LINEAR PREDICTION (9 Periods)
Forward and Backward Linear Prediction – Forward Linear Prediction, Backward Linear Prediction, Optimum reflection coefficients for the Lattice Forward and Backward Predictors. Solution of the Normal Equations: Levinson Durbin Algorithm, Schur Algorithm. Properties of Linear Prediction Filters.
UNIT-IV: DSP ALGORITHMS (8 Periods)
Fast DFT algorithms based on Index mapping, Sliding Discrete Fourier Transform, DFT Computation Over a narrow Frequency Band, Split Radix FFT, Linear filtering approach to Computation of DFT using Chirp Z-Transform.
UNIT-V: APPLICATIONS OF DIGITAL SIGNAL PROCESSING (9 Periods)
Digital cellular mobile telephony, Adaptive telephone echo cancellation, High quality A/D conversion for digital Audio, Efficient D/A conversion in compact hi-fi systems, Acquisition of high quality data, Multirate narrow band digital filtering, High resolution narrowband spectral analysis. **Total periods: 45**

TEXT BOOKS:
1. John G. Proakis, Dimitris G. Manolakis, *Digital Signal Processing, Principles, Algorithms and Applications,* Prentice Hall, 4th Edition, 2007.
2. Sanjit K Mitra, *Digital signal processing, A computer base approach,* McGraw-Hill Higher Education, 4th Edition, 2011.

REFERENCE BOOKS:
1. Emmanuel C Ifeachor Barrie. W. Jervis, *DSP-A Practical Approach*, Pearson Education, 2nd Edition, 2002.

2. A.V. Oppenheim and R.W. Schaffer, *Discrete Time Signal Processing,* PHI, 2nd Edition, 2006.

III B. Tech. – II Semester
(16BT61004) **ELECTROMAGNETIC THEORY**
(Program Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Multi-Variable Calculus and Differential Equations, Engineering Physics.

COURSE DESCRIPTION: Vector - calculus; Static Electric and Magnetic fields; time varying electromagnetic Fields; Maxwell's equations; Wave equations and wave propagation characteristics; electromagnetic interference and compatibility.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on
- Coulomb's Law, Gauss's Law, Biot-Savart's Law and Ampere's Law
- Static electric and magnetic fields
- EM Wave equations and propagation characteristics.
- Polarization of wave, Reflection and Refraction of Plane Waves
- Electromagnetic Interference and Compatability in the field of Electromagnetics

CO2. Analyze the electric and magnetic fields in different distributions.

CO3. Design and develop solutions for different boundary condition problems in electromagnetics.

CO4. Solve engineering problems pertaining to Electrostatics, magnetostatics, electromagnetic wave theory, interference and compatability to provide valid conclusions.

CO5. Apply appropriate techniques, resources to complex engineering activities for modeling electrostatic discharge, grounding, and earthing and electromagnetic compatability based systemswith understanding of limitations.

CO6. Apply course knowledge to assess societal issues and understand the consequent responsibilities relevant to the EMI and EMC standards.

Review of Coordinate Systems and Vector Calculus (2 Periods)

DETAILED SYLLABUS:

UNIT - I: ELECTROSTATICS (9 Periods)

Coulomb's Law and Electric Field Intensity, Electric Fields due to continuous Charge Distributions, Electric Flux Density, Gauss Law - Maxwell's equation, Applications of Gauss's Law, Electric Potential, Relationship between E and V, Energy Density in Electrostatics, Convection and Conduction Currents, Conductors, Continuity equation and relaxation time, Poisson's and Laplace's Equations, Capacitance: Parallel Plate, Coaxial, Spherical Capacitors, illustrative Problems.

UNIT - II: MAGNETOSTATICS (9 Periods)

Biot - Savart's Law, Ampere's Circuital Law -Maxwell's equation and Applications of Ampere's Law, Magnetic Flux Density - Maxwell's equation, Maxwell's equation in static EM fields, Magnetic Scalar and Vector Potentials, Force due to Magnetic fields: force on a charged particle, force on a current element and force between two current elements, Inductors and Inductances, Magnetic Energy, illustrative Problems.

UNIT - III: MAXWELL'S EQUATIONS (7 Periods)

Faraday's Law, Transformer and Motional EMF, Inconsistency of Ampere's Law and Displacement Current, Maxwell's Equations in Different Final Forms and Word Statements. Boundary conditions in Electrostatics: Dielectric Dielectric, Dielectric - Conductor and Conductor - Free space medium, Magnetic boundary conditions, illustrative Problems.

UNIT - IV: ELECTROMAGNETIC WAVES (9 Periods)

Solution for free space conditions, Uniform Plane Waves: Definition, Relation between E & H in a uniform plane wave, wave equation for a conducting medium, wave propagation in conductors and dielectrics, Polarization of wave, Reflection and Refraction of Plane Waves - Normal and Oblique Incidences for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Poynting vector and Poynting Theorem, illustrative Problems.

UNIT - V: INTRODUCTION TO EMI AND EMC (9 Periods)

Concepts of EMI and EMC and Definitions, Practical experiences and concerns, Classification, Natural and man - made EMI sources, EMC Standards, Switching transients, Electrostatic Discharge. Grounding - Principles and practice of Earthing, precautions in Earthing, cable shielding, Electrical bonding.

TEXT BOOKS: Total Periods: 45

1 Matthew N.O. Sadiku, *Elements of Electromagnetics*, Oxford Univ. Press, 6th Edition, 2014.

2. Kodali Prasad V, *Engineering Electromagnetic Compatibility*, Wiley India Pvt Ltd, 2nd Edition, 2010.

3. E.C. Jordan and K.G. Balmain, *Electromagnetic Waves and Radiating Systems*, PHI, 2nd Edition, 2012.

REFERENCE BOOKS:

1. William H Hayt Jr, John A. Buck, *Engineering Electromagnetics*, Tata Mc Graw Hill, 7th Edition, 2006.

2. Clayton R. Paul, *Introduction to Electromagnetic Compatibility*, JohnWiley & Sons, 2nd Edition, 2006.

III B. Tech. –II Semester

(16BT61005) OPTO-ELECTRONICS AND LASER INSTRUMENTATION

(Program Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Industrial Instrumentation-II.

COURSE DESCRIPTION: Optical fiber; components of optical fiber; fiber optic Sensors; Industrial and medical applications of laser.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge about
- Types of optical fiber, components of optical fiber.
- Measurement of temperature, pressure, strain using fiber optic sensors.
- Operation of laser, Industrial and biomedical applications of laser.
- Holography and optoelectronic modulators.

CO2. Analyze the optical parameters of various types of fibers and their characteristics.
CO3. Design fiber optic sensors for measurement of pressure, temperature, level and velocity.
CO4. Apply different Lasers and optical fibers for real time medical and weather forecasting.
CO5. Use advanced lasers in the field of material processing and biomedical.
CO6. Provides engineering solutions by using lasers and optical fibers to the society.

DETAILED SYLLABUS:

UNIT - I: FIBER OPTICS (9 Periods)

Introduction to optical fibers, Laws of reflection, critical angle, Light guidance, Numerical aperture, Dispersion, Losses, Different types of fibers, Modes of operation and their transmission characteristics.

Components of Optical Fiber: Light Sources for fiber optics, Photo detectors, source coupling, Fiber termination, Splicing and connectors.

UNIT - II: FIBER OPTIC INSTRUMENTATION (9 Periods)

Fiber optic sensors, Fiber optic instrumentation system, Interferometer method of measurement of length, Measurement of pressure, Temperature, Current, Voltage, Liquid level and strain, velocity, acceleration, atmospheric effects and pollutants , fiber optic Gyroscope, fiber grating sensors, acoustic sensors, Polarization maintaining fibers, Applications.

UNIT - III: FUNDAMENTALS OF LASER (9 Periods)

Fundamental characteristics of lasers, Three level and four level lasers, Properties of laser, Laser modes, Resonator configuration, Q-switching and mode locking, Types of lasers: Gas lasers, solid lasers, liquid lasers, semiconductor lasers.

UNIT - IV: INDUSTRIAL AND MEDICAL APPLICATIONS OF LASER (9 periods)

Industrial Applications: Industrial applications of lasers, Laser heating Material processing, laser welding, melting and trimming of material, scribing, trimming material removal and vaporization, calculation of power requirement of laser for material processing, Laser Doppler velocitymeter.

Medical applications: LASERS in medicine, Interaction with tissues, Interaction with bio molecules, laser endoscope, laser instruments for surgery, removal of tumors of vocal chords, Plastic surgery, Oncology.

UNIT - V: HOLOGRAPHY AND OPTOELECTRONIC MODULATORS (9 periods)

Holography: Principle, Methods, Holographic Interferometers, Different types of holographic techniques, Acoustical holography, Character recognitionbyholography, 3-D Cinematography with holographi cscreen.

Opto electronic Modulators: Electro-optic, Magneto-optic and Acousto- optic Modulators.

Total Periods: 45

TEXT BOOKS:

1. Das P., *Lasers and Optical Engineering*, Springers –Verlag New York Inc., Students Edition, 1991.
2. Ghatak A.K. and Thyagarajan K., O*ptical Electronics*, Foundation Books, 1991.

REFERENCE BOOKS:

1. Arumugam. M**,** *OpticalFibreCommunicationandSensors***,** Anuradha agencies, 2008**.**
2. Thyagarajan K. and Ghatak A.K., *Lasers: Theory and Applications*, Plenum Press, 1981.

3. Gerd Keiser, *Optical Fiber Communication*, TMH, 3rd Edition, 2000.

III B. Tech. II Semester
(16BT60207) **ADVANCED CONTROL SYSTEMS**
(Common to EEE and EIE)
(Program Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Control systems.
COURSE DESCRIPTION: Design of compensators and controllers, state space, canonical forms, controllability and observability, describing function, phase plane analysis, Lyapunov's stability analysis, Full order observer and reduced order observer.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge on
- State space analysis.
- Various compensators and controllers.
- Stability in the sense of Lyapunov.
- Full and reduced order observers in state space analysis.

CO2. Analyze the stability of nonlinear system using
- Describing function approach.
- Phase plane analysis.
- Lyapunov's method.

CO3. Design suitable compensator and controllers using root locus and bode plot.
CO4. Evaluate stability of systems using pole placement and Lyopunov method to provide valid solutions.
CO5. Select appropriate techniques for analyzing the stability of the system.
CO6. Apply the conceptual knowledge of advanced control systems in relevance to industry and society.

DETAILED SYLLABUS:
UNIT–I: LINEAR CONTROL SYSTEM DESIGN (10 Periods)
Introduction to control system design, types of compensators, design of compensators using root locus technique. Types of controllers, design of PI, PD and PID controllers using bode plot and root locus technique.
UNIT–II: STATE SPACE ANALYSIS (8 Periods)
Review of state space analysis. Canonical Forms – Controllable canonical form, observable canonical form, Jordan canonical form. Tests for controllability and observability for continuous time systems – Time varying case, time invariant case, principle of duality, controllability and observability form, Jordan canonical form.
UNIT-III: ANALYSIS OF NONLINEAR SYSTEMS (13 Periods)
Introduction to non-linear systems, different types of physical nonlinearities, describing functions, derivation of describing functions for dead zone, saturation, backlash, relay and hysteresis. Stability analysis of nonlinear systems through describing functions, phase-plane analysis, singular points, methods for constructing trajectories - Isoclines' method, delta method.
UNIT-IV: STABILITY ANALYSIS (6 Periods)
Stability in the sense of Lyapunov. Lyapunov's stability and Lypanov's instability theorems. Direct method of Lypanov for the linear and nonlinear continuous time autonomous systems. Generation of Lyapunov functions - Variable gradient method, Krasooviski's method and Popov's criterion.
UNIT–V: DESIGN OF CONTROL SYSTEMS IN STATE SPACE (8 Periods)
Necessity of pole placement, design by pole placement, necessary and sufficient conditions for arbitrary pole placement. Determination of feedback gain matrix using direct substitution method and Ackermann's formula. Full order observer and reduced order observer. **Total Periods: 45**

TEXT BOOKS:
1. M. Gopal, *Modern Control System Theory*, New Age International (P) Ltd., 2nd Edition, 2000.
2. K. Ogata, *Modern Control Engineering*, Prentice Hall of India, 4th Edition, 2006.

REFERENCE BOOKS:

1. A. Nagoorkani, *Advanced control theory*, RBA publications, 2nd Edition, 1999.
2. I.J. Nagrath and M.Gopal, *Control Systems Engineering*, New Age International (P) Ltd., 2007.

III B. Tech. II Semester
(16BT50403) **VLSI DESIGN**
(Program Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Switching Theory and Logic Design, Linear and Digital ICs.

COURSE DESCRIPTION: CMOS Technology; Stick Diagrams and Layouts; Subsystem design; Programmable Interconnect structures; Synthesis and Test Principles.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge in
- Understanding the Fabrication Process of MOS Transistors
- Electrical properties of CMOS Circuits
- Designing Static Combinational and Sequential logic at transistor level, including Mask layout.
- Estimating and optimizing combinational RC Circuit delay using RC delay models and logical effort.
- Design methodology and tools.
- Test Principles.

CO2. Analyze characteristics and performance of CMOS circuits.

CO3. Design solutions for subsystems to compensate tradeoff between area, speed and power requirements.

CO4. Synthesize and extract information from designs and layouts for optimum solutions.

CO5. Select and apply appropriate designs to overcome the limitations of CMOS devices for high speed applications.

CO6. Assess test strategies for design and development of Integrated Circuits for societal needs.

DETAILED SYLLABUS:

UNIT-I: FABRICATION AND ELECTRICAL PROPERTIES OF MOS (10 Periods)

Basic Electrical Properties of MOS: Ids – Vds relationships, Threshold Voltage VT, gm, gds and ù0; Pass Transistor, NMOS inverter, Pull up to pull down ratio for an NMOS inverter, CMOS Inverter, Fabrication Process for NMOS and CMOS technology.

UNIT-II: CMOS CIRCUIT DESIGN PROCESS (10 Periods)

VLSI design flow, MOS layers, stick diagrams, NMOS design style, CMOS design style, lambda based design rules, layouts for inverters, sheet resistance, capacitances of layers, Gate delays, Delay estimation, Limitations of Scaling.

UNIT-III: SUBSYSTEM DESIGN - I (8 Periods)

Adders – Transmission based Adder, Carry look-ahead adder, Manchester carry chain adder, Carry Skip Adder, Carry Select Adder; Barrel Shifter, Multipliers – Array Multiplier, Booth Multiplier; ALUs.

UNIT-IV: SUBSYSTEM DESIGN - II (9 Periods)

Counters- Synchronous and Asynchronous Counter; High Density Memory Elements - Design Approach, FPGAs, Programmable Interconnect structures - Fusible links, Antifuse via link, UV Erasable, Electrically Erasable; CPLDs, Cell based Design Methodology.

UNIT-V: LOW POWER DESIGN AND TESTING (8 Periods)

Need for Low Power VLSI Chips, Basic Principles Of Low Power Design, Low Power Techniques for SRAM, CMOS Testing, Need for testing, Test Principles, Design Strategies for test. **Total Periods: 45**

TEXT BOOKS:

1. Kamran Eshraghian, Douglas A. Pucknell and Sholeh Eshraghian, *Essentials of VLSI Circuits and Systems*, PHI, 2005.
2. Weste and Eshraghian, *Principles of CMOS VLSI Design*, Pearson Education, 1999.

REFERENCE BOOKS:

1. Gary Yeap, *Practical Low-Power Digital VLSI Design*, Springer Publication, 1998.
2. John M. Rabaey, *Digital Integrated Circuits: A Design Perspective*, PHI, 2nd Edition, 1997.
3. Stephen Brown, Zvonko Vranesic, *Fundamentals of Digital Logic with VHDL Design*, TMH, 2007.

III B. Tech. II Semester

(16BT61006) **AIRCRAFT INSTRUMENTATION**

(Program Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE: A Course on Industrial Instrumentation-II.

COURSE DESCRIPTION: Aircraft Instruments; Air Data Instruments; Gyroscopic Instruments; Engine Instruments and Electronic Flight Instrumentation System.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge about

- Aircraft instruments
- Air data instruments
- Gyroscopes
- Engine instruments
- Electronic Flight Instrumentation system

CO2. Analyze the parameters measured in aircraft system.

CO3. Design measurement systems pertaining to various parameters measurement in aircraft.

CO4. Solve Engineering problems pertaining to various parameters measurement in aircraft.

CO5. Select appropriate technique for measurement of parameters in the aircraft.

DETAILED SYLLABUS:

UNIT-I: BASICS OF AIRCRAFT **(9 Periods)**

Introduction, Control Surfaces, Forces, Moments and Angle of Attack, Modern Aircraft System, Aircraft Instruments and their Layout, Aircraft Display Types:Quantitative Displays, Display Colour and Markings,Instrument Grouping, Glass Cockpits of Modern Aircraft: Attitude Director Indicator, Electronic Attitude Director Indicator, Horizontal Situation Indicator.

UNIT-II: AIR DATA INSTRUMENTS **(9 Periods)**

Introduction to Air Data Instruments, Types of Air Data Instruments:Air Data Computer, International Standard Atmosphere: Introduction to ISA, Atmospheric Variations with Altitude, Earth's Atmosphere, Air Data Instruments: Combined Pitot and Static Probe, Separate Static Ports, Location of Combined Probe and Static Ports, Pneumatic-Type Air Data Instruments: Pneumatic Air Speed Indicator, Temperature Compensation.

UNIT-III: GYROSCOPIC AND ADVANCED FLIGHT INSTRUMENTS **(9 Periods)**

Types of Gyro: Conventional Mechanical Gyroscopes, Vibrating Gyros, Ring Laser Gyroscope, Fibre Optic Gyros, Basic Mechanical Gyros and its Properties, Directional Gyro, Gyro Horizon.

UNIT-IV: ENGINE INSTRUMENTS **(9 Periods)**

Introduction, Engine Speed Measurement: Electrical Tacho Generator / Indicator, Servo- Type RPM Indicators, Non-Contact type Tacho Probe, Optical Tachometer, Hall Effect Sensor, Torque Measurement: Hydro Mechanical Transducer, Electronic Torque Meter, Pressure Measurement.

UNIT –V: ELECTRONIC FLIGHT INSTRUMENTATION SYSTEM **(9 Periods)**

Engine Fuel Quantity Indicator, Fuel Flow Rate Indicator: Rotating–Vane Flow Meter, Flight Director System, Altitude Director Indicator, Horizontal Situation Indicator, Black Box.

Total Periods: 45

TEXT BOOK:

1. S.Nagabhushana, L.K.Sudha, *Aircraft Instrumentation and Systems*, I K International Publishing House Pvt. Ltd, 2010.

REFERENCE BOOK:

1. Pallett, E.H.J, *Aircraft Instruments and Integrated Systems*, Pearson higher Education, 1992.

III B. Tech. II Semester
(16BT61007) TELEMETRY AND TELECONTROL
(Program Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A Course on Principles of Communications.

COURSE DESCRIPTION: Different Telemetry Principles; Frequency and Time-division Multiplexed Systems; Satellite Telemetry; Optical Telemetry and Telecontrol Methods.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on different Telemetry Principles, Satellite Telemetry and Optical Telemetry.

CO2. Critically analyze the Telecontrol requirements to meet the specifications.

CO3. Design transmitter and receiver circuits for data transmission.

CO4. Analyze and solve errors during transmission.

CO5. Apply appropriate telemetry principles for data transmission in real time.

DETAILED SYLLABUS:

UNIT – I: TELEMETRY FUNDAMENTALS AND CLASSIFICATION (9 Periods)

Fundamental concepts, Significance, Principle, functional blocks of Telemetry and Telecontrol system; Methods of telemetry: Electrical, Pneumatic, Hydraulic and Optical Telemetry; State of the art; Telemetry standards.

UNIT – II: LANDLINE TELEMETRY (9 Periods)

Electrical Telemetry: Current Systems, Voltage Systems; Synchro Systems; Frequency systems, Position and Pulse systems; Example of a landline telemetry system.

UNIT – III: BIO TELEMETRY (9 Periods)

Introduction to Biotelemetry: Physiological parameters adaptable to Biotelemetry, Components of Biotelemetry Systems, Implantable Units, Applications of Telemetry in Patient Care.

UNIT – IV: OPTICAL TELEMETRY (9 Periods)

Optical fibers for signal transmission: Sources for fiber optic transmission, Optical detectors, trends in fiber, optic device development, Example of an optical telemetry system.

UNIT – V: TELECONTROL METHODS (9 Periods)

Analog and Digital techniques in telecontrol: telecontrol apparatus, Remote adjustment, Guidance and regulation; Telecontrol using information theory; Example of a telecontrol system.

Total Periods: 45

TEXT BOOKS:

1. D. Patranabis, *Telemetry Principles*, TMH, 2003.
2. Swoboda G., *Telecontrol Methods and Applications of Telemetry and Remote Control*, Reinhold Publishing Corp., London, 1991.

REFERENCE BOOK:

1. Leslie Cromwell, Fred. J. Weibell and Erich. A. Pfeiffer, *Biomedical Instrumentation and Measurements*, 2nd Edition, PHI, 2003.

III B. Tech. II Semester
(16BT61031) **ARM PROCESSORS AND PIC MICROCONTROLLERS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on ARM Processors and PIC Microcontrollers.

COURSE DESCRIPTION: Assembly language Programming using ARM processors; Interfacing standard peripherals & Programming-DAC, Stepper Motor, ADC, DAC, Keyboard, Seven Segment Display.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on instruction set, addressing modes, of ARM processors and PIC microcontrollers.
CO2. Analyze various programming alternatives, interfacing methods & usage of various on-chip resources like Timers, Interrupts, ADC, DAC, and Stepper Motor to build stand alone systems.
CO3. Design and develop microcomputer and microcontroller based system to suit market requirements.
CO4. Solve engineering problems and arrive at solutions in designing embedded Systems.
CO5. Apply resources, and tools for modeling microcomputer and microcontroller based systems with understanding of limitations.
CO6. Follow professional ethics in the design of embedded products.
CO7. Function effectively as an individual, and as a member in developing embedded products.
CO8. Communicate effectively in both written and verbal form in the area of processors and microcontrollers.

LIST OF EXPERIMENTS:

I. Programs using PIC Microcontrollers (Minimum of FIVE experiments)

1. Arithmetic operations.
2. Logical operations.
3. Bit manipulation operations.
4. Macros & Modular programming.
5. Bank Switching.
6. Branch/Time Delay programs.

II. Interfacing with PIC microcontrollers (Minimum of THREE experiments)

1. Interface an LED array, 7-segment display and LCD.
2. Interfacing of PIC18 with Keyboard and logic controllers.
3. Interfacing of PIC18 with ADC and DAC.
4. Interfacing DC Motors and Stepper Motors.

III. Programs using ARM Processors (Minimum of THREE experiments)

1. Arithmetic operations.
2. Logic operations.
3. Branch/Time Delay Programs.
4. Arm Mode & Thumb mode Programming.

III B. Tech. II Semester

(16BT61032) **PROCESS CONTROL LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on Process Control Instrumentation.

COURSE DESCRIPTION: Tuning methods, Characteristics of control valve, Response of controllers for different processes like flow, temperature, level etc., Design of controllers.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on process equipments.

CO2. Develop the transfer function of the process and analyze the performance of the process in terms of time domain specifications.

CO3. Design electronic PID controller and tune its controller parameters using various tuning methods.

CO4. Give valid conclusions by analyzing the response of flow, temperature, level process.

CO5. Use appropriate hardware/software tools to conduct the process control experiments to measure process parameters.

CO6. Apply concepts of process control for solving real-time issues.

CO7. Execute the experiment individually or in a team in the area of process control.

CO8. Communicate effectively in verbal and written forms in the field of process control.

LIST OF EXPERIMENTS:

PART A: Only for viva-voce examination (2 lab sessions)

Study and demonstration of Piping and Instrumentation diagrams: Symbols, connecting lines, General instruments or functions, Actuator and process elements.

PART B: Minimum of TEN experiments to be conducted

1. Obtain the characteristics of electro-pneumatic converter.
2. Obtain the valve flow-lift characteristics of Linear, Quick Opening and equal percentage control valve.
3. Design Electronic PID controller and verify the output using any simulation software.
4. Determine the PID controller parameters using process reaction curve method for a process.
5. Determine the PID controller parameters using continuous oscillation method for a process.
6. Study the response of ON-OFF controller for temperature process.
7. Obtain the performance for liquid level process with and without controller.
8. Compute the transfer function of a tank for a liquid level process with different flow rates.
9. Measure the flow-rate and to control flow-rate using PID controller for flow process.
10. Analyze the servo and regulatory response for pressure control process.
11. Study the response of ratio controller.
12. Study the closed loop performance of cascade controller.
13. Obtain the transfer function model for Interacting Systems.

III B. Tech. II Semester
(16BT61033) SEMINAR

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
	100	100	-	-	-	2

PRE-REQUISITES: —

COURSE DESCRIPTION: Identification of topic for the seminar; Literature survey; Performing critical study and analysis of the topic identified; Preparation of report and presentation.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate in-depth knowledge on the seminar topic.

CO2. Analyze critically, the concepts relevant to the seminar topic.

CO3. Undertake investigation of issues related to seminar topic providing valid conclusions.

CO4. Apply techniques to consolidate the solutions relevant to the seminar topic.

CO5. Comprehend societal issues in the context of seminar topic.

CO6. Understand environmental issues in the context of seminar topic.

CO7. Understand ethical issues in the context of seminar topic.

CO8. Function effectively as individual on the chosen seminar topic.

CO9. Develop communication skills, both in oral and written form, for preparing and presenting seminar report.

CO10. Engage in lifelong learning to improve knowledge and competence in the chosen area of seminar.

IV B. Tech. – I Semester
(16BT71001) ANALYTICAL INSTRUMENTATION

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Engineering Chemistry, Engineering Physics, Sensors and Transducers, Electrical and Electronic Measurements.
COURSE DESCRIPTION: Different types of Liquid and Gas analyzers, Spectroscopic techniques, chromatography, environmental pollution and nuclear radiation detectors.
COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge of gas/liquid analyzers, radia tion detectors, different Chromatography Techniques, environmental pollution and nuclear radiation detectors.
CO2. Analyze the sample by using various analytical instruments.
CO3. Provide valid conclusions by analyzing the different chemical samples using spectrophotometer and chromatography.
CO4. Use appropriate method of analyzer and spectrometer to evaluate the sample.
CO5. Use various analytical instruments like analyzers, spectrophotometer and chromatography to measure the elements of a compound for industrial applications.
CO6. Use environmental pollution monitoring devices to compliance with environmental issues.

DETAILED SYLLABUS:
UNIT - I: LIQUID AND GAS ANALYZERS (10 Periods)
Liquid Analyzers: Electrodes types, Electrochemical Cell; pH measurement, pH meters; Ion-selective electrodes; Conductivity cell, Conductivity meters types; Dissolved oxygen analyzer.
Gas Analyzers: Thermal conductivity**;** Paramagnetic oxygen analyzer, Magnetic wind**;** Hydrogen, Sodium analyzer, Silica analyzer.

UNIT - II: SPECTROSCOPIC TECHNIQUES – I (9 Periods)
Electromagnetic Spectrum, Classification of spectroscopic techniques; Beer - Lamberts law, Source, Detectors, Optical components for photometers; Colorimeter : Single beam and double beam photometer and Colorimeter types; UV – VIS , Infrared Spectroscopy, FTIR spectrophotometer.

UNIT - III: SPECTROSCOPIC TECHNIQUES – II (8 Periods)
Atomic Emission: Types of Excitation: Plasma, Thermal, Arc, Spark, Flame type; Atomic Absorption; Flame photometers: Burners, Flame sources.
Mass spectrometer: Magnetic deflection, Time of Flight, Radio frequency, Quadrupole; NMR spectrometer – Principle and Instrumentation.

UNIT - IV: CHROMATOGRAPHY (9 Periods)
Gas chromatography: Introduction, Principle, Types and Detection systems: Flame ionization detector, Argon ionization detector, Electron capture detector, Photo ionization detector and applications.
Liquid chromatography: Principle, types, detection system: Fluorescence detector, Refractive index detector, thermal detector and applications.

UNIT - V: ENVIRONMENTAL POLLUTION & RADIATION DETECTORS (9 Periods)
Environmental Pollution: COx monitor, NOx analyzer, estimation of H2S, Ammonia, sulphur dioxide, hydrocarbons, Turbidity and Nephelometer.
Nuclear Radiation Detectors: Introduction, Alpha, Beta, Gamma characteristics, Detectors- Gas filled: ionization chamber, proportional counter, GM counters; Liquid/Solid Detectors - Scintillation counter, solid state detector and X-Ray detectors.

Total Periods: 45

TEXT BOOKS:
1. R.S. Khandpur, *Handbook of Analytical Instruments*, TMH, 2nd Edition, 2006.
2. Willard H.H., Merrit L.L., Dean J.A. and Seattle F.L., *Instrumental Methods of Analysis*, CBS Publishing and Distributors, 7th Edition, 1995.

REFERENCE BOOKS:
1. Jain R.K., *Mechanical and Industrial Measurements*, Khanna Publishing, New Delhi, 10th Edition, 1992.
2. Liptak B.G, *Process Measurement and Analysis,* Chilton Book Company, Pennsylvania*,* 3rd edition, 1995.

3. G.W. Ewing, *Instrumental Methods of Analysis,* McGraw Hill, 2004.
4. Skoog D.A. and Holler.F.J, *Principles of Instrumental Analysis*, Holt Sounder Publication, Philadelphia, 1985.

IV B. Tech. – I Semester

(16BT71002) **BIOMEDICAL SIGNAL PROCESSING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Digital Signal Processing, Biomedical Instrumentation.

COURSE DESCRIPTION: Analysis of Non Stationary signals, noise & artifact removal, Advanced Signal processing techniques, Event Detection, Spectral Analysis.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate an understanding of biomedical signals and identify the need for Biomedical signal analysis.
CO2. Identify physiological interferences and artifacts affecting the biomedical signals and apply various filtering mechanisms for the enhancement of signals.
CO3. Apply advanced signal processing techniques for the analysis of biomedical signals
CO4. To analyze and detect various events and waveform complexities involved in EEG & ECG signals
CO5. Choose appropriate hardware and IT tools to program the devices to solve Biomedical Engineering Problems.
CO6. Perform the spectral analysis of biomedical signals as per societal needs.

DETAILED SYLLABUS:

UNIT-I: NATURE OF BIOMEDICAL SIGNALS AND ANALYSIS OF NON STATIONARY SIGNALS (9 Periods)

The nature of Biomedical Signals: Need for biomedical signal processing, sources of Biomedical Signals(ECG, EEG, PCG, EMG, Carotid Pulse), objectives of Signal analysis, Difficulties in signal analysis, signal modelling framework, computer aided diagnosis, Heart sounds and murmurs, EEG Rhythms and Waves.

UNIT-II: FILTERING FOR NOISE AND ARTIFACT REMOVAL (9 Periods)

Physiological interference, noise, Data Functions and Transforms, Convolution, Correlation and Covariance, Sampling Theory and Finite Data Considerations, Edge Effects, Illustration of noise removal with case studies, time and frequency domain filtering, homomorphic filtering, Problems.

UNIT –III: ADVANCED SIGNAL PROCESSING TECHNIQUES (9 Periods)

Optimal and Adaptive Filters, Optimal Signal Processing: Wiener Filters, Adaptive Signal Processing, Adaptive Noise Cancellation, Phase Sensitive Detection, Phase Sensitive Detectors, Problems.

UNIT –IV: EVENT DETECTION (9 Periods)

Detection of events & waves-Derivative Based methods for QRS detection, Pan–Tompkins algorithm for QRS detection, Detection of Dicrotic notch, Correlation Analysis of EEG channels, Data Reduction techniques-Turning point algorithm, Huffman Coding, problems.

UNIT –V: SPECTRAL ANALYSIS (9 Periods)

Classical Methods, Review of Fourier series for Periodic and Aperiodic Functions, Frequency Resolution, Truncated Fourier Analysis: Data Windowing, Power Spectrum, Direct FFT and Windowing, The Welch Method for Power Spectral Density Determination, Window Functions, Problems.

Total Periods: 45

TEXT BOOKS:

1. John L Semmlow, *Biosignal & Biomedical Image Processing* – Dekker Media Publishing, 2004.
2. Rangaraj M Rangayyan, *Biomedical Signal Analysis*, IEEE Press, 2001.

REFERENCE BOOK:

1. Willis J Tomkins, *Biomedical Digital Signal Processing,* PHI, 1993.

IV B. Tech. – I Semester
(16BT71003) **INDUSTRIAL AUTOMATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Switching Theory and Logical Design.

COURSE DESCRIPTION: Basics of Programmable Logic Controller (PLC); PLC Programming Languages; PLC intermediate Functions ; Concepts of SCADA; Concepts of DCS; Communication networks for DCS; Industrial Data Networks.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on Programmable Logic Controller Architecture, DCS and SCADA.
CO2. Analyze various methods of developing algorithms for PLC, SCADA and DCS.
CO3. Design suitable accessories in process automation.
CO4. Analyze the information to provide effective solution for real time problems in automation of process industries.
CO5. Select appropriate techniques/tools for providing Automation.
CO6. To follow ethics while selecting the standards and protocols in industrial automation.

DETAILED SYLLABUS:

UNIT –I: PROGRAMMABLE LOGIC CONTROLLER (8 Periods)
Programmable Logical Controller, Hardware, Architecture of PLC system, Power supplies and Isolators, Selection of PLC Systems-Allen Bradley, Omron, Mitsubishi. IEC Standard, Programming PLC's, Networking of PLC's, Advantages and Disadvantages of PLC.

UNIT –II: PLC INTERMEDIATE FUNCTIONS (10 Periods)
Ladder and functional block programming, Logic functions, Functional blocks, Timer functions, Counter functions, Register basics, Arithmetic functions, Number Comparison Functions, Skip and MCR functions, Sequencer functions, PID functions.

UNIT –III: DISTRIBUTED CONTROL SYSTEM (9 Periods)
Overview of Distributed Control System, DCS Software configuration, DCS Communication, DCS Supervisory Computer tasks, DCS Integration with PLCs and Computers. Communications in Distributed Control Systems – CSMA/CD Protocol, Token ring, Token Bus Communication Topology. Selection of DCS - Mitsubishi, ABB, Emerson Electric.

UNIT –IV: SUPERVISORY CONTROL AND DATA ACQUISITION (8 Periods)
Overview of SCADA, Elements of SCADA system, Remote terminal unit: Communication Interface, Discrete control, Analog control. Master terminal unit, Operator interface. Selection of SCADA Systems-Siemens, Schneider.

UNIT –V: HART AND FIELD DATA NETWORKS (10 Periods)
HART protocol: Introduction, Method of operation, structure, operating conditions, HART communication protocol, communication modes, HART networks, FBIO interface, HART commands, HART field controller implementation, HART OSI model. Field bus: Introduction, General field bus architecture, Basic requirements of field bus standard, Field bus topology, interoperability, interchangeability.

Total Periods: 45

TEXT BOOKS:

1. John W. Webb and Ronald A. Reis, *Programmable Logic Controllers-Principles and Applications*, Pearson Education, 5th Edition, 2002.
2. S.K. Singh, *Computer Aided Process Control*, PHI, 2009.
3. Stuart Boyer A, *Supervisory control and data Acquisition*, ISA, 4th Edition, 2009.

REFERENCE BOOKS:

1. Bolton. W, *Programmable Logic Controllers*, 5th edition, 2009.
2. Romily Bowden, *HART application guide and the OSI communication foundation*, 1999.

3. M. Chidambaram, *Computer Control of Processes*, Narosa Publications, 2nd Edition, 2003.

IV B. Tech. – I Semester

(16BT50501) COMPUTER NETWORKS

(Program Elective-3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Introduction to Computer Networks; The Physical Layer; The Data Link Layer; The Medium Access Control Sublayer; The Network Layer; The Transport Layer; The Application Layer.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on:
- Functionalities of Various OSI and TCP/IP layers
- 3G Mobile phone networks, 802.11
- TCP,UDP and SMTP

CO2. Analyze the issues related to data link, medium access and transport layers by using channel allocation and connection management schemes.

CO3. Design and compute subnet masks and addresses for networking requirements.

CO4. Solve problems related to Flow control, Error control, congestion control and Network Routing.

CO5. Apply Network Standards - 802.3 and 802.11 for developing computer Networks.

CO6. Assess the impact of wired and wireless Networks in the context of societal applications like VoIP, Multi-user Network Games, Internet of Things.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION AND PHYSICAL LAYER (9 Periods)

Introduction: Network hardware, Network software, Reference models - OSI, TCP/IP; Example networks – Internet; Wireless LANs - 802.11.

Physical Layer: **Guided transmission media, Wireless transmission.**

UNIT-II: DATA LINK LAYER AND MEDIUM ACCESS CONTROL SUBLAYER (10 Periods)

Data Link Layer: Data link layer design issues, Error detection and correction-CRC, Hamming codes, Elementary data link protocols, Sliding window protocols.

Medium Access Control Sublayer: ALOHA, Carrier sense multiple access protocols, Collision-free protocols, Ethernet, Data link layer switching-Repeaters, Hubs, Switches, Routers, and Gateways.

UNIT-III: NETWORK LAYER (10 Periods)

Network layer design issues, Routing algorithms - Shortest path, Flooding, Distance vector, Link state routing, Hierarchical, Broadcast, Multicast, Anycast; Congestion control algorithms, Network layer in the internet - The IP version 4 protocol, IP addresses, IP version 6, Internet control protocols.

UNIT-IV: TRANSPORT LAYER (9 Periods)

UDP – Segment header, Remote procedure call, Real-time transport protocols; TCP **–** service model, Protocol, Segment header, Connection establishment, Connection release, Sliding window, Timer management, Congestion control.

UNIT-V: APPLICATION LAYER (7 Periods)

Domain Name System (DNS)-Name space, Domain resource records, Name servers; Electronic mail-Architecture and services, User agent, Message formats, Message transfer, Final delivery; The World Wide Web- Architectural overview, HTTP.

Total Periods: 45

TEXT BOOK:

1. Andrew S. Tanenbaum and David J. Wetherall, *Computer Networks*, Pearson Education, 5th Edition, 2015.

REFERENCE BOOKS:

1. Behrouz A. Forouzan, *Data Communication and Networking*, Tata McGraw-Hill, 4th Edition, 2010.
2. James F. Kurose and Keith W. Ross, *Computer Networking: A Top-Down Approach Featuring the Internet*, Pearson Education, 2nd Edition, 2012.

IV B. Tech. – I Semester

(16BT71004) **AUTOMOTIVE INSTRUMENTATION**

(Program Elective-3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A Course on Industrial Instrumentation-II.

COURSE DESCRIPTION: Automobile engines; Combustion process in engines; Sensors in automotive systems; Safety, Comfort and convenience systems.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge about
- Operation of automotive Engine systems.
- Combustion process of automotive engine systems
- Automotive sensors
- Safety, Comfort and Convenience systems

CO2. Analyze various parameters measured using automotive sensors.

CO3. Design measurement systems pertaining to various parameters of automotive systems.

CO4. Solve Engineering problems pertaining to parameters measurement using automotive sensors to provide valid conclusions.

CO5. Select appropriate technique for the measurement of parameters of an automotive system.

CO6. Apply contextual knowledge to ensure safety, comfort and convenient automotive systems to meet societal needs.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO AUTOMOBILE ENGINES (9 periods)

Introduction to an Automobile, Types of Automobiles, Layout of an Automobile, Major Components of the Automobile, Functions of the Automobile Components, Classification of Automobile Engines, Use of Engines, Merits and Demerits of Vertical and Horizontal Engines, Reasons for using Single-Cylinder two-stroke, Air-cooled Petrol Engine on two-wheelers, Reasons for using Multi-Cylinder Diesel Engine for commercial vehicles, Merits and Demerits of two-stroke and Four-stroke cycle engines, Advantages of a Multi-Cylinder Engine for the same power.

UNIT-II: COMBUSTION PROCESS IN PETROL AND DIESEL ENGINES (9 periods)

Introduction, Properties of Petrol (Gasoline), Octane Number, Octane Ratings, Combustion Process in Petrol Engine, Types of Combustion Chambers, Properties of Diesel Fuel, Combustion Process in CI Engine, Diesel Knock, Types of CI Combustion Chambers, Open Combustion Chamber, Pre-Combustion Chamber, Turbulence Combustion Chamber, Air Cell Combustion Chamber, Energy Cell Combustion Chamber.

UNIT-III: AUTOMOTIVE SENSORS (9 Periods)

Basic Principles, Position Sensors, Speed and RPM Sensors, Acceleration and Vibration Sensors, Pressure Sensors, Flow Meters, Gas Sensors, Concentration Sensors, Temperature Sensors, Force and Torque Sensors, Optoelectronic Sensors.

UNIT-IV: PASSIVE SAFETY, COMFORT AND CONVENIENCE (9 Periods)

Occupant-Protection Systems: Seat Belts and seat belt Pretensioners, Airbag, Rollover Protection Systems, Components, Passenger-compartment climate control, Climate-control requirements, A/C-unit design and operating principle, Climate-control systems, Climate control for hybrid and electric vehicles, Auxiliary heater systems, Comfort and convenience systems in the door and roof areas, Power-window systems, Roof systems, Comfort and convenience functions in the passenger compartment, Electrical seat adjustment.

UNIT-V: DRIVER-ASSISTANCE SYSTEMS (9 Periods)

Driver-assistance systems, Parking systems: Parking aid with ultrasonic sensors, Parking aid assistant, Vehicle navigation: Navigation systems, Functions of navigation, Digital map, Adaptive cruise control: Function, Design and function, Control algorithms, Predictive emergency-braking systems, Video-based driver-assistance systems: Lane departure warning and lane keeping support, Road-sign recognition, Night vision systems: Applications, Far-infrared systems, Near-infrared systems.

Total Periods: 45

TEXT BOOKS:

1. Robert Bosch, *Automotive Handbook*, Wiley Publications, 9th Edition, 2014.
2. K K Jain, R B Asthana, *Automobile Engineering*, Mc Graw Hill Education (India) Pvt. Ltd. 2014.

REFERENCE BOOK:

1. Robert Bosch, *Safety, Comfort and Convenience Systems:Function, Regulation and Components*, Bentley publishers, 2006.

IV B. Tech. – I Semester

(16BT71005) COMPUTER CONTROL OF PROCESS

(Program Elective-3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Process Control Instrumentation.

COURSE DESCRIPTION: Analysis of discrete state variable system identification techniques; direct discrete design techniques; advanced control strategies used in industries; Adaptive Control.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on Z – Transform and modified Z - Transform of Sampled Data system.
CO2. Analyze various control strategies and identify mathematical model for various systems.
CO3. Design suitable accessories to make control strategies used in Industries.
CO4. Analyze the information to provide effective solution for real time problems of adaptive control methods.
CO5. Select appropriate techniques/tools for validation between continuous and discrete system.
CO6. Follow standards and protocols while designing various models in industries.

DETAILED SYLLABUS:

UNIT - I: DISCRETE STATE-VARIABLE TECHNIQUE (11 Periods)

State equation of discrete data system with sample and hold, State transition equation, Methods Of computing the state transition matrix, Decomposition of discrete data transfer functions, State Diagrams of discrete data systems, System with zero-order hold, Controllability and observability of linear time invariant discrete data system, Stability tests of discrete-data system, State Observer - State Feedback Control.

UNIT - II: SYSTEM IDENTIFICATION (8 Periods)

System Theory, Mathematical models, Model properties, Structural model representation, System identification procedure. Modified Z – Transform, First order system with time delay.

UNIT - III: CONTROLLER ALGORITHMS (9 Periods)

Computer control loop, Converting continuous time controller to discrete time domain, Design of controllers based on discrete time model – Dead beat and Dahlin's algorithms. Design of Feed Forward Controller: Block Diagram, Feed Forward control algorithms–dynamic, static, Dead beat.

UNIT - IV: ADVANCED PROCESS CONTROL STRATEGIES (9 Periods)

Cascade Control- Dynamic response, Types, Implementation, Smith Predictor, Analytical Predictor, Predictive Control – Model based and Multivariable System, Statistical Process Control, Algorithms for Processes with Dead Time.

UNIT - V: ADAPTIVE CONTROL (8 Periods)

Self-Tuning Regulators, Adaptive Control Adjustment, Indirect Adaptive Control, Direct Adaptive Control, Model Reference Adaptive Control, Relationship between MRAC and STR, Inertial Control with examples.

Total Periods: 45

TEXT BOOKS:

1. S.K.Singh, *Computer Aided Process Control*, PHI, 2009.
2. Gopal, M., *Digital Control and State Variable Methods*, Tata McGraw Hill, 2003.

REFERENCE BOOK:

1. M. Chidambaram, *Computer Control of Processes*, Narosa Publications, 2nd Edition, 2003.

IV B. Tech. – I Semester

(16BT71006) INDUSTRIAL ELECTRONICS

(Program Elective-3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Electronic Devices and Circuits.

COURSE DESCRIPTION: Silicon controlled rectifier (SCR) and its applications in power control; Electronic timers; Welding; High frequency heating; Ultrasonic generation and applications; Computer Numeric Control.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge in
- SCR operation and characteristics
- Electronic timers
- Electric welding
- Dielectric heating
- Ultrasonic wave generation

CO2. Analyze the performance of power supplies and power control circuits.

CO3. Design power control circuits and power supplies using SCRs and ICs.

CO4. Solve power control and power supply problems.

CO5. Apply appropriate techniques for switching the power supplies to get the desired output and use modern tools for automation.

CO6. Use SCRs for power control, and design power supplies for societal needs.

DETAILED SYLLABUS:

UNIT-I: SILICON CONTROLLED RECTIFIER (9 Periods)

Principle of operation, static characteristics of SCR, turn-on methods, Switching characteristics, Two transistor model of SCR, SCR commutation techniques, protection of SCR – di/dt protection, dv/dt protection.

UNIT -II: APPLICATIONS OF SCR IN POWER CONTROL (9 Periods)

Static circuit breaker, converters: single phase half wave and full wave, Chopper circuits: principle, methods and configurations, inverters: classification, single phase half bridge and full bridge inverters, Cycloconverters: Introduction, principle of operation of single phase cycloconverters.

UNIT-III: INDUSTRIAL APPLICATIONS (9 Periods)

Electronic timers: classification – function, technique, RC and digital timers, time base generators, electric welding: classification - Electric resistance welding and electric arc welding. High frequency heating: principle, merits, applications, high frequency source for induction heating, dielectric heating: principle, material properties, electrodes and their coupling to RF generator, thermal losses and applications. Ultrasonics: generation, applications – ultrasonics as a means of communication, flaw detection.

UNIT-IV: REGULATED POWER SUPPLIES (9 Periods)

Design of series and shunt voltage regulators, IC Voltage regulators – Fixed voltage regulator, adjustable regulator, IC 723 general purpose regulator- current limit protection, current foldback, current boosting, switching regulator, uninterruptable power supplies, illustrative problems.

UNIT-V: NUMERIC CONTROL (9 Periods)

Basic concept of numerical control, driving devices, hydraulic systems, DC motors, stepping motors, data processing unit characteristics of N/C system, CNC / DNC - CNC typical system, block diagram, interfacing of CNC Machines, adaptive control systems.

Total Periods: 45

TEXT BOOKS:

1. G K Mithal and Dr Maneesha Gupta, *Industrial and Power Electronics,* Khanna Publications, 19th Edition, 2007.
2. D Roy Chowduary, *Linear* Integrated *Circuits*, New age International (p) Ltd, 2nd Edition, 2003.

REFERENCE BOOKS:

1. Yoram Korean and Joseph Ben, *Numerical Control of Machine tools*, Khanna Publishers, New Delhi, 1998.

2. P.S.Bimbhra, *Power Electronics*, 3rd edition, Khanna publishers, 2001.

IV B. Tech. – I Semester
(16BT71007) INSTRUMENTATION IN PETROCHEMICAL INDUSTRIES
(Program Elective-4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Process control Instrumentation, Engineering Chemistry.

COURSE DESCRIPTION: Petroleum Processing; Measurement and unit operations; Control Loops of Petroleum Industry and Chemicals from Petroleum Industry.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on different oil recovery methods, oil gas separation and its Processing.

CO2. Analyze different extracts from petroleum refineries.

CO3. Provide valid conclusions of different real time petroleum products by interpreting data from various distillation techniques.

CO4. Use modern instruments for analysis and processing of petro chemical products.

CO5. Practice petrochemical Engineering in such a way to protect environment from Pollution.

CO6. Follow ethical procedures while practicing petrochemical engineering.

DETAILED SYLLABUS:

UNIT-I: PETROLEUM PROCESSING AND PETROLEUM PRODUCTS (9 Periods)

Petroleum exploration, characteristics of petroleum, chemicals manufacture, sources of refinery gases, applications of refinery gases, raw materials. Chemicals from petroleum, methane derivatives, acetylene derivatives, ethylene derivatives, Propylene derivatives, derivatives of higher olefins.

UNIT-II: UNIT OPERATIONS IN PETROLEUM INDUSTRY (9 Periods)

Unit Operations in Petroleum Industry: Thermal cracking, Catalytic cracking, Catalytic reforming, Chemical oxidation, Chemical reduction, Precipitation, Polymerization, Alkylation, Isomerization, Production of ethylene, Acetylene and Propylene from petroleum, Processing of Plastic, Rubber and Fibre.

UNIT-III: HEAT EXCHANGERS AND PIPE-STILL FURNACES (9 Periods)

Heat Exchangers, Theory of Heat Exchange, Plate Type Heat Exchanger, Extended Surface Exchanger, Scraped Surface Exchanger, Heat Exchanger Train, Pipe-Still Furnace, Pipe-Still Furnace Elements, Operation of a Furnace, Draught in a Furnace, Furnace Design by the Wilson, Lobo and Hottel Method.

UNIT-IV INSTRUMENTATION AND CONTROL IN A REFINERY (9 Periods)

Control Hardware, Control Loops, The Process Piping and Instrumentation Diagram, Control Software, Distributed Control System, The Control Room, Crude Throughput Control, Desalter Control, Atmospheric Distillation Column Control, Vacuum Distillation Control, Reformer Unit Control, Fluid Catalytic Cracking Unit Control, Fail-Safe Devices.

UNIT-V: DYNAMIC MODELING AND SIMULATION (9 Periods)

Pairing and Interaction in distillation, Proper pairing in single and dual composition control, Relative Gain Analysis, Decoupling for non-interacting control.

Case studies: Development of mathematical models for Heat exchangers, Derivation of interaction and pairing of variables in multivariable systems, Mathematical model of Crystallization process.

Total Periods: 45

TEXT BOOKS:

1. Uttam Ray Chaudhuri, *Fundamentals of Petroleum and petrochemical Engineering*, CRC press, 2011.
2. Balchan .J.G. and Mumme K.I., Van *Process Control Structures and applications,* No strand Reinhold Company, New York, 1988.

REFERENCE BOOKS:

1. Austin G.T. Shreeves, *Chemical Process Industries,* McGraw-Hill International student Edition, 1985.
2. Liptak B.G. *Instrumentation in process Industries,* Chilton book Company, 1994.
3. Liptak B.G., *Process measurement and analysis,* Chilton book Company, 3rd Edition, 1996.

IV B. Tech. – I Semester

(16BT71008) INTELLIGENT CONTROL

(Program Elective-4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:—

COURSE DESCRIPTION: Neural Networks for Modeling and Control; ANN Structures and Online Training Algorithms; Fuzzy Logic for Modeling and Control; Hybrid Control Schemes; Applications of intelligent systems.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on the Computer simulation of intelligent control systems to evaluate the performance.
CO2. Analyze neural network, fuzzy logic and hybrid control schemes.
CO3. Design neural network, fuzzy logic and hybrid control for engineering applications.
CO4. Solve the problems pertaining to neural network, fuzzy logic and hybrid control schemes and provide valid conclusions for real time applications.
CO5. Select appropriate neural network and fuzzy logic control techniques for modeling real time applications with an understanding of the limitations.
CO6. Follow ethical standards while using the algorithms to train the systems for industries.

DETAILED SYLLABUS:

UNIT- I: INTRODUCTION TO ANN AND FUZZY (9 Periods)

Introduction, McCulloch-Pitts Model, Types of Neuron Activation Function, ANN Architectures, Supervised, Unsupervised, Reinforced Learning, Potential applications to ANN.

Introduction to classical sets, properties, Fuzzy sets, Membership functions, Classical Relations and Fuzzy Relations.

UNIT- II: NEURAL NETWORKS FOR MODELING AND CONTROL (9 Periods)

Modeling of nonlinear systems using ANN, NARX, NNSS. Generation of training data, optimal architecture, Model validation, Control of nonlinear system using ANN, Direct and Indirect neuro control schemes.

UNIT- III: ANN STRUCTURES AND ONLINE TRAINING ALGORITHMS (9 Periods)

Recurrent neural network (RNN), Adaptive resonance theory (ART) based network, Radial basis function network, Online learning algorithms: BP through time, RTRL algorithms, Least Mean square algorithm, Reinforcement learning, case study of DC servo motor.

UNIT- IV: FUZZY LOGIC FOR MODELING AND CONTROL (9 Periods)

Modeling of nonlinear systems using fuzzy models, TSK model, Fuzzy Logic controller Fuzzification, Knowledge base, Decision making logic, Defuzzification, Adaptive fuzzy systems, case study of DC servo motor.

UNIT- V: HYBRID CONTROL SCHEMES (9 Periods)

ANFIS: Neuro fuzzy systems, Fuzzy Neuro systems, Introduction to GA, Optimization of membership function and rule base using Genetic Algorithm, Introduction to Support Vector Machine, Particle Swarm Optimization.

Total Periods: 45

TEXT BOOKS:

1. Laurence Fausett*, Fundamentals of Neural Networks*, Prentice Hall, Englewood cliffs, N.J.,1992.
2. Timothy J.Ross, *Fuzzy Logic with Engineering Applications*, McGraw Hill Inc., 1997.

REFERENCE BOOK:

1. Goldberg, *Genetic Algorithm in Search, Optimization and Machine Learning*, Addison Wesley Publishing Company, Inc. 1989.

IV B. Tech. – I Semester
(16BT71009) POWER PLANT INSTRUMENTATION
(Program Elective-4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A Course on Industrial Instrumentation-II.

COURSE DESCRIPTION: Different methods of power generation; Instrumentation and control in water and air-fuel circuit; Turbine monitoring and control; Power plant maintenance.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge about
- Different methods of power generation.
- Measurement and control in water and air-fuel circuit
- Turbine monitoring and Control
- Power plant management

CO2. Analyze the various parameters like temperature, pressure, level measured in power plant.

CO3. Design measurement system for the measurement of process parameters in power plant.

CO4. Solve Engineering problems pertaining to process parameters measurement and control circuits in power plant to provide valid conclusions.

CO5. Select appropriate technique for the measurement of process parameters in the power plant.

CO6. Apply safety measures during calibration and maintenance of instruments in power plant to meet societal needs.

DETAILED SYLLABUS:

UNIT-I: AN OVERVIEW OF POWER GENERATION (8 periods)

Methods of power generation: Hydro, Nuclear, Solar, Wind, Thermal, Tidal, Geothermal, classification of instruments in a power plant, Objectives of instrumentation and control, Cogeneration.

UNIT-II: INSTRUMENTATION IN WATER CIRCUIT AND AIR-FUEL CIRCUIT (10 periods)

Measurements in water circuit: Water circuit, Water flow measurement, Differential pressure transmitter, Steam flow measurement, Water and Steam pressure measurements,
Water and steam temperature measurements, Drum water level measurement in power plant.

Measurements in Air-fuel circuit: Air-fuel circuit- fuels, Combustion air, Flue gases, Waste gases, Measurement of Flow/Quantity, Pressure, Temperature, level in power plant.

UNIT –III: CONTROLS IN WATER CIRCUIT AND AIR-FUEL CIRCUIT (10 periods)

Controls in water circuit: Boiler drum level- single element drum level control, Superheated steam temperature control- waterside steam temperature control, Cascade steam temperature control, Feed forward-plus-feedback steam temperature control, Fire side steam temperature control, Steam pressure control.

Controls in Air-fuel circuit: Combustion control, Furnace draft control.

UNIT - IV: TURBINE MONITORING AND CONTROL (9 periods)

Principal parts of steam turbine, Turbine measurements- Process parameters, Mechanical parameters, Electrical parameters,Turbine control system- safety control systems, process control systems, Lubrication system, Controls in lubrication system, Turbo alternator cooling system .

UNIT -V: POWER PLANT MANAGEMENT (8 periods)

Maintenance of measuring instruments- Types of maintenance, Maintenance costs, Life cycle costs,Intrinsic and electrical safety- Intrinsic safety of instruments, Electrical safety, Explosion hazards and intrinsic safety, Interlocks for boiler operation- safety interlocks, start- up and shut down interlocks.

Total Periods: 45

TEXT BOOK:

1. K. Krishnaswamy, M. Ponni Bala, *Power Plant Instrumentation*, PHI, 2010.

REFERENCE BOOKS:

1. Patranabis, *Principles of Industrial Instrumentation*, Mcgraw Hill, 2nd Edition, 2001
2. A.R.Mallick, *Practical boiler operation engineering and power plant*, Denett & Co., 2nd Edition, 2010.

IV B. Tech. – I Semester
(16BT71010) SYSTEM DESIGN USING MICROCONTROLLERS
(Program Elective-4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on ARM Processors and PIC Microcontrollers.
COURSE DESCRIPTION: System design approaches; MSP430 Architecture; Instruction Set; Programming; Communication interfaces, Arduino, Interfacing using Arduino.
COURSE OUTCOMES: On successful completion of this course, students will be able to

CO1. Demonstrate knowledge in Arduino, MSP430 Architecture, Pin out, Instruction set.
CO2. Analyze various design issues regarding usage of on chip resources, Low power modes.
CO3. Design embedded systems using Arduino microcontrollers to suit market requirements.
CO4. Solve engineering problems and arrive at solutions in designing Embedded Systems to support interconnectivity.
CO5. Use on-chip resources and appropriate software tools to design networked embedded systems with an understanding of limitations.
CO6. Follow ethics by applying standards and protocols in embedded product development.

DETAILED SYLLABUS:

UNIT - I: ARDUINO OVERVIEW, PROGRAMMING AND INTERFACING (10 Periods)
Arduino Overview: Arduino Family Overview, Arduino Uno features, Arduino Uno Pin functionality. Arduino Mega2560 features, Arduino Mega 2560 Pin functionality, Timer Interrupts.
Basic Arduino Programming: Data types, Characters, bits & Bytes, Structures, Digital I/O Read/Write, Analog I/O Read/Write, Serial functions, Functions and Modules-Tabs.
Arduino Interfacing: Interfacing LEDs, Switches, Potentiometers, 4x4 Keypad, 16x2 LCD, Motors, HC-SR04 - Ultra Sonic Sensor.

UNIT - II: COMMUNICATION INTERFACES (9 Periods)
USB, RS 485, IEEE1394 Firewire, SPI – Serial Peripheral Interface, TWI (I2C) - Two Wire Interface, CAN – Controller Area Networks, Bluetooth, Ethernet, Zigbee, Wi-Fi.

UNIT - III: ARDUINO INTERFACING: ADVANCED (10 Periods)
Data logging using Micro SD Card Module, DS-1307 Real Time Clock Module, Communication using Software Serial, I2C, MCP2515-CAN, Sim900A Module, NEO-6M GPS Module, HC-05 Bluetooth and ESP8266-Wifi.

UNIT - IV: INTRODUCTION TO MSP430 (8 Periods)
MSP 430 Family overview, Features of MSP430, Architecture of MSP430, Pin out, Functional Block diagram, Memory, CPU, Memory mapped input and output, Clock generator; Exceptions- Interrupts, Low-Power Modes.

UNIT - V: MSP430 PROGRAMMING (8 Periods)
Instruction Set, Addressing Modes, Reflections on CPU and Instruction set. Development Environment, Sample programs in C and Assembly.

Total Periods: 45

TEXT BOOKS:

1. Jeremy Blum, *Exploring Arduino: Tools and Techniques for Engineering Wizardry*, Wiley, 2013.
2. John H. Davies, *MSP430 Microcontroller Basics*, Newnes Publications, 2008.

REFERENCE BOOKS:
1. Chris Nagy, *Embedded Systems Design using the TI MSP30 Series*, Newnes Publications, 2003.
2. Michael Margolis, *Arduino Cookbook*, O'Reilly, 2011.
3. Santanu Chattopadyay, *Embedded System Design*, PHI, 2010.

IV B. Tech. – I Semester
(16BT6HS01) BANKING AND INSURANCE
(Common to EEE, ECE and EIE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE- REQUISITES: —

COURSE DESCRIPTION: Origin of Banking; Functions of Banking; Role & Functions of RBI; Bank-Customer Relationship; Deposit and Loan Services of Banks; Banking Procedures; Electronic Payment Mechanisms; Business Models; Concepts of Risk and Uncertainty; Fundamentals of Insurance; Principles of Insurance; Essentials of Insurance Contracts; Insurance players in India.

COURSE OUTCOMES: On Successful completion of the course, students will be able to

CO1. Demonstrate Knowledge in
- Tools and concepts of Banking and Insurance.
- Basic Principles and concepts of Insurance and Banking.
- e-fund transfers, e-payments and e-business models.

CO2. Develop skills in providing solutions for
- Online banking and e – payments.
- Risk Management through insurance benefits the society at large.
- Money management by leveraging on technology, banking and insurance services.

CO3. Exhibit conceptual soundness about banking and insurance, this would contribute to more employment opportunities.

CO4. Provide life skills for effective utilization of Banking and Insurance facilities.

DETAILED SYLLABUS:

UNIT – I: INTRODUCTION TO BANKING (9 Periods)

Origin and growth of banking, meaning and functions of banking, importance of banking, Reserve Bank of India; functions, monetary policy, open market operations.

UNIT – II: BANK-CUSTOMER RELATIONSHIP (9 Periods)

Debtor-creditor relationship, anti money laundering, deposit products or services, payment and collection of cheques. Accounts – Types of accounts, procedure for opening and closing an account. Loans and Advances- principles of lending, types of loans.

UNIT – III: BUSINESS MODELS & ELECTRONIC PAYMENT SYSTEM (9 Periods)

Features, types of e-payment system, e-cash, NEFT, RTGS, Credit cards, Electronic purses and Debit cards. Business models- B2B, B2C, C2C, and B2G.

UNIT – IV: INTRODUCTION TO RISK AND INSURANCE (9 Periods)

Concept of risk, risk *Vs* uncertainty. Insurance definition, Insurance as risk mitigation mechanism, elements of insurance.

UNIT – V: INSURANCE OVERVIEW (9 Periods)

Principles of insurance, insurance types, LIC & GIC insurance contract- nature, elements, functions, IRDA, Insurance Players in India.

Total Periods: 45

TEXT BOOKS:
1. A.V. Ranganadha Chary, R.R. Paul, *Banking and Financial System*, Kalyani Publisher, New Delhi, 2nd Edition.
2. P.K.Gupta, *Insurance and Risk Management*, Himalaya Publishing House, New Delhi.

REFERENCE BOOKS:
1. Diwan, Praq and Sunil Sharma, *Electronic Commerce- A Manager's Guide to E-Business*, Vanity Books International, Delhi, 2002.

2. Kalakota Ravi and Whinston Andrew B, *Frontiers of Electronic Commerce*, Pearson Education India, New Delhi, 1996.
3. Schneider, Grey P, *Electronic Commerce, Course Technology*, Cengage Learning, 2008, 8th Edition, New Delhi.

IV B. Tech. – I Semester

(16BT6HS02) BUSINESS COMMUNICATION AND CAREER SKILLS

(Common to EEE, ECE and EIE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Technical English.

COURSE DESCRIPTION: Nature and Scope of Communication; Corporate Communication; Writing Business Documents; Careers and Resumes; Interviews.

COURSE OUTCOMES: On Successful completion of the course, students will be able to

CO1. Demonstrate knowledge in
- Corporate Communication
- Main Stages of Writing Messages
- Career Building

CO2. Analyze the possibilities and limitations of language in
- Communication Networks
- Crisis Management/Communication

CO3. Design and develop the functional skills for professional practice in
- Business Presentations & Speeches

CO4. Apply written and oral communication techniques in preparing and presenting various documents in technical writing.

CO5. Function effectively as an individual and as a member in diverse teams.

CO6. Communicate effectively with the engineering community and society in formal and informal situations.

DETAILED SYLLABUS:

UNIT -I: NATURE AND SCOPE OF COMMUNICATION (9 Periods)

Introduction: Functions of Communication – Roles of a Manager – Communication Basics – Communication Networks – Informal Communication – Interpersonal Communication –Communication Barriers.

UNIT- II: CORPORATE COMMUNICATION (9 Periods)

Introduction: What is Corporate Communication? – Corporate Citizenship and Social Responsibility – Corporate Communication Strategy – Crisis Management/Communication – Cross-Cultural Communication.

UNIT- III: WRITING BUSINESS DOCUMENT (9 Periods)

Introduction: Importance of Written Business Communication, Types of Business Messages – Five Main Stages of Writing Business Messages – Business Letter Writing – Effective Business Correspondence – Common Components of Business Letters – Strategies for Writing the Body of a Letter.

UNIT- IV: CAREERS AND RESUMES (9 Periods)

Introduction – Career Building – Business Presentations and Speeches – Resume Formats – Traditional, Electronic and Video Resumes – Sending Resumes – Follow-up Letters – Online Recruitment Process.

UNIT- V: INTERVIEWS (9 Periods)

Introduction – Fundamental Principles of Interviewing – General Preparation for an Interview – Success in an Interview – Types of Interviewing Questions – Important Non-verbal Aspects – Types of Interviews – Styles of Interviewing.

Total Periods: 45

TEXT BOOK:

1. Meenakshi Raman and Prakash Singh, *Business Communication*, Oxford University Press, New Delhi, 2nd edition, 2012.

REFERENCE BOOKS:

1. Neera Jain and Sharma Mukherji, *Effective Business Communication*, Tata Mc Graw-Hill Education, Pvt. Ltd., New Delhi, 2012.

2. Courtland L.Bovee et al., *Business Communication Today*, Pearson, New Delhi, 2011.
3. Krizan, *Effective Business Communication*, Cengage Learning, New Delhi, 2010.
4. R.K. Madhukar, *Business Communication*, Vikas Publishing House Pvt. Ltd., New Delhi, 2005.

IV B. Tech. – I Semester
(16BT6HS03) COST ACCOUNTING AND FINANCIAL MANAGEMENT
(Common to EEE, ECE and EIE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Scope, Objectives and Elements of cost Accounting; Cost Sheet and Tender quotations; Variance Analysis: Material variances, Labor variances; Meaning and Scope, Liquidity, Profitability Ratios: concept of Risk and Return on Investment.

COURSE OUTCOMES: On Successful completion of the course, students will be able to

CO1. Acquire Knowledge in
- Elements of Costing.
- Basic concepts of Financial Management.
- Risk and Return
- Significance of Cost Accountancy
- Behavioral Finance

CO2. Develop skills in
- Material, Labor, Overheads control.
- Excellence and ability to minimize the cost of the organization

C03. Develop effective Communication in Cost control and Financial Management.

CO4. Provide solutions for effective investment decisions.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO COST AND COST ACCOUNTING (9 Periods)
Cost and Cost Accounting, Scope, Objectives, Advantages and disadvantages – Cost Accounting *Vs* Management Accounting – Elements of Costing – Installation of costing system – Material Control, Labour Control, Overhead Control.

UNIT -II: COST SHEET AND PREPARATION OF COST SHEET (9 Periods)
Analysis of Cost – Preparation of cost sheet, estimate, tender and quotation (Simple problems) – Importance of Costing while pricing the products.

UNIT- III: STANDARD COSTING AND VARIANCE ANALYSIS (9 Periods)
Introduction to Standard Costing & Variances – Variance Analysis: Material variances, Labour variances (Simple Problems).

UNIT -IV: INTRODUCTION TO FINANCIAL MANAGEMENT AND RATIO ANALYSIS (9 Periods)
Financial Management-Meaning and Scope, Liquidity, Profitability, Financial Statement Analysis through ratios (Simple Problems).

UNIT -V: INTRODUCTION TO INVESTMENT AND BEHAVIORAL FINANCE (9 Periods)
Investment-Meaning and Definition- concept of risk and returns-Investment Alternatives- Introduction to Behavioral Finance – Anomalies –Key Concepts –Anchoring – Mental Anchoring-Confirmation and Hindsight Bias-Gambler's Fallacy-Herd Behavior-Over Confidence-Overreaction and Availability Bias-Prospect Theory.

Total Periods: 45

TEXT BOOKS:

1. S.P. Jain and K.L. Narang: *Cost Accounting*, Kalyani Publishers, Ludhiana, 6th Edition, 2002.
2. James C Van Horne, *Financial Management and Policy*, Prentice-Hall of India/Pearson, 12th Edition,

2001.

REFERENCE BOOKS:

1. The Institute of Company Secretaries of India, *Cost and Management Study Material*, New Delhi.
2. I.M. Pandey, *Financial Management*, Vikas Publishing House Pvt. Ltd., 10th Edition, 2010.

IV B. Tech. – I Semester

(16BT6HS04) ENTREPRENEURSHIP FOR MICRO, SMALL AND MEDIUM ENTERPRISES

(Common to EEE, ECE and EIE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Introduction to Entrepreneur Development; Idea generation and formation of Business Plan; Micro and Small Enterprises; Institutional Finance and Support to Entrepreneur; Woman Entrepreneurship.

Course outcomes: On Successful completion of the course, students will be able to

CO1. Acquire Knowledge in
- Schemes and institutions encouraging entrepreneurship.
- Basic Principles and concepts of Accountancy.
- Significance of entrepreneurship.

CO2. Develop skills in providing solutions for
- Personal excellence through financial and professional freedom.
- Women entrepreneurship serving as contrivance in societal development

CO3. Develop Critical thinking and evaluation ability.

CO4. Widens knowledge and build up attitude towards trouble shooting.

CO5. Demonstrate business acumen.

DETAILED SYLLABUS:

UNIT – I: INTRODUCTION TO ENTREPRENEURSHIP DEVELOPMENT (9 Periods)

Concept of Entrepreneurship – Growth of Entrepreneurship in India **-** Factors affecting entrepreneurship growth - Characteristics of an Entrepreneur – Functions of Entrepreneur – Need for an Entrepreneur – Entrepreneurial Decision Process – Types of Entrepreneurs – Distinction between an Entrepreneur and a manager.

UNIT – II: IDEA GENERATION AND FORMULATION OF BUSINESS PLANS (9 Periods)

Sources of Ideas – Methods of idea generation – Steps in Setting up of a Small Business Enterprise – Formulation of Business Plan – Contents of Business Plan – Significance – Common Errors in Business Plan Formulation, The role of incubation centers for promoting Entrepreneurship, Start-up – New Guidelines.

UNIT – III: MICRO AND SMALL ENTERPRISES (9 Periods)

Meaning and Definition – Micro and Macro units – Essentials – Features – Characteristics – Scope of Micro and Small Enterprises – Objectives of Micro Enterprises – relationship between Micro and Macro Enterprises - Problems of Micro and Small Enterprises.

UNIT – IV: INSTITUTIONAL FINANCE (9 Periods)

Institutional Finance **–** Need-Scope-Services - Various Institutions offering Institutional support: – Small Industries Development of Bank of India (SIDBI), State Industrial Development Corporations (SIDCs)– Small Industries Development Organisation (SIDO) – Small Industries Service Institutes (SISIs) – District Industries Centres (DICs) – National Institute of Entrepreneurship and Small Business Development (NIESBUD) – Technical Consultancy Organizations (TCOS). Micro Units Development and Refinance Agency Bank (MUDRA).

UNIT –V: WOMEN AND RURAL ENTREPRENEURSHIP (9 Periods)

Concept of Women entrepreneur - Functions of Women entrepreneurs - Growth of women entrepreneurship in India - Challenges of Women entrepreneurs- Programmes supporting women entrepreneurship – Rural Entrepreneurship – Meaning, Need for Rural entrepreneurship, Problems of rural entrepreneurship, Role of NGOs, Role of Bharatiya Mahila Bank for encouraging Women Entrepreneurs.

Total Periods: 45

TEXT BOOKS:

1. Dr.S.S.Khanka*, Entrepreneurial Development*, S. Chand and Company Ltd, Revised Edition, 2012.
2. Madhurima Lall & Shikha Sahai, *Entrepreneurship*, Excel Books India, 2nd Edition 2008.

REFERENCE BOOKS:

1. Nandan, H., *Fundamentals of Entrepreneurship*, PHI Learning Pvt. Ltd., 2013, New Delhi, 3rd Edition 2013.
2. Vasanth Desai, *The Dynamics of Entrepreneurial Development and Management*, Himalaya Publishing House, 4th Edition 2009.
3. Bholanath Dutta, *Entrepreneurship Management* – Text and Cases, Excel Books, 1st Edition 2009.

IV B. Tech. – I Semester

(16BT6HS05) FRENCH LANGUAGE (La Langue Francais)

(Common to EEE, ECE and EIE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Oral communications; Basic grammar; advanced grammar; basic writing; Business French (La Francais Commercial)

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge in
- Process of communication
- Modes of listening
- Paralinguistic features
- Skimming and Scanning
- Elements of style in writing

CO2. Analyze the possibilities and limitations of language, understanding
- Barriers to Communication
- Barriers to Effective Listening
- Barriers to Speaking
- Formal and metaphorical language

CO3. Design and develop language skills for professional practice.
CO4. Apply basic writing skills in writing Emails and understanding wide range of technical terminologies.
CO5. Understand French culture and civilization.
CO6. Communicate effectively with the native French in day to day situation.

DETAILED SYLLABUS:

UNIT- I: ORAL COMMUNICATION (9 Periods)
Introduction - Language as a Tool of Communication, French alphabets, Phonetics and pronunciation, making contacts, giving information, Arranging things, Expression of feelings.

UNIT- II: BASIC GRAMMAR (9 Periods)
Introduction –Articles, -Er ending Verbs, Nouns, Numbers, Gender, Pronouns, Sentence structure – Case study.

UNIT- III: ADVANCED GRAMMAR (9 Periods)
Introduction -Adjectives, Prepositions, Introduction to tenses – Present tense, past tense and future tense, Active and Passive voice.

UNIT – IV: BASIC WRITING (9 Periods)
Introduction -Introduction to written communication, Pre-writing, Creating context for writing and Data collection, fill in forms, Write greeting cards, Invitations and Short personal announcements, Short text to describe photos and pictures.

UNIT-V: BUSINESS FRENCH (La Francais Commercial) (9 Periods)
Introduction - E-mail writing, Letter writing, Learning technical vocabulary and its application.
Case study of influential French companies, Learning computer/desktop/new age- media vocabulary, Introduction to how to present a topic, Fixing an Appointment.

Total Periods: 45

TEXT BOOK:

1. Annie Berther, *Alter Ego*, Hachette Publications, 2012.

REFERENCE BOOKS:
1. Regine Merieux, Yves Loiseau, Connexions, Goyall Publishers, 2011.
2. Delphine Ripaud, *Saison*, French and Euroean Inc., 2015.

IV B. Tech. – I Semester
(16BT6HS06) GERMAN LANGUAGE (Deutsch alsFremdsprache)
(Common to EEE, ECE and EIE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Oral communication; Basic grammar; Advanced grammar; Basic writing; Berufsdeutcsch (Business German)
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge in
- Process of communication
- Modes of listening
- Paralinguistic features
- Skimming and Scanning
- Elements of style in writing

CO2. Analyze the possibilities and limitations of language, understanding
- Barriers to Communication
- Barriers to Effective Listening
- Barriers to Speaking
- Formal and metaphorical language

CO3. Design and develop language skills for professional practice.
CO4. Apply basic writing skills in writing Emails and understanding wide range of technical terminologies.
CO5. Understand German culture and civilization.
CO6. Communicate effectively with the native German in day to day situation.

DETAILED SYLLABUS:

UNIT – I: ORAL COMMUNICATION (9 Periods)
Introduction - Language as a Tool of Communication, German alphabets, Phonetics and pronunciation, making contacts, giving information, Arranging things, Expression of feelings.

UNIT – II: BASIC GRAMMAR (9 Periods)
Introduction – Articles, Verbs, Nouns, Numbers, Gender, Pronouns, Sentence structure – Case study.

UNIT – III: ADVANCED GRAMMAR (9 Periods)
Introduction - Adjectives, Prepositions, Introduction to tenses – Present tense, past tense and future tense, Active and Passive voice, Introduction to Case - Akkusativ, Nominativ, Dativ & Genetiv Case.

UNIT – IV: BASIC WRITING (9 Periods)
Introduction - Introduction to written communication, Pre-writing, Creating context for writing and Data collection, fill in forms, Write greeting cards, Invitations and Short personal announcements, Short text to describe photos and pictures.

UNIT –V: BERUFSDEUTCSCH (BUSINESS GERMAN) (9 Periods)
Introduction - E-mail writing, Letter writing, Learning technical vocabulary and its application.
Case studies of influential German companies, Learning computer/desktop/new age- media vocabulary, Introduction to how to present a topic, Fixing an Appointment.

Total Periods: 45

TEXT BOOK:

1. Heuber, *Tangram Aktuelleins*, Heuber Verlag Publications, 2011.

REFERENCE BOOKS:

1. Anta Kursisa, Gerhard Newner,Sara vicenta, Fir fuer Deutsch 1 und Deutsch 2, HeuberVerlag Publications, 2005
2. Herman Funk, Studio D A1, Cornelsen GOYAL SAAB Publication, 2011.

IV B. Tech. – I Semester
(16BT6HS07) INDIAN CONSTITUTION
(Common to EEE, ECE and EIE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —-

COURSE DESCRIPTION: Elements, functions and functionaries according to Indian Constitution, understanding for better professional practice and good citizenry.

COURSE OUTCOMES: On Successful completion of the course, students will be able to

CO1. Gain knowledge in

- Parliamentary proceedings, laws, legislature, administration and its philosophy
- Federal system and judiciary of India
- Socials problems and public services like central civil services and state civil services
- Indian and international political aspects and dynamics

CO2. Develop etiquette and professional behavior in line with the constitution of India for becoming a responsible citizen

DETAILED SYLLABUS:

UNIT- I: PREAMBLE AND ITS PHILOSOPHY (8 Periods)
Introduction and Evolution of Indian Constitution, preamble and its philosophy.

UNIT- II: UNION GOVERNMENT (8 Periods)
Powers, Functions and Position of President, Vice-President and Council of Ministers, Composition of parliament, Constitution Amendment Procedure, Financial Legislation in Parliament.

UNIT-III: FEDERAL SYSTEM (14 Periods)
Centre-State relations, Directive Principles of State Policy, Fundamental Rights and Duties, Centre-State Relations, Features of Federal System, Administrative Relationship between Union and States, Powers, Functions and Position of Governors, Function of Chief Ministers, Council of Ministers, Composition and powers of the State Legislature.

UNIT-IV: JUDICIARY AND PUBLIC SERVICES (10 Periods)
The Union Judiciary - Supreme Court and High Court, All India Services, Central Civil Services, State Services, Local Services and Training of Civil Services.

UNIT-V: INTERNATIONAL POLITICS (5 Periods)
Foreign Policy of India, International Institutions like UNO, WTO, SAARC and Environmentalism.

Total Periods: 45

TEXT BOOK:

1. Briji Kishore Sharma, *Introduction to the Constitution of India*, Prentice Hall of India, 2005.

REFERENCE BOOKS:

1. Mahendra Pal Singh,V. N. Shukla's, *Constitution of India*, Eastern Book Company,

2011.
2. Pandey J. N., *Constitutional Law of India* - Central Law Agency, 1998.

IV B. Tech. – I Semester
(16BT6HS08) INDIAN ECONOMY
(Common to EEE, ECE and EIE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Introduction; Time Value of Money; Elementary Economic Analysis; Value Analysis, Value Engineering; Economic Planning.

COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1.Acquire the knowledge in
- Micro and Macro Economics.
- Traditional and Modern methods of Capital Budgeting.
- Five year plans and NITI Aayog.

CO2. Analyze
- Capital Budgeting.
- Value Analysis and Value Engineering.
- Economic analysis
- Law of supply and demand

CO3. Understand the nuances of project management and finance

DETAILED SYLLABUS:
UNIT – I: INTRODUCTION **(9 Periods)**
Economics- Flow in an Economy, Law of Supply and Demand; Micro and Macro Economics; Relationship between Science, Engineering, Technology, and Economic Development;Concept of Engineering Economics-Types of Efficiency, Definition and Scope of Engineering Economics.

UNIT – II: TIME VALUE OF MONEY **(12 Periods)**
Concepts and Application; Capital Budgeting-Traditional and Modern Methods; Simple and Compound Interest, Cash Flow Diagram, Principle of Economic Equivalence; Evaluation of Engineering Projects – Present Worth Method, Future Worth Method,
Annual Worth Method, Internal Rate of Return Method, Cost-benefit Analysis in Public Projects; Depreciation Policy-Depreciation of Capital Assets, Causes of Depreciation, Straight Line Method and Declining Balance Method.

UNIT – III: ELEMENTARY ECONOMIC ANALYSIS **(9 Periods)**
Economic Analysis – Meaning, Significance, Simple Economic Analysis; Material Selection for a Product, Substitution of Raw Material; Design Selection for a Product;Material Selection-Process Planning, Process Modification.

UNIT - IV: VALUE ENGINEERING **(6 Periods)**
Introduction- Value Analysis, Value Engineering,Functions, Aims; Value Analysis vs. Value Engineering; Value Engineering Procedure- Advantages, Application Areas.

UNIT- V: ECONOMIC PLANNING **(9 Periods)**
Introduction- Need For Planningin India,Five year plans(1951-2012), NITI Aayog(from 2014 onwards); Inclusive Growth-Meaning, Significance, Need for inclusive growth in India, Strategy for more inclusive growth, Challenges and Prospects; Employment and Inclusive Growth in India, Role of engineers in sustaining inclusive growth.

Total Periods: 45

TEXT BOOKS:
1. PanneerselvamR, *Engineering Economics*, PHI Learning Private Limited, Delhi, 2nd Edition, 2013.

2. Jain T.R., V. K.Ohri, O. P. Khanna, *Economics for Engineers,* VK Publication, 1st Edition, 2015.

REFERENCE BOOKS:

1. DuttRudar & Sundhram K. P. M., *Indian Economy*, S. Chand, New Delhi, 62 revised Edition 2010.
2. Misra S.K. & V. K. Puri, *Indian Economy: Its Development Experience,* Himalaya Publishing House, Mumbai 32nd Edition, 2010.

IV B. Tech. – I Semester
(16BT6HS09) INDIAN HERITAGE AND CULTURE
(Common to EEE, ECE and EIE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —-

COURSE DESCRIPTION: Basic traits of Indian Culture; Humanistic Reforms under Jainism and Buddhism; Culture in the medieval period; Socio Religious reforms in Indian Culture; Reform movements for harmonious relations.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Acquaint knowledge in
- Human aspirations and values in Vedic culture.
- Cultural aspects of Buddhism and Jainism
- Unification of our country under Mourya's and Gupta's administrations
- Socio Religious aspects of Indian culture
- Reform movements and harmonious relations

CO2. Apply ethical principles and reforms as models for the upliftment of the societal status in the present cultural contexts

DETAILED SYLLABUS:

UNIT - I: BASIC TRAITS OF INDIAN CULTURE (9 periods)
Meaning and definition and various interpretations of culture . Culture and its features. The Vedic and Upanishadic culture and society. Human aspirations and values in these societies. Chaturvidha purushardhas, Chaturashrma and Chaturvarna theory.

UNIT- II: HUMANISTIC REFORMS UNDER JAINISM AND BUDDHISM (9 periods)
Salient features of Jainism - contributions of Jainism to Indian culture. Contributions of Aachaarya and Mahaapragya. Buddhism as a humanistic culture. The four noble truths of Buddhism. Contributions of Buddhism to Indian culture.

UNIT-III: CULTURE IN THE MEDIEVAL PERIOD (9 periods)
Unifications of India under Mouryas and Guptas and their cultural achievements. Cultural conditions under satavahanas. Contributions to pallavas and cholas to art and cultural achievements of vijayanagara rulers.

UNIT- IV: SOCIO RELIGIOUS REFORMS IN INDIAN CULTURE (9 periods)
Western impact on India, Introductin of western education, social and cultural awakening and social reform movements of Rajaramohan Roy - Dayanandha Saraswathi- Anne Besant. (Theosophical society)

UNIT- V: REFORM MOVEMENTS FOR HARMONIOUS RELATIONS (9 periods)
Vivekananda, Eswarchandra vidyasagar and Veeresalingam- emancipation of women and struggle against caste. Rise of Indian nationalism. Mahatma Gandhi- Non violence and satyagraha and eradication of untouchability **Total Periods: *45***

TEXT BOOK:

1. Valluru Prabhakaraiah, *Indian Heritage and Culture*, Neelkamal Publications Pvt. Ltd. Delhi, 2015.

REFERENCE BOOKS:

1. L. P. Sharma, *History of Ancient India*, Konark Publishers, Pvt. Ltd. New Delhi, 2010.

2. L. P. Sharma, *History of Medieval India*, Konark Publishers, Pvt. Ltd. New Delhi, 2010.
3. L. P. Sharma, *History of Modern India*, Konark Publishers, Pvt. Ltd. New Delhi, 2010.
4. *The Cultural Heritage of India Vol-I, II, III, IV, V*, The Ramakrishna Mission Institute of Culture, Calcutta.

IV B. Tech. – I Semester
(16BT6HS10) INDIAN HISTORY
(Common to EEE, ECE and EIE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Introduction; Ancient India; Classical and Medieval era; Modern India; India after independence.

COURSE OUTCOMES: On Successful completion of the course, students will be able to
CO1. Gain knowledge on evolution and history of India as a nation.
CO2. Analyze social and political situations of past and current periods.
CO3. Practice in career or at other social institutions morally and ethically.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION (8 Periods)
Elements of Indian History; History Sources: Archaeology, Numismatics, Epigraphy & Archival research; Methods used in History; History & historiography; sociological concepts-structure, system, organization, social institutions, Culture and social stratification (caste, class, gender, power), State& Civil Society.

UNIT-II: ANCIENT INDIA (9 Periods)
Mohenjo-Daro civilization; Harappa civilization; Mauryan Empire.

UNIT -III: CLASSICAL & MEDIEVAL ERA (12 Periods)
Classic Era (200 BC - 1200 AD); Hindu - Islamic Era (1200 - 1800 AD).

UNIT-IV: MODERN INDIA (6 Periods)
Age of Colonialism (17th - 19th centuries); First war of Indian Independence; Freedom Struggle (1857-1947).

UNIT-V: INDIA AFTER INDEPENDENCE (1947-) (10 Periods)
The Evolution of the Constitution and Main Provisions; Consolidation of India as a Nation; Politics in the States; Indian economy; Modernization and globalization, Secularism and communalism, Nature of development, Processes of social exclusion and inclusion, Changing Nature of work and organization.

Total periods: 45

TEXT BOOK:
1. K. Krishna Reddy, *Indian History*, Tata McGraw-Hill, 21st reprint, 2017.

REFERENCE BOOKS:
1. Guha, Ramachandra, *India after Gandhi*, Pan Macmillan, 2007.
2. Thapar, Romila, *Early India*, Penguin, 2002.

IV B. Tech. – I Semester

(16BT6HS11) PERSONALITY DEVELOPMENT

(Common to EEE, ECE and EIE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Soft Skills Lab.

COURSE DESCRIPTION: Self-esteem & Self-Management; Developing Positive Attitudes; Self-Motivation & Self-Management; Getting Along with the Supervisor; Workplace Success.

COURSE OUTCOMES: On Successful completion of the course, students will be able to

CO1. Demonstrate knowledge in
- Self-Management
- Planning Career

CO2. Analyze the situations based on
- Attitudes
- Thinking strategies

CO3. Design and develop the functional skills for professional practice in

CO4. Function effectively as an individual and as a member in diverse teams.

CO5. Communicate effectively in public speaking in formal and informal situations.

DETAILED SYLLABUS:

UNIT – I: SELF-ESTEEM & SELF-IMPROVEMENT (9 Periods)

Know Yourself – Accept Yourself; Self-Improvement: Plan to Improve - Actively Working to Improve Yourself.

Case study: 1

UNIT – II: DEVELOPING POSITIVE ATTITUDES (9 Periods)

How Attitudes Develop – Attitudes are Catching – Improve Your Attitudes.

Case study: 2

UNIT – III: SELF-MOTIVATION & SELF-MANAGEMENT (9 Periods)

Show Initiative – Be Responsible Self-Management; Efficient Work Habits – Stress Management – Employers Want People Who can Think – Thinking Strategies.

Case study: 3

UNIT – IV: GETTING ALONG WITH THE SUPERVISOR (9 Periods)

Know your Supervisor – Communicating with Your Supervisor – Special Communications With Your Supervisor – What Should You Expect of Your Supervisor? – What Your Supervisor Expects of You - Moving Ahead Getting Along with Your Supervisor.

Case study: 4

UNIT - V: WORKPLACE SUCCESS (9 Periods)

First Day on the Job – Keeping Your Job – Planning Your Career – Moving ahead.

Case study: 5

Total Periods: 45

TEXT BOOK:

1. Harold R. Wallace and L. Ann Masters, *Personality Development*, Cengage Learning, Delhi, Sixth Indian Reprint 2011.

REFERENCE BOOKS:

1. Barun K. Mitra, *Personality Development and Soft Skills,* Oxford University Press, New Delhi, 2011.
2. Stephen R. Covey, *The 7 Habits of Highly Effective People*, Free Press, New York, 1989.
3. K. Alex, *Soft Skills*, S. Chand & Company Ltd, New Delhi, Second Revised Edition 2011.

4. Stephen P. Robbins and Timothy A. Judge*, Organizational Behaviour*, Prentice Hall, Delhi, 16th Edition 2014.

IV B. Tech. – I Semester
(16BT6HS12) PHILOSOPHY OF EDUCATION
(Common to EEE, ECE and EIE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Introduction to Philosophy and Engineering Education; Philosophical methods and their implications in engineering; Philosophical education in India; Values and Engineering education; Outcome based education.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Acquire knowledge in
- Philosophy of Engineering education.
- Philosophical Methods.
- Knowledge acquiring methods.
- Engineering education and responsibilities.

CO2. Understand the impact of Outcome Based Education for effective educational outcomes.

CO3. Apply reasoning to assess societal issues with the con textual knowledge of engineering education and responsibilities.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO PHILOSOPHY AND ENGINNERING EDUCATION (9 Periods)
Concept , Significance, and Scope of Philosophy in Engineering – Aims of Engineering Education – relationship between philosophy and engineering education – speculative, normative and critical approaches of philosophy in engineering.

UNIT-II: PHILOSOPHICAL METHODS AND THEIR IMPLICATIONS IN ENGINEERING (9 Periods)
Introduction to Philosophical approaches: Idealism, Naturalism, Pragmatism, Realism and Existentialism; Significance and Scope in Engineering Education.

UNIT: III: PHILOSOPHICAL EDUCATION IN INDIA (9 Periods)
Different branches of philosophy- meaning, Epistemology: nature and scope; Knowledge acquiring methods;Kinds and instruments of knowledge; Re-shapingof educational thoughts by Indian thinkers: Rabindranath Tagore, Sri Aurobindo Gosh, Mahatma Gandhi,Jiddu Krishnamurthy and Swamy Vivekananda.

UNIT-IV: VALUES AND ENGINEERING EDUCATION (9 Periods)
Introduction; Engineering educationand responsibilities: health, social, moral, ethics aesthetic; Value: crisis and strategies forinculcation.
Case study: Engineering Solutions given by Mokshagundam Visvesvaraya.

UNIT-V: OUTCOME- BASED EDUCATION (9 periods)
Institutional visioning; educational objectives; programme outcomes, curriculum, stakeholders, infrastructure and learning resources; governance and management, quality in education.

Total periods: 45

TEXT BOOKS:
1. Ganta Ramesh, *Philosophical Foundations of Education*, Neelkamal Publications, 1st Edition, 2013.
2. CarlMicham,*Thinking through technology(The Paths between Engineering and Philosophy)*.University of Chicago Press, 1st Edition, 1994.
3. Louis L Bucciarelli, *Engineering Philosophy,* Delft University Press,1st Edition, 2003.
4. NBA/ABET Manuals.

REFERENCE BOOKS:
1. Louis L Bucciarelli, *Philosophy of Technology and Engineering Sciences*, North Holland, 1st Edition, 2009 (e-book).

2. Samuel Florman, *Existential pleasures of education*. Martins's Griffin S.T. publication, 1st Edition, 1992.

IV B. Tech. – I Semester

(16BT6HS13) PUBLIC ADMINISTRATION

(Common to EEE, ECE and EIE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Introduction; Public Policy; Good Governance; E-Governance; Development Administration.
COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Acquireknowledge in
- Public Policy.
- Good Governance.
- E-governance.
- Development Administration.

CO2. Analyze the possibilities and limitations ofexisting policies through Good Governance perspective.
CO3. Design and develop solutions in e-governance modelsto find and provide opportunities in e-governance.
CO4. Adopt principles ofe-governance in addressing the ex isting issues and challenges in e-governance sector.
CO5. Understand the significance of Administrative Development in finding professional engineering solutions by probing
- Bureaucracy.
- Role of civil society.

DETAILED SYLLABUS:

UNIT – I: INTRODUCTION **(9 Periods)**
Public and Private Administration- Differences and Similarities, Meaning, Scope; Importance of Public Administration in Modern Era; Public Administration and its implications in the field of Engineering.
Case Study: Unique Identification Authority of India (UIDAI):Aadhaar Project: Challenges Ahead

UNIT – II: PUBLIC POLICY **(9 Periods)**
Meaning and Scope; Policy Formulation in India; Policy making process; Policy Implementation
Engineering and Public Policy,Social, ethical, Monetary and fiscal policies; policy implications of engineering;The engineer's role in Public Policy.
Case Study: NITI Aayog: Demonetization and Aftermath of Demonetization – Cashless transactions.

UNIT – III: GOOD GOVERNANCE **(9 Periods)**
Significance; Objectives;Concepts;Reforms;Organization and its basic problemsAdministrative and Governance reforms in India; Sustainable and Inclusive growth in India;Engineering and Sustainable Environment-Role of Engineers; Right to information Act
Case Study: Strategies in Good Governance: A Case Study of Karnataka, Kerala and Orissa.

UNIT – IV: E-GOVERNANCE **(9 Periods)**
Meaning, Significance, Issues in E-governance; E-governance Models, Problems and Opportunities; Application of DataWarehousing and Data Mining in Governance; Engineers role in re-engineering E-governance.
Case Study: e-Housing System for Bhavana Nirman Dhanasahayam Online disbursement of housing assistance in Kerala.

UNIT - V: DEVELOPMENT ADMINISTRATION **(9 Periods)**
Introduction; Development Administration-Administrative Development- Sustainable Development -Significance-Objectives; Bureaucracy - Personnel administration and human resources development; Role of civil society-Citizens and administration;Development and Engineering: Issues Challenges and Opportunities.
Case Study: Neeru-Chettu (Water-Tree) of Andhra Pradesh.
Case Study: TPDDL of Delhi and Odisha.

Total Periods: 45

TEXT BOOKS:
1. M.P. Sharma, B.L. Sadana, HarpreetKaur. *Public Administration in Theory and Practice.*KitabMahal, Mumbai, 1st Edition, 2014.
2. CSR Prabhu, *E. Governance – concepts and case studies*.PHI, New Delhi, 2/e 2012.

REFERENCE BOOKS:

1. Surendra Munshi, Bijupaul Abraham *Good Governance, Democratic societies and Globalization*, Sage publications, New Delhi, 1st Edition, 2004.
2. R.K.Sapru, *Public Policy,* Sterling Publishers Pvt Ltd., New Delhi, 1st Edition, 2001.

IV B. Tech. – I Semester

(16BT60112) BUILDING MAINTENANCE AND REPAIR

(Common to EEE, ECE and EIE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Durability of buildings, Failure and repair of buildings, MaterialTechniques for repair, Maintenance of buildings, Conservation and recycling.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Acquire basic knowledge on durability and serviceability, failures, repair and rehabilitation of buildings.
CO2. Analyze failures, repair and rehabilitation techniques.
CO3. Solve complex building maintenance problems through proper investigations and interpretation.
CO4. Use modern tools and techniques for various repairs and rehabilitation of structures.
CO5. Provide solutions for building maintenance and repair problems considering health and safety.
CO6. Consider environmental sustainability in building maintenance and repair.
CO7. Maintain ethical standards for quality in repairs and rehabilitation of structures.
CO8. Evaluate specifications and perform cost analysis of building components while repair and rehabilitation.

DETAILED SYLLABUS:

UNIT – I: DURABILITY AND SERVICEABILITY OF BUILDINGS (10 Periods)

Life expectancy of different types of buildings; Effect of environmental elements such as heat, dampness, frost and precipitation on buildings; Effect of chemical agents on building materials, Effect of pollution on buildings, Effect of fire on building; Damage by biological agents like plants, trees, algae, fungus, moss, insects, etc.; Preventive measures on various aspects, Inspection, Assessment procedure for evaluating for damaged structures, Causes of deterioration, Testing techniques.

UNIT – II*:* FAILURE AND REPAIR OF BUILDINGS (10 Periods)

Building failure – Types, Methodology for investigation; Diagnostic testing methods and equipment, Repair of cracks in concrete and masonry, Materials for Repair, Methods of repair, Repair and strengthening of concrete buildings, Foundation repair and strengthening, Underpinning, Leakage of roofs and repair methods.

UNIT – III: TECHNIQUES FOR REPAIR (8 Periods)

Rust eliminators and polymers coating for rebars during repair, Foamed concrete, Mortar and dry pack, Vacuum concrete, Gunite and shotcrete, Epoxy injection, Mortar repairs for cracks, Shoring and underpinning.

UNIT – IV: MAINTENANCE OF BUILDINGS (9 Periods)

Reliability principles and its applications in selection of systems for building, Routine maintenance of building, Maintenance cost, Specifications for maintenance works, Dampness - Damp proof courses, Construction details for prevention of dampness; Termite proofing, Fire protection, Corrosion protection.

UNIT – V: CONSERVATION AND RECYCLING (8 Periods)

Performance of construction materials and components in service, Rehabilitation of constructed facilities, Conservation movement, Materials and methods for conservation work, Recycling of old buildings and its advantages, Examples.

Total Periods: *45*

TEXT BOOKS:

1. Dennison Campbell, Allen and Harold Roper, *Concrete Structures – Materials, Maintenance and Repair*, Longman Scientific and Technical, UK, 1991.
2. Allen, R. T. L., Edwards, S. C. and J. D. N. Shaw, *The Repair of Concrete Structures*, Blackie Academic & Professional, UK, 1993.

REFERENCES:

1. Peter H. Emmons, *Concrete Repair and Maintenance*, John Wiley and Sons Publications, 2002.
2. Building Construction under Seismic Conditions in the Balkan Region, UNDP/UNIDO Project Rer/79/015, Volume 5, *Repair and Strengthening of Reinforced Concrete, Stone and Brick Masonry Buildings*, United Nations Industrial Development Organisation, Vienna.
3. Shetty, M. S., *Concrete Technology*, S. Chand and Company.
4. Smith, P. and Julian, W., *Building Services*, Applied Science Publications, London, 1976.
5. SP: 25, BIS; *Causes and Prevention of Cracks in Buildings*.

6. Champion, S., *Failure and Repair of Concrete Structures*, John Wiley and Sons Publications, 1961.
7. Perkins, P. H., Repair, Protection and Water Proofing of Concrete Structures, E& FN Spon, UK, 3rd Edition, 1997.

IV B. Tech. – I Semester
(16BT60113) CONTRACT LAWS AND REGULATIONS
(Common to EEE, ECE and EIE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Construction contracts; Tenders; Arbitration; Legal requirements; Labour regulations.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate basic Knowledge on construction contracts, tenders, arbitration, legal requirements and labour regulations.
CO2. Analyze contracts and tenders.
CO3. Address the legal issues in contracts and tenders.
CO4. Follow laws and regulations in the preparation of contracts and tenders.
CO5. Prepare contract and tender documents as per the standards.
CO6. Consider project schedule, cost, quality and risk in the preparation of contracts and tenders.

DETAILED SYLLABUS:
UNIT – I: CONSTRUCTION CONTRACTS (9 Periods)
Indian contracts act, Elements of contracts, Types of contracts, Features, Suitability, Design of contract documents, International contract document and laws, Standard contract document, Law of torts.

UNIT – II: TENDERS (9 Periods)
Prequalification, Bidding, Accepting; Evaluation of tender from technical, contractual and financial points of view; Two cover system, Preparation of the documentation, Contract formation and interpretation, Potential contractual problems, Price variation clause, Comparison of actions and laws, Subject matter, Violations.

UNIT–III: ARBITRATION (9 Periods)
Arbitration, Comparison of actions and laws, Agreements, Appointment of arbitrators, Conditions of arbitration, Powers and duties of arbitrator, Rules of evidence,Enforcement of award, Arbitration disputes, Dispute review board.

UNIT – IV: LEGAL REQUIREMENTS (9 Periods)
Legal requirements for planning, Property law, Agency law, Tax laws – Income tax, Sales tax, Excise and custom duties, Local government approval, Statutory regulations, Insurance and bonding, Laws governing purchase and sale, Use of urban and rural land, Land revenue codes, EMD, Security deposits, Liquidated damages.

UNIT – V: LABOUR REGULATIONS (9 Periods)
Social security, Welfare legislation; Laws relating to wages, bonus and industrial disputes; Labour administration, Insurance and safety regulations, Workmen's compensation act, Maternity benefit act, Child labour act, Other labour laws.

Total Periods: 45

TEXT BOOKS:
1. Subba Rao, G. C. V., *Law of Contracts I & II*, S. Gogia & Co., 11th Edition, 2011.
2. Jimmie Hinze, *Construction Contracts,* McGraw Hill, 3nd Edition, 2011.

REFERENCE BOOKS:
1. Kishore Gajaria, *GT Gajaria's Law Relating to Building and Engineering Contracts in India*, Lexis Nexis Butterworths India, 4th Edition, 2000.
2. Patil, B. S., *Civil Engineering Contracts and Estimates*, University Press (India) Private Ltd., 4th Edition, 2015.

3. Joseph T. Bockrath, *Contracts and the Legal Environment for Engineers and Architects*, McGraw Hill Education, 7th Edition, 2010.
4. Akhileshwar Pathak, *Contract Law*, Oxford University Press, 2011.

IV B. Tech. – I Semester

(16BT60114) DISASTER MITIGATION AND MANAGEMENT

(Common to EEE, ECE and EIE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Disasters; Earthquakes; Floods; Cyclones; Droughts; Landslides; Disaster management.

COURSE OUTCOMES: On successful completion of course, students will be able to

CO1. Demonstrate knowledge on disasters, their vulnerability and mitigation measures.
CO2. Analyze disasters and their vulnerability.
CO3. Design strategies for effective disaster mitigation.
CO4. Address pre and post disaster issues for better preparedness and mitigation measures, through proper analysis and interpretation.
CO5. Use appropriate methods in disaster mitigation and management.
CO6. Use historical data of disasters to inform the people over preparedness and mitigation measures.
CO7. Solve disaster related issues considering environment.
CO8. Consider economical issues in disaster management.

DETAILED SYLLABUS:

UNIT- I: DISASTERS **(9 Periods)**

Types of disasters - Natural disasters; Impact of disasters on environment, infrastructure and development; Concepts of hazards and vulnerability analysis, Hazard Assessment, Guidelines for hazard assessment and vulnerability analysis, Basic principles and elements of disaster mitigation.

UNIT**- II: EARTHQUAKES** **(9 Periods)**

Introduction to earthquake, Intensity scale (MSK–64), Seismic activity in India, Seismic zones of India, Earthquakes in A.P., Action plan for earthquake disaster preparedness, Elements at risk, Recovery and rehabilitation after earthquake, Earthquake resistant design and construction of buildings; Tsunami – Onset, Types and causes, Warning, Elements at risk, Typical effects, Specific preparedness and mitigation strategies.

UNIT- III: FLOODS, CYCLONES AND DROUGHTS **(11 Periods)**

Floods and Cyclones: Onset, Types, Warnings; Elements at risk, Typical effects, Indian floods and cyclones, Hazard zones, Potential for reducing hazards, Mitigation strategies and community based mitigation.

Droughts: Onset, Types and warning; Causes, Impact, Early warning and response mechanisms, Mitigation strategies, Droughts in India.

UNIT- IV: LANDSLIDES **(8 Periods)**

Onset, Types and warning; Causes, Elements at risk, Indian landslides, Hazards zones, Typical effects, Mitigation strategies and community based mitigation.

UNIT- V: DISASTER MANAGEMENT **(8 Periods)**

Disaster management organization and methodology, Disaster management cycle, Disaster management in India – Typical cases; Cost–benefit analysis with respect to various disaster management programs implemented by NGOs and Government of India. **Total Periods: 45**

TEXT BOOKS:

1. V. K. Sharma, *Disaster Management, Medtech Publishing, 2nd Edition, 2013*.
2. Anand S. Arya, Anup Karanth, and Ankush Agarwal, *Hazards, Disasters and Your Community: A Primer for Parliamentarians*, GOI–UNDP Disaster Risk Management Programme, Government of India, National Disaster Management Division, Ministry of Home Affairs, New Delhi, Version 1.0, 2005.

REFERENCE BOOKS:

1. Donald Hyndman and David Hyndman, *Natural Hazards and Disasters*, Cengage Learning, 3rd Edition, 2011.
2. *Disaster Management in India,* A Status Report, Ministry of Home Affairs, Govt. of India, May 2011.
3. Rajendra Kumar Bhandari, *Disaster Education and Management: A Joyride for Students, Teachers, and Disaster Managers*, Springer India, 2014.

4. R. B. Singh, *Natural Hazards and Disaster Management*, Rawat Publications, 2009.

IV B. Tech. – I Semester
(16BT60115) ENVIROMENTAL POLLUTION AND CONTROL
(Common to EEE, ECE and EIE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Fundamentals of air pollution; Dispersion of pollutants; Effects and control of air pollution; Water pollution; Soil pollution and control; Municipal solid waste management.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge on air, water, soil pollution and their control and solid waste management.
CO2. Analyze causes and effects of air, water and soil pollution and their remedial measures.
CO3. Recommend suitable solutions to complex environmental pollution problems.
CO4. Use appropriate remedial technique to solve environmental pollution problems.
CO5. Understand the effects of environmental pollutionon human health and vegetation.
CO6. Encourage sustainable development through implementation of pollution control measures.
CO7. Maintain IS Codes for environmental quality control.
DETAILED SYLLABUS:
UNIT – I: AIR AND NOISE POLLUTION (8 Periods)
Air Pollution: Scope, Significance, Classification, Sources – Line, Area, Stationary, Mobile; Effects of air pollutants on man, material and vegetation; Global effects of air pollution; Air pollution meteorology - Lapse rate, Inversion, Plume pattern; Dispersion of air pollutants - Dispersion models and applications; Ambient air quality standards.
Noise Pollution: Sound pressure, Power and intensity, Impacts of noise, permissible limits of noise pollution, measurement of noise.
UNIT – II: AIR AND NOISE POLLUTION CONTROL (10 Periods)
Self cleansing properties of the environment, Dilution method, Control at source, Process changes and equipment modifications, Control of particulates – Types of equipment, Design and operation - Settling chambers, Centrifugal separators, Bag house filters, Wet scrubbers, Electrostatic precipitators; Control of gaseous pollutants – Adsorption, Absorption, Condensation, Combustion; Control of air pollution from automobiles, Control of noise pollution.
UNIT – III: WATER POLLUTION AND CONTROL (10 Periods)
Water pollution – Sources, Causes, Effects; Surface and groundwater quality – Physical, Chemical, Biological; Drinking water quality standards, Water purification – Processes, Engineered systems – Aeration, Solids separation, Settling operations, Coagulation, Softening, Filtration, Disinfection; Wastewater – Sources, Causes, Effects, Treatment and disposal – Primary, Secondary, Tertiary; Case studies.
UNIT – IV: SOIL POLLUTION AND CONTROL (8 Periods)
Soil pollutants, Sources of soil pollution, Causes, Effects and control of soil pollution, Diseases caused by soil pollution, Methods to minimize soil pollution, Effective measures to control soil pollution, Case studies.
UNIT – V: MUNICIPAL SOLID WASTE MANAGEMENT (9 Periods)
Types of solid waste, Composition of solid waste, Collection and transportation of solid waste, Methods of disposal – Open dumping, Sanitary landfill, Composting, Incineration, Utilization - Recovery and recycling, Energy Recovery. **Total Periods: 45**
TEXT BOOKS:
1. Peavy, H. S, Rowe, D. R., and Tchobanoglous, G., *Environmental Engineering*, McGraw Hill Inc., 1985.
2. C. S. Rao, *Environmental Pollution Control Engineering*, New Age International Pvt. Ltd., 2nd Edition, 2007.
3. Ibrahim A. Mirsa, *Soil Pollution: Origin, Monitoring & Remediation*, Springer, UK, 2nd Edition, 2008.
REFERENCE BOOKS:
1. M. N. Rao and H. V. N. Rao, *Air Pollution,* Tata McGraw–Hill Education Pvt. Ltd., 19th Edition, 2010.
2. Daniel Vallero, *Fundamentals of Air Pollution,* Academic Press (Elsevier), 5th Edition, 2014.
3. S. M. Khopkar, *Environmental Pollution Monitoring and Control,* New Age International Pvt. Ltd., 2nd Edition, 2007.

4. V. M. Domkundwar, Environmental Engineering, Dhanpat Rai & Co. Pvt. Ltd., New Delhi, 2014.

IV B. Tech. – I Semester
(16BT60116) PLANNING FOR SUSTAINABLE DEVELOPMENT
(Common to EEE, ECE and EIE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:—
COURSE DESCRIPTION: Sustainable development; Environmental impact; Sustainable Policies; Governance; Theories and strategies; Media and education for sustainability.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate the knowledge on sustainable development, environmental impact, sustainable policies, governance, systems and strategies, media and education for sustainability.
CO2. Analyze theories, environmental impact, policies, systems and strategies for sustainable development.
CO3. Develop suitable methods and systems for sustainable development.
CO4. Use appropriate techniques in solving issues related to sustainable development.
CO5. Provide solutions to problems associated with sustainable development considering society.
CO6. Consider environment while planning sustainable development.
CO7. Communicate effectively on sustainable development issues through media and education.
CO8. Consider economical issues while planning for sustainable development.

DETAILED SYLLABUS:
UNIT – I: SUSTAINABLE DEVELOPMENT (9 Periods)
Definition and concepts of sustainable development, Capitalization of sustainability - National and global context; Millennium development goals, Emergence and evolution of sustainability and sustainable development, Theories of sustainability, Case studies.
UNIT – II: ENVIRONMENTAL IMPACT (9 Periods)
Climate change – Science, Knowledge and sustainability; Unforeseen environmental impacts on development, Challenges of sustainable development, Centrality of resources in sustainable development, Case studies.
UNIT – III: SUSTAINABLE POLICIES AND GOVERNANCE (9 Periods)
Governance - Democracy and Eco–welfare; Global civil society and world civil politics, Civic environmentalism, Policy responses to sustainable development, Economics of sustainability, Social responsibility in sustainability, National action, ISO 14001: Environmental management system.
UNIT – IV: SUSTAINABLE SYSTEMS AND STRATAGIES (9 Periods)
Need for system innovation, Transition and co–evolution, Theories and methods for sustainable development, Strategies for eco–innovation, Ecological foot print analysis, Socio ecological indicators – Eco labels; Policy programmes for system innovation, Case studies.
UNIT – V: MEDIA AND EDUCATION FOR SUSTAINABILITY (9 Periods)
Role of emerging media, Remarkable design and communication art, Activism and the public interest, Education for sustainability, Participation in decision making, Critical thinking and reflection, Case studies.

Total Periods: 45

TEXT BOOKS:

1. John Blewitt, *Understanding Sustainable Development*, Earth Scan Publications Ltd., 2nd Edition, 2008.
2. Jennifer A. Elliot, *An Introduction to Sustainable Development*, Earth Scan Publications Ltd., 4th Edition, 2006.

REFERENCE BOOKS:

1. Peter Rogers, Kazi F Jalal and John A Boyd, *An Introduction to Sustainable Development*, Earth Scan Publications Ltd., 2006.
2. Simon Dresner, *The Principles of Sustainability*, Earth Scan Publications Ltd., 2nd Edition, 2008.
3. Peter Bartelmus, *Environment Growth and Development: The Concepts and Strategies of Sustainability*, Routledge, 3rd Edition, 2003.

4. Gabriel Moser, Enric Pol, Yvonne Bernard, Mirilia Bonnes, Jose Antonio Corraliza and Maria Vittoria Giuliani, *People Places and Sustainability*, Hogrefe & Huber Publishers, 2nd Edition, 2003.

IV B. Tech. – I Semester

(16BT60117) PROFESSIONAL ETHICS

(Common to EEE, ECE and EIE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Engineering ethics; Professional ideals and virtues; Engineering as social experimentation; Responsibilities and rights; Global issues.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate the principles of ethics, importance of professional values and social responsibility.
CO2. Analyze the problems in the implementation of moral autonomy and use ethical theories in resolving moral dilemmas.
CO3. Develop suitable strategies to resolve problems arise in practicing professional ethics.
CO4. Provide solutions to complex problems associated with professional ethics by proper analysis and interpretation.
CO5. Use appropriate theories in resolving issues pertain to professional ethics.
CO6. Understand the impact of professional ethics on society and address the limitations of codes of ethics.
CO7. Practice engineering with professionalism, accountability and ethics.
CO8. Function as a member, consultant, manager, advisor and leader in multi-disciplinary teams.
CO9. Write reports without bias and give instructions to follow ethics.

DETAILED SYLLABUS

UNIT - I: ENGINEERING ETHICS (9 periods)

Scope and aim of engineering ethics, Senses of engineering ethics, Variety of moral issues, Types of inquiry, Moral dilemmas, Moral autonomy-Kohlberg's theory, Gilligan's theory, Consensus and controversy.

UNIT - II: PROFESSIONAL IDEALS AND VIRTUES (8 periods)

Theories about virtues, Professions, Professionalism, Characteristics, Expectations, Professional responsibility, Integrity, Self-respect, Sense of responsibility, Self-interest, Customs and religion, Self-interest and ethical egoism, Customs and ethical relativism, Religion and divine command ethics, Use of ethical theories, Resolving moral dilemmas and moral leadership.

UNIT - III: ENGINEERING AS SOCIAL EXPERIMENTATION (10 periods)

Engineering as experimentation, Similarities to standard experiments, Learning from the past and knowledge gained, Engineers as responsible experimenters, Conscientiousness, Moral autonomy and accountability, The challenger case, Codes of ethics and limitations, Industrial standards, Problems with the law of engineering.

UNIT - IV: RESPONSIBILITIES AND RIGHTS (9 periods)

Collegiality and loyalty, Respect for authority, Collective bargaining, Confidentiality, Conflict of interests, Occupational crime, Rights of engineers, Professional rights, Whistle-blowing, The BART case, Employee rights and discrimination.

UNIT - V: GLOBAL ISSUES (9 periods)

Multinational corporations, Professional ethics, Environmental ethics, Computer ethics, Engineers as consultants, Witnesses, Advisors and Leaders, Engineers as Managers, Managerial ethics applied to Engineering Profession, moral leadership. **Total Periods: 45**

TEXT BOOKS:

1. Mike W. Martin and Roland Schinzinger, *Ethics in Engineering*, Tata McGraw-Hill, 3rd Edition, 2007.
2. Govindarajan, M., Nata Govindarajan, M., Natarajan, S. and Senthilkumar, V. S., *Engineering Ethics*, Prentice Hall of India, 2004.

REFERENCE BOOKS:

1. S. Kannan and K. Srilakshmi, *Human Values and Professional Ethics*, Taxmann Allied Services Pvt Ltd., 2009.
2. Edmund G. Seebauer and Robert L. Barry, *Fundamental of Ethics for Scientists and Engineers*, Oxford University Press, 2001.

3. Charles F. Fledderman, *Engineering Ethics*, Pearson Education, 2nd Edition, 2004.
4. R. Subramanaian, *Professional Ethics*, Oxford Higher Education, 2013.

IV B. Tech. – I Semester
(16BT60118) RURAL TECHNOLOGY
(Common to EEE, ECE and EIE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Rural technology; Non conventional energy; Community development; IT in rural development.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate the knowledge on technologies for rural development.
CO2. Analyze various technologies available which are appropriate for rural development.
CO3. Carryout feasibility study on the public and private partnership for rural development.
CO4. Develop and use latest technologies for rural development.
CO5. Address health and safety issues while choosing technologies for rural development.
CO6. Educate the rural populace on the positive impacts of biofertilisers and usage of agromachinery in agriculture.

DETAILED SYLLABUS:

UNIT – I: RURAL TECHNOLOGY (9 Periods)

India - Technology and rural development, Pre and post independence period, Rural India Life, Indian farmer, Role of science and technology in rural development, Rural technology and poverty eradication, Rural business hubs, Technology in improving rural infrastructure, Various organizations related to innovation, Issues of technology transfer - CAPART, NABARD, CSIR, NIF.

UNIT – II: NON CONVENTIONAL ENERGY (9 Periods)

Definition of energy, Types of alternative sources of energy, Sources of non conventional energy – Solar energy: Solar cooker, Solar heater; Biogas, Recycling and management, Wastes conservation, Assessment and production of biomass products and their utilization.

UNIT – III: TECHNOLOGIES FOR RURAL DEVELOPMENT (9 Periods)

Food and agro based technologies, Tissue culture, Nursery, Building and construction technologies, Cultivation and processing of economic plants, Cottage and social industries.

UNIT – IV: COMMUNITY DEVELOPMENT (9 Periods)

Water conservation, Rain water Harvesting, Drinking water, Environment and Sanitation, Bio fertilizers, Medical and aromatic plants, Employment generating technologies – Apiculture, Pisciculture, Aquaculture.

UNIT – V: IT IN RURAL DEVELOPMENT (9 Periods)

Role of information technology (IT) in rural areas, Impact of IT in rural development, Need and necessity of technology, Corporate social responsibilities, Private sector participation (Activities in different spheres: Employment, Education, Health, Agriculture and service sectors) and Saansad Adarsh Gram Yojana (SAGY), Village adoption schemes. **Total Periods: 45**

TEXT BOOKS

1. M. S. Virdi, *Sustainable Rural Technologies*, Daya Publishing House, 2009.
2. S. V. Prabhath and P. Ch. Sita Devi, *Technology and Rural India*, Serials Publications, 2012.

REFERENCE BOOKS

1. R. Chakravarthy and P. R. S. Murthy, *Information Technology and Rural Development,* Pacific Book International, 2012.
2. Shivakanth Singh, *Rural Development Policies and Programmes,* Northern Book Centre, 2002.
3. L. M. Prasad, *Principles and Practice of Management*, S. Chand & Sons, 8th Edition, 2014.

4. Venkata Reddy, K., *Agriculture and Rural Development - Gandhian Perspective*, Himalaya Publishing House, 2001.

IV B. Tech. – I Semester
(16BT60308) GLOBAL STRATEGY AND TECHNOLOGY
(Common to EEE, ECE and EIE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Introduction to strategic management; Strategic management process; Principles of good strategy; Globalization strategies; Research and Development strategies; Technology Management and Transfer; Elements of Transfer Process; Corporate Governance in the Indian scenario.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate the knowledge on Strategic management, Research & development strategies, Technology management and transfer, Globalization and Corporate governance.
CO2. Indentify and analyze crucial problems in strategic management to improve performance of the organizations.
CO3. Develop the products and production process by using research and development strategies.
CO4. Conduct investigations on the impact of globalization in current scenario in the context of corporate governance.
CO5. Appraise the resources and capabilities of the firm in terms of their ability to confer sustainable development.
CO6. Apply ethics in strategic decision making.

DETAILED SYLLABUS:

UNIT - I: STRATEGIC MANAGEMENT (9 Periods)

Introduction, Classes of decisions, Levels of strategy, Core competence, Strategic intent and stretch, Approaches to strategy making, Roles of different strategists, Strategic management- Process, Benefits, Limitations; Ethics in strategic decision making, Principles of good strategy, Strategic Management in India.

UNIT - II: RESEARCH & DEVELOPMENT STRATEGIES (9 Periods)

Concept, Evolution of R&D Management, R&D as a business, R&D as competitive advantage, Elements of R & D strategies, Integration of R & D, Selection and implementation of R & D strategies, R & D trends.

UNIT - III: TECHNOLOGY MANAGEMENT AND TRANSFER (9 Periods)

Technology Management: Introduction, Technology - Definition, Components, Classification Features; Technology Management- Concept, Nature; Drivers of Management of Technology-Significance, Scope, Responding to technology challenges.

Technology Transfer: Introduction, Definition, Classification, Significance, Elements of process, Types of Technology Transfer, Package, Modes of Transfer, Routes, Channels and Effectiveness of Technology Transfer.

UNIT - IV: GLOBALISATION (9 Periods)

Definition, Stages, Essential conditions for globalization, Globalization strategies, Competitive advantage of Nations, Factors affecting Globalization, Globalization of Indian business.

UNIT – V: CORPORATE GOVERNANCE: THE INDIAN SCENARIO (9 Periods)

Emergence of corporate governance in India- Landmarks, Models, Codes and status in India, Role and Responsibilities of Regulators, The Board of Directors; Corporate Governance- Specific issues in India, Family owned Business, Corporate Governance and the Indian ethos. **Total periods: 45**

TEXT BOOKS:

1. Francis Cherunilam, *Strategic Management*, Himalaya Publishing House, 3rd Edition, 2002.
2. C.S.G.Krishnamacharyulu and Lalitha Ramakrishnan, *Management of Technology*, Himalaya Publishing House, 2nd Edition, 2012.

REFERENCE BOOKS:

1. White and Bruton, *The Management of Technology and Innovation: A Strategic Approach,* Cengage Learning, 1st Edition, 2007.

2. S.K.Mandak, *Ethics in Business and Corporate Governance*,TMH, 2nd Edition, 2012.

IV B. Tech. – I Semester

(16BT60309) INTELLECTUAL PROPERTY RIGHTS AND MANAGEMENT

(Common to EEE, ECE and EIE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Protection of ideas; innovation and artistic endeavors; Acts and procedure related to patents, trademarks, copy right, design registration, trade secrets and cyber laws; Infringement; Commercialization of intellectual property rights; Case studies in each.

COURSE OUTCOMES: On Successful completion of the course, students will be able to

CO1. Demonstrate knowledge on intellectual property rights, patents, trademarks, copyrights, trade secrets and commercialization of intellectual property.

CO2. Analyse the commercial significance of discoveries and developments and to assist in bringing these into public use.

CO3. Investigate and ensure smooth transition from concept to final product by following National & International Laws of Intellectual Property.

CO4. Utilize the various policies and procedures related to patents, trademarks and copyrights relating to IPR.

CO5. Safeguard, review and manage the intellectual property so that it may receive adequate and appropriate legal protection against unauthorized use.

CO6. Follow ethical standards in capacity building and work as a platform for development, promotion, protection, compliance, and enforcement of intellectual property and knowledge.

CO7. Prepare documents and fill applications needed for filing a patent, design, copyright and trade mark.

DETAILED SYLLABUS:

UNIT – I: OVERVIEW OF INTELLECTUAL PROPERTY RIGHTS (9 Periods)

Introduction, Intellectual Property vs Conventional Property, and importance of intellectual property rights (IPRs), types of intellectual property, International Treaties for protection of IPR-Paris Convention, World Intellectual Property Organization (WIPO), World Trade Organization (WTO), Trade Related Aspects of Intellectual Property Rights (TRIP) Agreement, General Agreement on Tariffs and Trade(GATT).

UNIT – II: TRADEMARKS (9 Periods)

Introduction, Functions and kinds of trademarks, Trade Mark Registration Process, Post registration procedures, Trade Mark maintenance, Transfer of rights, Inter parties Proceedings, Infringement and Dilution of Ownership of Trade Mark, Trade Mark claims, International Trade Mark Law.

UNIT – III: PATENTS (9 Periods)

Introduction, Rights under Patent Law, Patent Application Process, Terms and Maintenance of Patents Requirements, Patent Ownership and Transfer, Licensing of Patent Rights, Sole and Joint Inventors, Disputes over Inventorship, Patent Infringement, International Patent Law, Patent Cooperation Treaty (PCT), Patent Law Treaty (PLT), Substantive Patent Law Treaty (SPLT).

UNIT - IV: COPY RIGHTS, TRADE SECRETS, CYBER LAWS (9 Periods)

Copy Rights: Introduction, nature and scope, subject matter, Rights afforded by copyright law, Copyrights ownership, transfers and duration, Copyright registration process.

Trade Secrets: Introduction, Determination of Trade Secret Status, Emploer-Employee Relationships, Protection of submissions.

Cyber laws: E-commerce and cyber laws, cyber crime and legislation- need, objective and scope; IT Act 2000, Information Technology and Information Security.

UNIT - V: INDUSTRIAL DESIGN AND COMMERCIALIZATION OF INTELLECTUAL PROPERTY RIGHTS (9 Periods)

Industrial Design: Intoduction, Indian Law related to registration of Industrial Designs, Essential requirements for registration of a design in India, International Agreements – Hague System; Conflicts related to registration of design.

Commercialization of Intellectual Property Rights: Competition and Confidentiality Issues, Antitrust Laws, Assignment of Intellectual Property Rights, Technology, Transfer Agreements, Intellectual Property Issues in the Sale of Business, Legal Auditing of Intellectual Property, Due Diligence of Intellectual Property Rights in a Corporate Transaction.

Total Periods: 45

TEXT BOOKS:

1. Deborah E. Bouchoux, *Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets*, Cengage Learning, 4th edition, 2016.
2. Kompal Bansal and Parikshit Bansal, *Fundamentals of Intellectual Property for Engineers*, BS Publications, 1st Edition, 2013.

REFERENCE BOOKS:

1. Prabuddha Ganguli, *Intellectual Property Rights-Unleashing the Knowledge Economy*, McGraw Hill Education, 6th reprint, 2015.
2. P. Narayanan, *Intellectual Property Law*, Eastern Book Company, 3rd Edition, 2013.

3. R. Radha Krishnan, S. Balasubramanian, *Intellectual Property Rights: Text and Cases*, Excel Books, 1st Edition, 2008.

IV B. Tech. – I Semester

(16BT60310) MANAGING INNOVATION AND ENTREPRENEURSHIP

(Common to EEE, ECE and EIE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:–

COURSE DESCRIPTION: Evolution of entrepreneurship from economic theory Managerial and entrepreneurial competencies; Concepts of Shifting Composition of the Economy Purposeful Innovation & Sources of Innovative Opportunity; The Innovation Process; Innovative Strategies; Entrepreneurial Motivation; Entrepreneurs versus inventors; Ethics and International Entrepreneurship; Strategic Issues in International Entrepreneurship; Problem solving Innovation and Diversification.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate the principles of business innovation and entrepreneurship for establishing industrial ventures.

CO2. Analyze business plans for potential investors and stakeholders and effectively answer probabilistic questions on the substance of plan.

CO3. Develop a comprehensive and well planned business structure for a new venture.

CO4. Conduct investigation on complex problems, towards the development of Project.

CO5. Apply modern statistical and mathematical tools to design projects and subsequent work procedures.

CO6. Apply ethics in constructive innovation framework.

CO7. Exhibit professionalism by employing modern project management and financial tools.

DETAILED SYLLABUS:

UNIT - I: CREATIVITY AND INNOVATION **(7 Periods)**

Introduction, Levels of innovation, Purposeful innovation and the sources of innovative opportunity, The innovation process, Innovative strategies, Strategies that aim at introducing and innovation, Dynamics of ideation and creativity – Inbound, Outbound; Context and process of new product development, Theories of outsourcing.

UNIT - II: PARADIGMS OF INNOVATION **(11 Periods)**

Systems approach to innovation, Innovation in the context of developed economies and Emerging economies, Examining reverse innovation and its application, Performance gap, Infrastructure gap, Sustainability gap, Regulatory gap, Preference gap, organizational factors effecting innovation at firm level.

UNIT - III: SOURCES OF FINANCE AND VENTURE CAPITAL **(7 Periods)**

Importance of finance, Comparison of venture capital with conventional development capital, Strategies of venture funding, Investment phases, Investment process, Advantages and disadvantages of venture capital, Venture capital developments in India.

UNIT - IV: INTELLECTUAL PROPERTY INNOVATION AND ENTREPRENEURSHIP **(11 Periods)**

Introduction to Entrepreneurship, Evolution of entrepreneurship from economic theory, Managerial and entrepreneurial competencies, Entrepreneurial growth and development, Concepts, Ethics and Nature of International Entrepreneurship, Intellectual property – forms of IP, Patents, Trademarks, Design registration, Copy rights, Geographical indications, Patent process in India.

UNIT - V: OPEN INNOVATION FRAMEWORK & PROBLEM SOLVING **(9 Periods)**

Concept of open innovation approach, Difference between open innovations and Cloud innovation approaches, Limitations and Opportunities of open innovation framework, Global context of strategic alliance, Role of strategic alliance, Problem Identification and Problem Solving, Innovation and Diversification.

Total Periods: 45

TEXT BOOKS:

1. Vinnie Jauhari, Sudhanshu Bhushan, *Innovation Management*, Oxford University Press, 1st Edition, 2014.
2. Drucker, P. F., *Innovation and Entrepreneurship*, Taylor & Francis, 2nd Edition, 2007.

REFERENCE BOOKS:

1. Robert D Hisrich, Claudine Kearney, *Managing Innovation and Entrepreneurship*, Sage Publications, 1st Edition, 2014.
2. V.K.Narayanan, *Managing Technology and Innovation for Competitive Advantage*, Pearson India, 1st Edition, 2002.

IV B. Tech. – I Semester

(16BT60311) **MATERIALS SCIENCE**

(Common to EEE, ECE and EIE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Structure and Bonding in metals; Steels, Cast Irons and Non Ferrous alloys; Material Selection for conductors, Insulators and semi conductors; Strengthening mechanisms of metals; Plastics and Ceramics as Insulators; AC and DC properties of Insulators; Semiconductors and Magnetic materials; Composite materials in Electrical and Electronics engineering; Material Selection and manufacturing of Optical fibers.

COURSE OUTCOMES: On Successful completion of the course, students will be able to

CO1. Demonstrate the knowledge on concepts of fundamental science and engineering principles relevant to materials.

CO2. Analyze the structures of various types of Ferrous, Non ferrous alloys influencing various engineering applications.

CO3. Conduct investigations to select suitable materials with desired properties for engineering applications.

CO4. Use phase diagrams to interpret the data regarding microstruc ture of materials.

CO5. Consider health and safety issues while providing materials to real time applications.

CO6. Use composite materials that reduce material waste in design and manufacturing for sustainability.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO MATERIALS SCIENCE (7 Periods)

Structure of metals: Bonds in Solids, Crystallization of metals, Grain and grain boundaries, Effect of grain boundaries on the properties of metals / alloys, Determination of grain size measurement.

Constitution of alloys: Necessity of alloying, Types of solid solutions, Hume rothery rules, Intermediate alloy phases.

UNIT - II: CAST IRONS, STEELS AND NON-FERROUS METALS (12 Periods)

Structure and properties of Grey cast iron, Spheroidal cast iron, White Cast iron, Malleable Cast iron, Alloy cast irons, Classification of steels, structure and properties of plain carbon steels, Structure and properties of Copper and its alloys, Aluminum and its alloys.

UNIT - III: ELECTRIC CONDUCTORS & INSULATORS (12 Periods)

Type of materials selected for conductors, Insulators and semi conductors, Introduction to ceramics - Bonding and microstructure, DC properties of ceramic materials, AC properties of ceramic materials, mechanical properties, Ceramics as Conductors, Insulators and capacitors; Introduction to Plastics - DC properties, AC properties, Mechanical properties.

UNIT - IV: SEMICONDUCTORS AND MAGNETIC MATERIALS (9 Periods)

Fabrication of Semiconductors, Producing a silicon wafer-Lithography and Deposition packaging of semiconductors materials; Types of magnetic materials, Measuring magnetic properties, Application of soft magnetic materials in Electromagnets and relays, AC transformers, Generators and motors.

UNIT - V: ADVANCED MATERIALS AND APPLICATIONS (5 Periods)

Composites - Fiber reinforced metal matrix, Ceramic matrix, Polymer matrix, Properties and applications of composites; Ceramics - Alumina, Zirconia, Silicon Carbide, SiAlONs, Reaction Bonded Silicon Nitride (RBSN); Glasses- properties and applications, manufacturing of optical fibers.

Total Periods: 45

TEXT BOOKS:

1. Kodgire V D, *Material Science and Metallurgy*, Everest Publishing House, Pune, 31st edition, 2011.
2. Ian. P.Jones, *Material Science for Electrical and Electronic Engineers*, Oxford University Press, 1st Edition, 2000.

REFERENCE BOOKS:

1. V. Raghavan, *Physical Metallurgy: Principles and Practices*, PHI, New Delhi, 2nd edition, 2006.
2. William. D. Callister, *Materials Science & Engineering-An Introduction*, John Wiley and Sons, New Delhi, 6th edition, 2002.

IV B. Tech. – I Semester
(16BT70412) **GREEN TECHNOLOGIES**
(Common to EEE, ECE and EIE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Principles of green engineering; Green communications; Green energy; Green computing; Green construction; Green manufacturing.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Deploy conceptual knowledge in green technologies pertaining to engineering practice.
CO2. Analyze various green technologies for engineering practice.
CO3. Provide green solutions to engineering problems.
CO4. Apply various green techniques in the engineering practice.
CO5. Consider health and safety issues while providing green solutions to the society.
CO6. Understand issues related to environment sustainability.
CO7. Apply ethical standards for environmental sustainability in the engineering practice.

DETAILED SYLLABUS:

UNIT-I: PRINCIPLES OF GREEN ENGINEERING AND GREEN COMMUNICATIONS (11 Periods)

Principles of Green Engineering:
Introduction, Definition of green engineering, Principles of green engineering.

Green Communications:
Introduction, Origin of Green Communications, Energy Efficiency in Telecommunication systems, Telecommunication system model and energy Efficiency, Energy saving concepts, Quantifying energy efficiency in ICT, Energy efficiency metrics of green wireless networks, Embodied energy of communication devices- Introduction, The extended energy model, Embodied/Operating Energy of a BS in Cellular network- A Case study; Energy efficient standards for wireline communications.

UNIT-II: GREEN ENERGY (9 Periods)

Introduction, adverse impacts of carbon emission, control of carbon emission– methods, greenhouse gas reduction – methods, Energy sources and their availability, Green energy for sustainable development. Green energy sources – Solar energy, Wind energy, Fuel cells, Biofuels, Wave and Geothermal energy (Principle of generation only).

UNIT-III: GREEN IT (9 Periods)

The importance of Green Information technologies, Strategizing Green Initiatives, Implementation of Green IT, Information Assurance, Communication and Social Media, Regulating Green IT- Laws, Standards and Protocols; RoHS, REACh, WEEE, Legislating for GHG Emissions and Energy Use of IT Equipment, Non-regulatory Government Initiatives, Industry Associations and Standard Bodies, Green Building Standards, Green Data Centres, Social Movements and Greenpeace, Conclusions.

UNIT-IV: GREEN CONSTRUCTION (9 Periods)

Green Building: Definition, Typical features, Benefits, Requisites for green building construction, Sustainability, Concept of REDUCE, REUSE, RECYCLE, RETHINK, REPLENISH AND REFUSE (6 R's), Sustainable construction focus point – Site selection, Planning, Water, Energy, Material, Indoor air quality, Construction procedures.

Indian Green Building Council: Introduction to IGBC green homes, Benefits of IGBC, IGBC green home rating system, Introduction to USGBC, LEED rating system, Procedure to get IGBC certification, GRIHA Rating.

UNIT-V: GREEN MANUFACTURING (9 Periods)

Introduction, background, definition, motivation and barriers to green manufacturing, Impact of manufacturing in environmental ecology, Need for green manufacturing, Advantages and Limitations, green manufacturing strategies, Green manufacturing and sustainability, Sustainability tools; Waste stream mapping and application, Green manufacturing through clean energy supply, green lean manufacturing, green packaging and supply chain.

Total Periods: 47

TEXT BOOKS:

1. Konstantinos Samdanis, Peter Rost, Andreas Maeder, Michela Meo, Christos Verikoukis, *Green Communications: Principles, Concepts and Practice,* John Wiley & Sons, 2015.
2. Soli J. Arceivala, *Green Technologies for a better future,* McGraw Hill Education (India) Pvt Ltd, 2014.
3. San Murugesan, G.R. Gangadharan, *Harnessing Green IT – Principles and Practices,* John Wiley & Sons Ltd., 2008.
4. Tom Woolley, Sam Kimmins, Paul Harrison and Rob Harrison, *Green Building Handbook*, *Volume 1*, E & FN Spon, an imprint of Thomson Science & Professional.
5. *IGBC Green Homes Rating System Version 1.0* – A bridged reference guide.
6. J Paulo Davim, Green Manufacturing: Processes and Systems, Springer, 2012
7. David A Dornfeld, Green Manufacturing: Fundamentals and Applications, Springer, 2013.

REFERENCE BOOKS:

1. Athanasios V Alavanidis, Thomais Vlachogianni, *Green Chemistry and Green Engineering*, Synchrona Themata, 2012.

2. G.D. Rai, *Non-conventional Energy Sources*, Khanna Publishers, Delhi, 5th edition, 2011.
3. Marty Poniatowski, *Foundation of Green Information Technology, Prentice Hall, 2009.*
4. R. K. Gautham, *Green Homes*, BS publications, 2009.

IV B. Tech. – I Semester

(16BT70413) INTRODUCTION TO NANOSCIENCE AND TECHNOLOGY

(Common to EEE, ECE and EIE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Introduction to the concept of nano; Description of nanomaterial; Nanostructure characterization tools; Classification of nanomaterials; Fabrication of nanomaterial; Different applications of nanostructures and nanomaterials.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge in
- Nanoscale technology.
- Difference between micro and nanotechnology
- Classification of Nanostructure and Nanomaterial
- Fabrication of various nanomaterials and nanostructures.

CO2. Analyze numerical and analytical problems in
- Nanomaterial size by using Scanning Electron Microscope and X-Ray diffraction

CO3. Design and fabricate devices based on nanostructures like
- Nano solar cell
- Nano cantilever
- Nano bio-sensor

CO4. Synthesize nano particle of different materials to solve the problems related to fabrication of nanostructures.

CO5. Select appropriate technique for fabrication of nanostructures and nanocomposites.

CO6. Apply ethical standards and legal issues while using chemical substances in fabrication of new nanostructures.

DETAILED SYLLABUS:

UNIT-I: FUNDAMENTALS OF NANOTECHNOLOGY (8 Periods)

Introduction – Scientific revolutions, Time and length scale in structures, Definition of a nanosystem; Dimensionality and size dependent phenomena - Surface to volume ratio Fraction of surface atoms, Surface energy and surface stress, surface defects, Properties at nanoscale (optical, mechanical, electronic, and magnetic).

UNIT-II: IDENTIFICATION AND CHARACTERIZATION TOOLS FOR NANOMATERIALS AND NANOSTRUCTURE (10 Periods)

Field Emission Scanning Electron Microscopy (FESEM), Environmental Scanning Electron Microscopy (ESEM) High Resolution, Transmission Electron Microscope (HRTEM), Scanning Tunneling Microscope(STM), Surface enhanced Raman spectroscopy (SERS), Secondary Ion Mass Spectroscopy, Focused Ion Beam Photoelectron Spectroscopy, X-ray Photoelectron Spectroscopy (XPS), Auger electron spectroscopy (AES), Rutherford backscattering spectroscopy (RBS), X-Ray Diffraction, Intensities in X-Ray Scattering Particle Size Effect.

UNIT-III: CLASSIFICATION OF NANOMATERIALS (10 Periods)

Classification based on dimensionality, Quantum Dots, Wells and Wires-III-V Nanoparticles, Electronic Structure of Nanosemiconductor, Carbon based nanomaterials (buckyballs, nanotubes, graphene), Metal based nano materials (nanogold, nanosilver and metal oxides), Nanocomposites, Nanopolymers, Nanoglasses, Nano ceramics, Biological nanomaterials, Fulrene-discovery and early years,.

UNIT-IV: SOME FABRICATION TECHNIQUES OF NANOMATERIALS AND NANOSTRUCTURES (9 Periods)

Chemical Methods: Metal Nanocrystals by Reduction, Solvothermal Synthesis, Photochemical Synthesis, Sonochemical Routes, Chemical Vapor Deposition (CVD), Metal Oxide Chemical Vapor Deposition (MOCVD), Plasma Enhanced Chemical Vapour Deposition Technique (PECVD), Hydrothermal Method, Sol-Gel.

Physical Methods: Ball Milling, Electrodeposition, Spray Pyrolysis, Flame Pyrolysis, DC/RF Magnetron Sputtering, Molecular Beam Epitaxy (MBE) Thermal Evaporation Method.

UNIT-V: APPLICATIONS (8 Periods)

Solar energy harvesting, Catalysis, Molecular electronics and printed electronics Nanoelectronics, Polymers with a special architecture, Liquid crystalline systems, Linear and nonlinear optical and electro-optical properties, Applications in displays and other devices, Nanomaterials for data storage, Photonics, Plasmonics, Chemical and biosensors, Nanomedicine and Nanobiotechnology, MESFET. **Total Periods: 45**

TEXT BOOKS:

1. Pradeep T., *A Textbook of Nanoscience and Nanotechnology*, Tata McGraw Hill Education Pvt. Ltd., 2012.
2. Hari Singh Nalwa, *Nanostructured Materials and Nanotechnology*, Academic Press, 2002.

REFERENCE BOOKS:

1. Nabok A., *Organic and Inorganic Nanostructures*, Artech House, 2005.
2. Dupas C., Houdy P., Lahmani M.*, Nanoscience: Nanotechnologies and Nanophysics*, Springer - Verlag Berlin Heidelberg, 2007.
3. S.M. Sze, Physics of Semiconductor Devices, 2nd Edition 2001.

IV B. Tech. – I Semester

(16BT60505) ENGINEERING SYSTEM ANALYSIS AND DESIGN

(Common to EEE, ECE and EIE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Systems Process; Technologies for Systems; System Development Life Cycle; System Analysis and Modeling; Levels of Management; Project Management; Systems Implementation and Importance of UML Prototyping; Maintaining and Managing the Systems Output Process.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge in
- Systems Process and System Design
- Systems Analysis and Modeling
- System Development Life Cycle
- Design Management and Maintenance Tools.

CO2. Analyze System Process and estimate the given models by using case tools.

CO3. Design and Develop a model to the organizational systems.

CO4. Solve complex problems related to engineering systems and produce accurate results.

CO5. Apply object oriented techniques for modeling dynamic systems.

CO6. Contribute towards societal issues and responsibilities in designing, modeling and developing of organizational systems.

DETAILED SYLLABUS:

UNIT–I: INTRODUCTION **(9 Periods)**

Systems, Types of systems, Integrating technologies for systems, Need for system analysis and design, Role of the systems analyst, System development life cycle, CASE tools for analysis and design.

UNIT–II: ANALYSIS AND MODELING ORGANIZATIONAL SYSTEM **(9 Periods)**

Organization as system, System analysis, Depicting systems graphically, Use case modeling, Levels of management, Organizational culture.

UNIT–III: PROJECT MANAGEMENT **(10 Periods)**

Project initiation, Problem in organization, Determining feasibilities, Ascertaining hardware and software needs, Identifying, Forecasting, Comparing costs and benefits, Activity planning and control, Managing the project.

UNIT-IV: OBJECT ORIENTED ANALYSIS AND DESIGN USING UML **(8 Periods)**

Introduction, Object modeling, Dynamic modeling, functional modeling, packages and other UML artifacts, the importance of using UML for modeling.

UNIT-V: DESIGNING EFFECTIVE OUTPUT **(9 Periods)**

Output design objectives, Relating output content to output method, Realizing how output bias affects users, Designing output for display, Case studies-Designing a web site management, Online exam management, Online portal design.

Total Periods: 45

TEXT BOOK:

1. Kenneth E. Kendall and Julie E. Kendall, *System Analysis and Design*, Pearson Education, 9th Edition, 2011.

REFERENCE BOOKS:

1. Dennis, Wixom and Roth, *Systems Analysis and Design*, John Wiley, 1st Edition, 2012.
2. Shelly and Rosenblatt, *Systems Analysis and Design,* Cengage Learning, 9th Edition, 2012.

IV B. Tech. – I Semester
(16BT71011) MICRO-ELECTRO-MECHANICAL SYSTEMS
(Common to EEE, ECE and EIE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:—

COURSE DESCRIPTION: Overview of Micro Electro Mechanical Systems (MEMS); scaling laws; working principles of microsensors and microactuators; materials; microfabrication processes; packaging of Microsystems.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on MEMS devices, scaling laws, microsensors and microactuators.

CO2. Analyze the properties of materials and identify its suitability for MEMS device.

CO3. Design MEMS devices that meet desired specifications and requirements.

CO4. Analyze and synthesize the information to provide effective solution to engineering problems with MEMS devices.

CO5. Use modern techniques in micro manufacturing process.

CO6. Develop efficient and cost effective MEMS based products for society.

DETAILED SYLLABUS:

UNIT-I: OVERVIEW OF MEMS AND SCALING LAWS **(9 Periods)**

MEMS and Microsystems, Microsystems and microelectronics, miniaturization, applications of MEMS in the automotive industry and in other industries.

Scaling laws of miniaturization: Introduction to scaling, scaling in: geometry, rigid- body dynamics, electrostatic forces, electromagnetic forces, Electricity, Fluid mechanics, Heat transfer.

UNIT -II: **WORKING PRINCIPLES OF MICROSYSTEMS** **(9 Periods)**

Microsensors, acoustic wave sensors, biomedical and biosensors, chemical sensors, pressure sensors, thermal sensors. Microactuation: actuation using thermal forces, shape-memory alloys, piezoelectric crystals, electrostatic forces. MEMS with microactuators, microgrippers, micromotors, microvalves, micropumps. Microaccelerometers, microfludics.

UNIT-III: MATERIALS FOR MEMS AND MICROSYSTEMS **(9 Periods)**

Substrate and wafers, silicon as a substrate material, silicon compounds, silicon piezoresistors, gallium arsenide, quartz, piezoelectric crystals, polymers, carbon nano tube (CNT), development of CNTs, application of CNTs.

UNIT-IV: MEMS FABRICATION PROCESS AND MICROMANUFACTURING **(9 Periods)**

Photolithography, ion implantation, diffusion, oxidation, chemical vapor deposition, physical vapor deposition, deposition by epitaxy, etching, bulk micromanufacturing, surface micromanufacturing, LIGA process.

UNIT-V: MEMS PACKAGING **(9 Periods)**

Introduction to microsystem packaging, objectives and general considerations in packaging design, three levels of microsystem packaging, interfaces in microsystem packaging, packaging technologies, three-dimensional packaging, selection of packaging materials, signal mapping and transduction, Design case: Pressure sensor packaging.

Total Periods: 45

TEXT BOOK:

1. Tai-Ran Hsu, *MEMS & Microsystems, Design and Manufacture*, McGraw Hill Education (India) Pvt. Ltd., 2002.

REFERENCES BOOKS:

1. G.K.Ananthasuresh, K.J.Vinoy, *Micro and Smart Systems*, Wiley India, 2010.

2. Nitaigour Premchand Mahalik, *MEMS*, McGraw Hill Education (India) Pvt. Ltd., 2007.

IV B. Tech. – I Semester
(16BT61205) CYBER SECURITY AND LAWS
(Common to EEE, ECE and EIE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Cyber Crimes and Indian IT Act; Cyber Offenses; Tools and Methods used in Cyber Crime; Phishing ad Identity Theft; Indian and Global Perspective on Cyber Crimes and Cyber Security; Organizational Implications on Cyber Security; IPR Issues; Cyber Crime and Terrorism; Cyber Crime Illustrations.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge in Cyber security, Cyber crimes and its related laws in Indian and Global Act.
CO2. Analyze the legal perspectives and laws related to cyber crimes in Indian context.
CO3. Apply security and privacy methods in development of modern applications and in organizations to protect people and to prevent cyber crimes.
CO4. Solve Cyber security issues using privacy policies.
CO5. Use antivirus tools to minimize the impact of cyber threats.
CO6. Follow security standards for the implementation of Cyber Security and laws.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO CYBER CRIMES AND OFFENSES (9 Periods)

Cyber Crimes: Introduction, Definition, Origin, Cyber crime and information security, Cyber criminals, Classifications of cyber crimes, The legal perspectives and Indian perspective, Cyber crime and Indian ITA 2000, Global perspective on cyber crimes.

Cyber Offenses: Introduction, Criminals planning on attacks, Social engineering, Cyber stalking, Cyber cafe and crimes, Botnets.

UNIT-II: TOOLS AND METHODS USED IN CYBER CRIME & PHISHING AND IDENTITY THEFT (9 Periods)

Introduction, Proxy servers and Anonymizers, Phishing, Password cracking, Key loggers and Spywares, Virus, Worms and Ransomware, Trojan horses and Backdoors, Steganography, DoS and DDoS attacks.

Phishing and Identity Theft: Introduction, Phishing, Identity Theft (ID Theft).

UNIT-III: CYBER CRIMES AND CYBER SECURITY-LEGAL PERSPECTIVES (8 Periods)

Introduction, Cyber laws in Indian context, The Indian IT act, Challenges to Indian law and Cyber crime scenario in India, Consequences of not addressing the weakness in IT act, Digital signatures and the Indian IT Act, Cyber Crime and Punishment, Cyberlaw, Technology and Students in India scenario.

UNIT-IV: CYBER SECURITY-ORGANIZATIONAL IMPLICATIONS (10 Periods)

Introduction, Web threats for organizations – evils and perils, Security and privacy implications from cloud computing, Social Media Marketing-Security risks and Perils for organizations, Social computing and associated challenges for organizations, Protecting people's privacy in organization, Organizational guidelines for internet usage, Safe computing and Usage policy, Incident handling and Best practices.

UNIT-V: CYBER CRIME & TERRORISM AND ILLUSTRATIONS (9 Periods)

Cyber Crime & Terrorism: Introduction, Intellectual property in the cyber space, The ethical dimension of cyber crimes, The psychology, Mindset and skills of hackers and cyber criminals, Sociology of cyber criminals, Information warfare.

Cyber Crime Illustrations: Indian banks lose millions of rupees, Justice vs. Justice, Parliament attack, The Indian case of online gambling, Bank and credit card related frauds, Purchasing goods and services scam, Nigerian 419 scam.

Total Periods: 45

TEXT BOOK:

1. Nina Gobole and Sunit Belapure, *Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives*, Wiley India, 2011.

REFERENCE BOOK:

1. Prashant Mali, *Cyber Law and Cyber Crimes*, Snow White Publications Pvt. Ltd., 2013.

IV B. Tech. – I Semester
(16BT61505) BIOINFORMATICS
(Common to EEE, ECE and EIE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —

COURSE DESCRIPTION: Introduction to Bioinformatics; Biology and Information; Sequence alignment and dynamic programming; Biological Database; Homology Modeling; Structure Prediction; Molecular Dynamics

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on concepts of biological databases, Genome and proteome.

CO2. Analyze biological sequences for Homology Modeling.

CO3. Apply clustering methods for Phylogenetic trees.

CO4. Solve bio sequencing problems using dynamic programming.

CO5. Select and apply appropriate techniques and tools to structure Prediction

DETAILED SYLLABUS:

UNIT-I: NUCLEIC ACIDS, PROTEINS, AND AMINO ACIDS (8 Periods)

Bioinformatics-Definition, Nucleic acid structure, Protein structure, the central dogma, Physico-chemical properties of the amino acids and their importance in protein folding, Polymerase chain reaction (PCR).

UNIT-II: INFORMATION RESOURCES FOR GENES AND PROTEIN (10 Periods)

Database file formats, Nucleic acid sequence databases, Protein sequence databases.

Sequence Alignment Algorithm

Pair wise sequence alignment – The problem, Pair wise sequence alignment – Dynamic programming methods, The effect of scoring parameters on the alignment, Multiple sequence alignment.

UNIT-III: PREDICTION OF THE THREE-DIMENSIONAL STRUCTURE OF A PROTEIN AND HOMOLOGY MODELING (9Periods)

Secondary Structure Prediction, Basic Principles, The Steps of Comparative Modeling, Accuracy of Homology Models, Manual versus Automatic Models, SNPs, Motifs.

UNIT-IV: PHYLOGENETIC METHODS (10 periods)

Phylogenetic trees, choosing sequences, Distance matrices and clustering methods, Calculation of distances in the neighbor-joining method, Bootstrapping, Tree optimization criteria and tree search methods, The maximum-likelihood criterion, Calculating the likelihood of the data on a given tree, The parsimony criterion.

UNIT-V: NEW FOLD MODELING (8 Periods)

Estimating the Energy of a Protein Conformation, Energy Minimization, Molecular Dynamics, The "Omics" Universe-Transcriptomics, Proteomics, Interactomics, Structural Genomics, Pharmacogenomics.

Total Periods: 45

TEXT BOOKS:

1. Paul G. Higgs and Teresa K. Attwood, *Bioinformatics and Molecular Evolution* Blackwell Publishing, 2005.
2. Anna Tramontano, *Introduction to Bioinformatics*, Chapman and Hall/CRC, 2006.

REFERENCE BOOKS:

1. Hooman H. Rashidi and Lukas K. Buehler, *Bioinformatics Basics, Applications in Biological Science and Medicine,* CRC Press, Taylor & Francis Group, 2nd Edition, 2005.
2. Rastogi S. C., NamitaMendiratta and Parag Rastogi, *Bioinformatics: Methods and Applications: Genomics, Proteomics and Drug Discoveryn,* PHI Learning Pvt. Ltd., 3rd Edition, 2011.

IV B. Tech. – I Semester
(16BT71031) ANALYTICAL AND BIOMEDICAL INSTRUMENTATION LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Courses on Analytical Instrumentation, Biomedical Instrumentation.

COURSE DESCRIPTION: Measurements of parameters: calorific value, blood pressure, respiration rate and heart sounds; characteristics of spectrometer; gas chromatography, and flame photometer.

COURSE OUTCOMES: On Successful completion of the course, students will be able to

CO1. Demonstrate knowledge on measurement of heart sounds, respiration rate, pH Value and calorific value.
CO2. Analyze the performance of spectrometers, flame photometer, gas chromatography and Geiger Muller counters.
CO3. Design the Instrumentation Amplifier for bio-signals.
CO4. Conduct the analytical and biomedical experiments to provide valid conclusions.
CO5. Use appropriate hardware and software tools to conduct the analytical and biomedical experiments.
CO6. Commit to ethical principles in the usage of biomedical equipments.
CO7. Do experiments related to analytical and biomedical instruments effectively as an individual and as a member in a group.
CO8. Communicate effectively in verbal and written forms in the area of analytical and biomedical instrumentation.

LIST OF EXPERIMENTS:
Minimum of TEN experiments to be conducted

1. Calibration and measurement of pH value, Dissolved Oxygen and Thermal Conductivity of a given sample.
2. Measure the absorbance, transmittance and concentration of the sample using UV-VIS Spectrophotometer.
3. Measure the concentration of a sample using Flame Photometer.
4. Characteristics of Geiger Muller Counter.
5. Compound analysis of a sample using Gas/Liquid chromatography.
6. Blood pressure measurement using sphygmomanometer.
7. Analysis of ECG for different lead configurations.
8. Analysis of EEG Signals.
9. Analysis of EMG Signals.
10. Design of Instrumentation Amplifier for bioelectrical Signals.
11. Measurement of Respiration rate, Heart Sounds.

IV B. Tech. – I Semester

(16BT71032) INDUSTRIAL AUTOMATION LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Courses on Process Control Instrumentation, Industrial Automation.

COURSE DESCRIPTION: Automatic control of motors; liquid level; temperature; pressure; processes using PLC based control systems and SCADA systems. P&I diagram of Feedback Control system, Cascade control system and Ratio control system.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on
- P& I diagrams
- PLC and SCADA
- Pneumatic and Hydraulic

CO2. Analyze operation and performance of automation process made for Level Process, Bottle filling system, Temperature and DC motor speed control.

CO3. Design an algorithm to automate Level Process, Bottle filling system, Temperature and DC motor speed control.

CO4. Interpret and synthesis the data obtained from various industrial processes to provide valid conclusions.

CO5. Select and apply appropriate techniques to make industrial process automation.

CO6. Follow professional ethics and practices to provide automation solutions for the society.

CO7. Commit to ethical principle in the design of process and algorithms.

CO8. Function effectively as individual and as member in team in the field of industriala utomation.

CO9. Communicate effectively both oral and written forms in the area of industrial automation.

LIST OF EXPERIMENTS:

Minimum of ELEVEN experiments to be conducted

1. Study of various symbols and abbreviations used in P&I diagram.
2. Draw the P&I diagram of Feedback Control System and Cascade Control System.
3. Implementation of Ladder Diagrams for Logic gates, timer and counters.
4. Programming a PLC to demonstrate control of a level Process.
5. Programming a PLC to demonstrate DC Motor speed control.
6. Programming a PLC to demonstrate Bottle filling system.
7. Programming a PLC to demonstrate Temperature control.
8. Implementation of PLC programming through SCADA.
9. Programming a PLC to demonstrate control of flow process trough SCADA.
10. Study of hydraulic components and hydraulic circuits.
11. Design of pressure and flow control valves using hydraulics.
12. Study of pneumatic components and technology.
13. Design of the interaction between cylinders & valves using pneumatics.

IV B. Tech. – I Semester
(16BT71033) COMPREHENSIVE ASSESSMENT

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
	100	100	-	-	-	2

PRE-REQUISITES: All the technical courses of the program up to IV B. Tech. – I Semester.

COURSE DESCRIPTION: Assessment of student learning outcomes in the courses of the program.

COURSE OUTCOMES: Comprehensive Assessment enables a successful student to:

CO1. Demonstrate knowledge in the courses of the Electronics and Instrumentation

CO2. Analyze problems in the courses of the Electronics and Instrumentation.

CO3. Design solutions for the problems in the courses of the Electronics and Instrumentation.

CO4. Solve complex engineering problems in the courses of the Electronics and Instrumentation.

CO5. Apply tools and techniques to complex engineering activities with an understanding of limitations in the courses of the Electronics and Instrumentation.

CO6. Provide solutions as per societal needs with consideration to health, safety, legaland cultural issues in the domain of Electronics and Instrumentation.

CO7. Understand the impact of the professional engineering solutions in environmental context and need for sustainable development in the domain of Electronics and Instrumentation.

CO8. Apply ethics and norms of the engineering practice in the courses of the Electronics and Instrumentation.

CO9. Function effectively as an individual in the domain of Electronics and Instrumentation.

CO10. Present views cogently and precisely in the domain of Electronics and Instrumentation.

CO11. Engage in life-long learning in the domain of Electronics and Instrumentation.

IV B. Tech. – II Semester

(16BT81031) **PROJECT WORK**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
100	100	200	-	-	-	12

PRE-REQUISITES: All technical courses of the program up to IV B. Tech. – I Semester.

COURSE DESCRIPTION: Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Preparation of thesis and presentation.

COURSE OUTCOMES: On successful completion of project work, students will be able to

CO1. Demonstrate in-depth knowledge on the project topic.

CO2. Identify, analyze and formulate complex problem chosen for project work to attain substantiated conclusions.

CO3. Design solutions to the chosen project problem.

CO4. Undertake investigation of project problem to provide valid conclusions.

CO5. Use the appropriate techniques, resources and modern engineering tools necessary for project work.

CO6. Understand societal issues in the context of the project work.

CO7. Understand environmental issues while executing the project work.

CO8. Understand professional and ethical responsibilities while executing the project work.

CO9. Function effectively as individual and a member in the project team.

CO10. Develop communication skills, both oral and written form, for preparing and presenting project report.

CO11. Demonstrate knowledge and understanding of cost and time analysis required for carrying out the project.

CO12. Engage in lifelong learning to improve knowledge and competence in the chosen area of the project.

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(Autonomous)

COURSE STRUCTURE (2016-2017)

CIVIL ENGINEERING

I B.Tech. (I Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits (C)	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
I Year - I Semester										
1.	16BT1HS01	Technical English	3	1	-	4	3	30	70	100
2.	16BT1BS01	Engineering Chemistry	3	1	-	4	3	30	70	100
3.	16BT1BS03	Matrices and Numerical Methods	3	1	-	4	3	30	70	100
4.	16BT1BS04	Multi–Variable Calculus and Differential Equations	3	1	-	4	3	30	70	100
5.	16BT10501	Programming in C	3	1	-	4	3	30	70	100
6.	16BT1HS31	English Language Lab	-	-	3	3	2	50	50	100
7.	16BT1BS31	Engineering Chemistry Lab	-	-	3	3	2	50	50	100
8.	16BT10331	Computer Aided Engineering Drawing	-	1	6	7	3	50	50	100
9.	16BT10531	Programming in C Lab	-	-	3	3	2	50	50	100
Total			**15**	**6**	**15**	**36**	**24**	**350**	**550**	**900**

I B.Tech. (II Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits (C)	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
I Year - II Semester										
1.	16BT1BS02	Engineering Physics	3	1	-	4	3	30	70	100
2.	16BT2BS01	Transformation Techniques and Partial Differential Equations	3	1	-	4	3	30	70	100
3.	16BT20101	Building Materials and Construction Technology	3	1	-	4	3	30	70	100
4.	16BT20102	Engineering Mechanics	4	1	-	5	4	30	70	100
5.	16BT20241	Basic Electrical and Electronics Engineering	3	1	-	4	3	30	70	100
6.	16BT1BS32	Engineering Physics Lab	-	-	3	3	2	50	50	100
7.	16BT20131	Building Materials and Construction Technology Lab	-	-	3	3	2	50	50	100
8.	16BT20252	MATLAB Practice for Civil Engineers	-	1	3	4	2	50	50	100
9.	16BT20331	Engineering Workshop Practice	-	-	3	3	2	50	50	100
Total			16	6	12	34	24	350	550	900

II B.Tech. (I Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits (C)	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
II Year - I Semester										
1.	16BT3BS01	Probability Distributions and Statistical Methods	3	1	-	4	3	30	70	100
2.	16BT3HS02	Managerial Economics and Principles of Accountancy	3	1	-	4	3	30	70	100
3.	16BT30101	Construction Planning and Project Management	3	1	-	4	3	30	70	100
4.	16BT30102	Fluid Mechanics and Hydraulic Machinery	3	1	-	4	3	30	70	100
5.	16BT30103	Mechanics of Solids	3	1	-	4	3	30	70	100
6.	16BT30104	Surveying	3	1	-	4	3	30	70	100
7.	16BT30131	Fluid Mechanics and Hydraulic Machinery Lab	-	-	3	3	2	50	50	100
8.	16BT30132	Strength of Materials Lab	-	-	3	3	2	50	50	100
9.	16BT30133	Surveying Lab	-	-	3	3	2	50	50	100
Total			**18**	**6**	**9**	**33**	**24**	**330**	**570**	**900**

II B.Tech. (II Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits (C)	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
II Year - II Semester										
1.	16BT3HS01	Environmental Studies	3	-	-	3	3	30	70	100
2.	16BT40101	Concrete Technology	3	1	-	4	3	30	70	100
3.	16BT40102	Engineering Geology	3	1	-	4	3	30	70	100
4.	16BT40103	Engineering Hydrology	3	1	-	4	3	30	70	100
5.	16BT40104	Structural Analysis-I	3	1	-	4	3	30	70	100
6.	16BT40105	Water Supply Engineering	3	1	-	4	3	30	70	100
7.	16BT40131	Concrete Technology Lab	-	-	3	3	2	50	50	100
8.	16BT40132	Engineering Geology Lab	-	-	3	3	2	50	50	100
9.	16BT4HS31	Soft Skills Lab	-	-	3	3	2	50	50	100
Total			**18**	**5**	**9**	**32**	**24**	**330**	**570**	**900**

III B.Tech. (I Semester)

S. No.	Course Code	Course Title	Course Category Contact Periods/ Week				Credits (C)	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
III Year - I Semester										
1.	16BT50101	Irrigation Engineering	3	1	-	4	3	30	70	100
2.	16BT50102	Reinforced Cement Concrete Structures	3	1	-	4	3	30	70	100
3.	16BT50103	Soil Mechanics	3	1	-	4	3	30	70	100
4.	16BT50104	Structural Analysis-II	3	1	-	4	3	30	70	100
5.	16BT50105	Wastewater Technology	3	1	-	4	3	30	70	100
6.		Interdisciplinary Elective-1	3	1	-	4	3	30	70	100
	16BT50441	1. Principles of Image Processing								
	16BT5HS01	2. Costing and Finance Management for Civil Engineers								
	16BT50241	3. Renewable Energy								
	16BT70308	4. Computational Fluid Dynamics								
7.	16BT50131	Computer Aided Building Planning and Drawing	-	1	3	4	2	50	50	100
8.	16BT50132	Environmental Engineering Lab	-	-	3	3	2	50	50	100
9.	16BT50133	Geotechnical Engineering Lab	-	-	3	3	2	50	50	100
Total			**18**	**7**	**9**	**34**	**24**	**330**	**570**	**900**

III B.Tech. (II Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
III Year - II Semester										
1.	16BT60101	Foundation Engineering	3	1	-	4	3	30	70	100
2.	16BT60102	Highway and Traffic Engineering	3	1	-	4	3	30	70	100
3.	16BT60103	Steel Structures	3	1	-	4	3	30	70	100
4.	**Interdisciplinary Elective-2**		3	1	-	4	3	30	70	100
	16BT40502	1. Data Base Management Systems								
	16BT50341	2. Optimization Techniques								
	16BT60104	3. Fire Engineering								
	16BT60241	4. Energy Audit and Conservation								
5.	**Program Elective – 1**		3	1	-	4	3	30	70	100
	16BT60105	1. Advanced Reinforced Cement Concrete Structures								
	16BT60106	2. Advanced Structural Analysis								
	16BT60107	3. Advanced Surveying								
	16BT60108	4. Geoenvironmental Engineering								
	16BT60109	5. Groundwater Development and Management								
	16BT60110	6. Solid Waste Management								
	16BT60111	7. Structural Health Monitoring								
6.	**Open Elective**		3	1	-	4	3	30	70	100
7.	16BT60131	Computer Aided Design and Detailing Lab	-	-	3	3	2	50	50	100
8.	16BT60132	Highway Engineering Lab	-	-	3	3	2	50	50	100
9.	16BT60133	Seminar	-	-	-	-	2	-	100	100
10.	16BT6MOOC	MOOC	-	-	-	-	-	-	-	-
Total			**18**	**6**	**6**	**30**	**24**	**280**	**620**	**900**

Sl. No.	Course Code	Open Elective Course Title	Sl. No.	Course Code	Open Elective Course Title
1.	16BT6HS01	Banking and Insurance	16.	16BT60114	Disaster Mitigation and Management
2.	16BT6HS02	Business Communication and Career Skills	17.	16BT60115	Environmental Pollution and Control
3.	16BT6HS03	Cost Accounting and Financial Management	18.	16BT60116	Planning for Sustainable Development
4.	16BT6HS04	Entrepreneurship for Micro, Small and Medium Enterprises	19.	16BT60117	Professional Ethics
5.	16BT6HS05	French Language	20.	16BT60118	Rural Technology
6.	16BT6HS06	German Language	21.	16BT60308	Global Strategy and Technology
7.	16BT6HS07	Indian Constitution	22.	16BT60309	Intellectual Property Rights and Management
8.	16BT6HS08	Indian Economy	23.	16BT60310	Managing Innovation and Entrepreneurship
9.	16BT6HS09	Indian Heritage and Culture	24.	16BT60311	Materials Science
10.	16BT6HS10	Indian History	25.	16BT70412	Green Technologies
11.	16BT6HS11	Personality Development	26.	16BT70413	Introduction to Nanoscience and Technology
12.	16BT6HS12	Philosophy of Education	27.	16BT60505	Engineering System Analysis and Design
13.	16BT6HS13	Public Administration	28.	16BT71011	Micro-Electro-Mechanical Systems
14.	16BT60112	Building Maintenance and Repair	29.	16BT61205	Cyber Security and Laws
15.	16BT60113	Contract Laws and Regulations	30.	16BT61505	Bio-informatics

IV B.Tech. (I Semester)

S. No.	Course Code	Course Title	Course Category Contact Periods/ Week				Credits (C)	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
IV Year - I Semester										
1.	16BT70101	Estimation and Quantity Surveying	3	1	-	4	3	30	70	100
2.	16BT70102	Geospatial Technologies	3	1	-	4	3	30	70	100
3.	16BT70103	Railway, Airport and Harbour Engineering	3	1	-	4	3	30	70	100
4.		Program Elective – 2	3	1	-	4	3	30	70	100
	16BT70104	1. Advanced Foundation Engineering								
	16BT70105	2. Architecture and Town Planning								
	16BT70106	3. Environmental Impact Assessment and Management								
	16BT70107	4. Global Positioning System (GPS)								
	16BT70108	5. Structural Dynamics								
	16BT70109	6. Transportation Planning and Management								
	16BT70110	7. Water Resources Systems Planning and Management								
5.		Program Elective – 3	3	1	-	4	3	30	70	100
	16BT70111	1. Advanced Steel Structures								
	16BT70112	2. Earthquake Resistant Design of Structures								
	16BT70113	3. Highway Construction and Maintenance								
	16BT70114	4. Industrial Wastewater Treatment								
	16BT70115	5. Infrastructure Development and Management								
	16BT70116	6. Soil Dynamics and Machine Foundations								
	16BT70117	7. Watershed Management								
6.		Program Elective – 4	3	1	-	4	3	30	70	100
	16BT70118	1. Air Pollution and Control								
	16BT70119	2. Bridge Engineering								
	16BT70120	3. Ground Improvement Techniques								
	16BT70121	4. Hydro Power Engineering								
	16BT70122	5. Pavement Analysis and Design								
	16BT70123	6. Prestressed Concrete								
	16BT70124	7. Rehabilitation and Retrofitting of Structures								
7.	16BT70131	Civil Engineering Software Lab	-	-	3	3	2	50	50	100
8.	16BT70132	Remote Sensing and Geographical Information Systems Lab	-	-	3	3	2	50	50	100
9.	16BT70133	Comprehensive Assessment	-	-	-	-	2	-	100	100
Total			**18**	**6**	**6**	**30**	**24**	**280**	**620**	**900**

IV B.Tech. (II Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits (C)	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
IV Year - II Semester										
1.	16BT80131	Project Work*	-	-	-	-	12	100	100	200
		Total	-	-	-	-	**12**	**100**	**100**	**200**

I B. Tech. - I Semester

(16BT1HS01) **Technical English**

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: English at Intermediate level

COURSE DESCRIPTION: Introduction to Communication; Active Listening; Effective Speaking; Reading; and Writing.

COURSE OUTCOMES: On successful completion of this course, the students will be able to

CO1. Demonstrate knowledge in

a. Process of communication
b. Modes of listening
c. Paralinguistic features
d. Skimming and Scanning
e. Elements of style in writing

CO2. Analyze the possibilities and limitations of language for understanding

a. Barriers to Communication
b. Barriers to Effective Listening
c. Barriers to Speaking
d. Formal and metaphorical language

CO3. Design and develop functional skills for professional practice**.**

CO4. Apply writing skills in preparing and presenting documents

CO5. Function effectively as an individual and as a member in diverse teams.

CO6. Communicate effectively with the engineering community and society in formal and informal situations**.**

DETAILED SYLLABUS:

UNIT I: INTRODUCTION TO COMMUNICATION **(9 periods)**

Introduction –Language as a Tool of Communication – Communicative Skills (Listening, Speaking, Reading and Writing) – Effective Communication – Modes of Communication – Barriers to Communication (classification)

UNIT II: ACTIVE LISTENING **(9 periods)**

Introduction – Reasons for poor Listening – Traits of a Good Listener – Listening Modes – Types of Listening – Barriers to Effective Listening – Listening for General Content and Specific Information

UNIT III: EFFECTIVE SPEAKING **(9 periods)**

Introduction – Achieving Confidence, Clarity and Fluency – Paralinguistic Features – Barriers to Speaking – Types of Speaking – Persuasive Speaking

UNIT IV: READING **(9 periods)**

Introduction and Reading Rates – Reading and Interpretation – Intensive and Extensive Reading – Critical Reading – Reading for Different Purposes – SQ3R Reading Technique –Study Skills

UNIT V: WRITING **(9 periods)**

Introduction – Language – Elements of Style – Techniques for Good Technical Writing – Referencing and Styling – Right Words and Phrases – Sentences

Total Periods: *45*

TEXT BOOKS:

1. Meenakshi Raman & Sangeetha Sharma, *Technical Communication*, Oxford University Press, New Delhi, 2012.

REFERENCE BOOKS:

1. Ashraf Rizvi, *Effective Technical Communication*, McGraw-Hill Education (India) Pvt.Ltd., New Delhi, 2015.
2. Sanjay Kumar & Pushp Lata, *Communication Skills*, Oxford University Press, New Delhi, 2013.
3. Teri Kwal Gamble and Michael Gamble, *Communication Works*, Tata Mc Graw-Hill, New Delhi, 2010.

4. Rajendra Pal and J.S. Korlahalli, *Essentials of Business Communication*, Sultan Chand and Sons (P) Ltd, New Delhi, 2010.

I-B. Tech - I Semester
(16BT1BS01): **ENGINEERING CHEMISTRY**
(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITE: Intermediate/Senior Secondary Chemistry

COURSE DESCRIPTION: Water technology, Chemistry of Engineering materials, Nanochemistry, Green Chemistry, Electro chemical cells, Sensors, Corrosion and Lubricants.

COURSE OUTCOMES:

After completion of the course, a successful student is able to:

CO1: Acquire basic knowledge in water technology, engineering plastics, conducting polymers, composites, Electro chemical cells, Nano Chemistry, principles of Green Chemistry, corrosion phenomenon and lubricants.

CO2: Develop analytical skills in:
- a. Determination of hardness of water.
- b. Determination of viscosity, flame and fire points, cloud and pour points.

CO3: Develop designing skills in:
- a. Synthesis of engineering plastics.
- b. Chemical methods for the synthesis of Nano materials.

CO4: Develop skills for providing solutions through:
- a. Mitigation of hardness of water.
- b. Newer Nanomaterials and engineering plastics for specific applications

CO5: Acquire awareness to practice engineering in compliance to modern techniques such as:
- a. Nalgonda technique for defluoridation of water
- b. Electroplating technique for control of corrosion.

CO6: Acquire awareness to societal issues on:
- a. Quality of water.
- b. Bio-diesel
- c. Chemical materials utility and their impact.

DETAILED SYLLABUS:

UNIT–I: WATER TECHNOLOGY (9 periods)

Introduction: Types of water, impurities in water and their consequences, types of hardness of water, units of hardness of water, disadvantages of hardness of water, estimation of hardness of water by EDTA method, Boiler troubles: Scales and Sludges, Caustic embrittlement, Boiler corrosion and Priming and Foaming.

Softening of water: Zeolite process and Ion exchange process, advantages and disadvantages. Desalination of brackish water by Reverse Osmosis, Numerical problems on estimation of hardness of water.

Fluorides in water: Effects on human health, defluoridation method-Nalgonda method; comparison of merits and demerits of various defluoridation methods (Nalgonda, Bone Charcoal, Activated Alumina, Contact precipitation, Brick, Reverse osmosis).

UNIT – II: CHEMISTRY OF ENGINEERING MATERIALS (9 periods)

Engineering Plastics: Definition, general properties, synthesis, properties and applications of PC, PTFE, and PMMA.

Conducting polymers: Definition, types of conducting polymers: Intrinsic and extrinsic conducting polymers with examples, engineering applications of conducting polymers.

Biodegradable polymers: Definition, properties, classification, mechanism of degradation of biodegradable polymers and their applications.

Composites – Introduction, types of composites: fiber reinforced particulate and layered composites with examples, advantages of composites and applications.

UNIT– III: NANOCHEMISTRY AND GREEN CHEMISTRY (9 periods)

Nanochemistry: Introduction, classification, properties and applications of Nano materials (nano particles, nano tubes, nano wires, nano composites, dendrimers); synthesis of Nano materials – Sol-gel process.

Green Chemistry: Introduction, principles of green chemistry, Tools of Green Chemistry with Examples, Applications of Green Chemistry in science and technology.

Biodiesel: Introduction, Synthesis (Trans esterification method), advantages, disadvantages and applications.

UNIT–IV: ELECTROCHEMICAL CELLS AND SENSORS (9 periods)

Electrochemical cell: Introduction, EMF of an electrochemical cell.

Batteries: Introduction, types of Batteries: primary and secondary batteries with examples, Ni-Cd batteries, Lithium-ion batteries, Lithium- Polymer batteries, Applications of batteries.

Fuel Cells: Definition, examples: H_2 – O_2 Fuel cell, solid oxide fuel cell, Bio-fuel cell and applications of fuel cells.

Sensors - Introduction, Types of Sensors, electrochemical sensor: construction and working principle of potentiometric sensor, and applications of electrochemical sensors.

UNIT–V: CORROSION AND LUBRICANTS (9 periods)

Corrosion: Introduction, Definition, types of corrosion (dry and wet corrosion), galvanic corrosion, concentration cell corrosion, Factors influencing corrosion, Corrosion control: cathodic protection; sacrificial anodic protection and impressed current cathodic protection; protective coatings: Galvanizing and Electroplating (Nickel).

Lubricants: Definition, functions of lubricants, mechanism of lubrication, classification of lubricants, properties of lubricants – viscosity, flash and fire points, cloud and pour points, Aniline points, neutralization number and mechanical strength. **Total periods: 45 periods**

TEXT BOOKS:

1. P.C.Jain & Monika Jain, **Engineering Chemistry**, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 16th edition, 2013.
2. K.N. Jayaveera, G.V. Subba Reddy & C. Ramachandraiah **Engineering Chemistry**, Mc. Graw-Hill Higher Education, Hyderabad, 1st edition, 2015.

REFERENCE BOOKS:

1. A.K. Bandyopadhyay, **Nano Materials,** New Age international publishers, 2nd edition, 2014.
2. Paul T. Anastas and John C Warner, **Green Chemistry: Theory and practice,** Oxford University Press, 2000.

I B. Tech. - I Semester
(16BT1BS03) MATRICES AND NUMERICAL METHODS
(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate /Senior secondary mathematics

COURSE DESCRIPTION: Fundamentals of matrix theory; numerical solutions of equations, curve fitting; interpolation; numerical differentiation and integration; numerical solutions of ordinary differential equations.

COURSE OUTCOMES: After completion of the course a successful student is able to

CO1: Acquire basic **knowledge** in
- (a) Finding the rank of matrices and analyzing them.
- (b) Solving algebraic and transcendental equations by various numerical methods.
- (c) Fitting of various types of curves to the experimental data.
- (d) Estimating the missing data through interpolation methods.
- (e) Identification of errors in the experimental data
- (f) Finding the values of derivatives and integrals through various numerical methods.
- (g) Solving differential equations numerically when analytical methods fail.

CO2: Develop skills in **analyzing** the
- (a) methods of interpolating a given data
- (b) properties of interpolating polynomials and derive conclusions
- (c) properties of curves of best fit to the given data
- (d) algebraic and transcendental equations through their solutions
- (e) properties of functions through numerical differentiation and integration
- (f) properties of numerical solutions of differential equations

CO3: Develop skills in **designing** mathematical models for
- (a) Fitting geometrical curves to the given data
- (b) Solving differential equations
- (c) Constructing polynomials to the given data and drawing inferences.

CO4: Develop numerical skills in **solving the problems** involving
- (a) Systems of linear equations
- (b) Fitting of polynomials and different types of equations to the experimental data
- (c) Derivatives and integrals
- (d) Ordinary differential equations

CO5: Use relevant numerical **techniques** for
- (a) Diagonalising the matrices of quadratic forms
- (b) Interpolation of data and fitting interpolation polynomials
- (c) Fitting of different types of curves to experimental data
- (d) obtaining derivatives of required order for given experimental data
- (e) Expressing the functions as sum of partial fractions

DETAILED SYLLABUS:

UNIT–I : MATRICES **(11 periods)**

Rank of a matrix, echelon form, normal form, inverse of a matrix by elementary row operations. Solutions of linear system of equations. Eigen values, Eigen vectors and properties (without proof), Diagonalization. Quadratic form (QF), reductions to canonical form using orthogonal transformation and nature of QF.

UNIT-II NUMERICAL SOLUTIONS OF EQUATIONS AND CURVE FITTING **(8 periods)**

Solutions of Algebraic and Transcendental equations by bisection method, Regula-Falsi method, Newton – Raphson's method. Curve fitting by the principle of least squares, fitting of a straight line, parabola and exponential curves.

UNIT- III INTERPOLATION **(8 periods)**

Interpolation, difference operators and their relationships, Newton's forward and backward formulae, Lagrange's interpolation formula. Partial fractions using Lagrange's interpolation formula.

UNIT-IV NUMERICAL DIFFERENTIATION AND INTEGRATION **(8 periods)**

Numerical differentiation using Newton's forward and backward formulae. Numerical integration using Trapezoidal rule, Simpson's $1/3^{rd}$ rule and $3/8^{th}$ rule.

UNIT- V NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS **(10 periods)**

Numerical solutions of first order Initial value problems using Taylor series method, Euler's method , modified Euler's method, Runge – Kutta method (4^{th} order only) and Milne's predictor – corrector method.

Total no. of periods: 45

TEXT BOOK:

1. T.K.V. Iyenger, B. Krishna Gandhi, S.Ranganadham and M.V.S.S.N.Prasad, ***Mathematical Methods,*** S.Chand and Company, 8/e, 2013

REFERENCE BOOKS:

1. B.S. Grewal, ***Higher engineering mathematics***, Khanna Publishers, 42nd Edition. 2012
2. S.S.Sastry, ***Introductory methods of Numerical Analysis***, Prentice Hall of India, 5/e, 2013

I B. Tech. - I Semester

(16BT1BS04) MULTI-VARIABLE CALCULUS AND DIFFERENTIAL EQUATIONS

(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate /Senior secondary mathematics

COURSE DESCRIPTION: First order differential equations; higher order linear differential equations; functions of several variables; applications of integration; multiple integrals; vector calculus.

COURSE OUTCOMES: After completion of the course a successful student is able to

CO1: Acquire knowledge in
- (a) Higher order Differential equations
- (b) Maximum and minimum values for the functions of several variables
- (c) Double and triple integrals
- (d) Differentiation and integration of vector functions.
- (e) Line and surface volume
- (f) transforming integrals from three dimensional surfaces and volumes on to plane surfaces

CO2: Develop skills in analyzing the
- (a) methods for differential equation for obtaining appropriate solutions,
- (b) Properties of oscillatory electrical circuits and heat transfer in engineering systems
- (c) The variations in the properties of functions near their stationary values
- (d) Flow patterns of fluids, electrical and magnetic flux and related aspects

CO3: Develop skills in designing mathematical models for
- (a) R-C and L-R-C oscillatory electrical circuits
- (b) Heat transfer and Newton's law of cooling
- (c) Engineering concepts involving lengths of curves and areas of planes, Flux across surfaces

CO4: Develop analytical skills in solving the problems involving
- (a) Newton's law of cooling
- (b) non homogeneous linear differential equations
- (c) maximum and minimum values for the functions
- (d) lengths of curves, areas of surfaces and volumes of solids in engineering
- (e) transformation of integrals from three dimensional surfaces and volumes on to plane surfaces

CO5: Use relevant mathematical techniques for evaluating
- (a) various types of particular integrals in differential equations
- (b) stationary values for multi variable functions
- (c) multiple integrals in change of variables
- (d) integrations of vector functions.

DETAILED SYLLABUS:

UNIT-I: FIRST ORDER DIFFERENTIAL EQUATIONS (6 periods)

Linear and Bernoulli type, exact equations and reducible to exact. Orthogonal trajectories (Both Cartesian and polar forms). Newton's law of cooling.

UNIT II: HIGHER ORDER LINEAR DIFFERENTIAL EQUATIONS (9 periods)

Method for solution of linear equations- Differential operator *D*, Solution of second order linear homogeneous equations with constant coefficients, Solution of Higher order homogeneous linear equations with constant coefficients, **Solution of Non homogeneous linear equations**-Operator methods for finding particular integrals- for cases – e^{ax}, sin ax, cos ax, x^n, $e^{ax}V(x)$, $xV(x)$. Method of Variation of parameters. Applications to oscillatory electrical circuits.

UNIT-III: FUNCTIONS OF SEVERAL VARIABLES (8 periods)

Functions of Two Variables: Limits, Continuity; **Partial Derivatives**: Total Differential and Derivatives, Jacobian, Functional dependence, Taylor's Theorem, maxima and minima of functions of two variables with and without constraints – Lagrange's method of undetermined multipliers.

UNIT-IV: APPLICATIONS OF INTEGRATION AND MULTIPLE INTEGRALS (10 periods)

Applications of integration to – lengths of curves, areas of surfaces of revolution, Double and Triple integrals – change of order of integration, change of variables in integrals. Area enclosed by plane curves, volumes of solids.

UNIT-V: VECTOR CALCULUS (12 periods)

Vector differentiation: Gradient of a scalar field and Directional Derivative, Divergence and Curl of a Vector field

Line integrals: Line integrals independent of path – work done.

Surface area and Surface Integrals: Surface Area, Surface Integrals, Flux across a surface.

Green's Theorem: Green's Theorem (without proof)-verification- applications

Gauss Divergence Theorem and Stoke's Theorem: Gauss Divergence theorem (without proof), Stokes's Theorem (without proof) –verifications and applications. **Total no. of periods: 45**

TEXT BOOK:

1. T.K.V. Iyengar, B. Krishna Gandhi,S.Ranganatham and M.V.S.S.N. Prasad, ***Engineering Mathematics, Vol-1***, S. Chand &Company, 13/e, 2014

REFERENCE BOOKS:

1. Grewal, B.S., ***Higher engineering mathematics***,Khanna publishers, Delhi, 42/e. 2012.
2. Kreyszig, E., ***Advanced Engineering Mathematics***,John Wiley and Sons, Inc.,9/e.2012.

I B. Tech. - I Semester

(16BT10501) PROGRAMMING IN C

(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: NIL

COURSE DESCRIPTION:

Program design; Operators and Expressions; Data Input and Output; Control Statements; Functions; Arrays; Strings; Pointers; Structures & Unions and File handling Techniques;

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1: Demonstrate knowledge in:
- o Elements of C Language
- o Selection and Repetition statements.
- o Arrays, Strings and Functional statements.
- o Derived data types, Files and Pointers

CO2: Analyze complex engineering problems to develop suitable solutions

CO3: Design algorithms for specified engineering problems

CO4: Use appropriate 'C' language constructs for solving engineering problems

CO5: Write programs using 'C' language to implement algorithms

DETAILED SYLLABUS:

UNIT I – INTRODUCTION TO C PROGRAMMING, OPERATORS & EXPRESSIONS (08 periods)

Introduction to C Programming: The C Character set, Writing First Program of C, Identifiers and Keywords, Data types, Constants, Variables and Arrays, Declarations, Expressions, Statements and Symbolic Constants.

Operators and Expressions: Arithmetic Operators, Unary Operators, Relational and Logical Operators, Assignment Operators, the Conditional Operators.

UNIT II – DATA INPUT AND OUTPUT & CONTROL STATEMENTS (08 periods)

Data Input and Output: Single Character Input and Output, Input Data & Output data, The gets and puts Function.

Control Statements: Branching: The if-else Statement, Looping: The while Statement, More Looping: The do-while Statement, Still More Looping: The for Statement, Nested Control Statement, The switch Statement, The break & continue Statements, The goto Statement.

UNIT III – FUNCTIONS, PROGRAM STRUCTURES & ARRAYS (11 p*eriods*)

Functions: A Brief Overview, Defining a Function, Accessing a Function, Function Prototypes, Parsing Argument to a Function, Recursion.

Program Structure: Storage Classes, Automatic Variables, External (Global) Variables, Static Variables, Multi file Programs,

Arrays: Defining an Array, Processing an Array, Processing Array to function, Multidimensional Arrays. Linear search, Binary search, Fibonacci search, Bubble sort and Insertion sort

UNIT IV – STRINGS & POINTERS (09 periods)

Strings: Defining a String, NULL Character, Initialization of Strings, Reading and Writing a String, Processing a Strings, Character Arithmetic, Searching and Sorting of Strings, Library Functions for Strings.

Pointers: Pointer Declaration, Passing Pointers to a Function, Pointers and One-dimensional Arrays, Dynamic Memory Allocation, Operations on Pointers, Pointers and Multidimensional Arrays, Arrays of Pointers.

UNIT V – STRUCTURES AND UNIONS & FILE HANDLING (09 periods)

Structures and Unions: Defining a Structure, Processing a Structure, User-Defined Data types (typedef), Structures and Pointers, Passing Structures to Function, Self –Referential Structures, Unions

File Handling: Files introduction, Opening and Closing a Data File, Reading and Writing a Data File, Processing a Data File, Unformatted Data File, Concept of Binary Files, Accessing the File Randomly.

Total Periods: *45*

TEXT BOOK:

1. Byron Gottfried and Jitender Kumar C "*Programming with C*," Third Edition, McGraw Hill Education (India) Pvt, Ltd, New Delhi, 2016.

REFERENCE BOOKS:

1. PradipDey and Manas Ghosh, *"Programming in C",* Second Edition, Oxford University Press, NewDelhi, 2007.

2. E. Balagurusamy, "*Programming in C",* Seventh Edition, Mc Graw Hill Education (India) Pvt, Ltd, New Delhi, 2014.

I B. Tech. - I Semester

(16BT1HS31) ENGLISH LANGUAGE LAB

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITE: English at Intermediate or Equivalent Level

COURSE DESCRIPTION: Phonetics; Vocabulary Building; Functional Grammar; Just a Minute; Elocution/Impromptu; Giving Directions/Conversation Starters; Role Play; Public Speaking; Describing People, Places, Objects and Events; Reading Comprehension; Listening Comprehension; Information Transfer.

COURSE OUTCOMES:

On successful completion of this course the students will be able to

CO1. Demonstrate knowledge in
a. Phonetics b. Information Transfer

CO2. Analyze the situations in professional context by using
a. Vocabulary b. Grammar

CO3. Design and develop functional skills for professional practice.

CO4. Apply the techniques of Listening and Reading skills to comprehend Listening and Reading comprehension.

CO5. Function effectively as an individual and as a member in diverse teams through
a. Extempore talk and b. Role Play

CO6. Communicate effectively in public speaking in formal and informal situations.

CO7. Recognize the need to engage in lifelong learning to upgrade competence of knowledge and communication.

DETAILED SYLLABUS:

LIST OF EXERCISES:

1. Phonetics
2. Vocabulary Building
3. Functional Grammar
4. Just a Minute
5. Elocution/Impromptu
6. Giving Directions/Conversation Starters
7. Role Play
8. Public Speaking
9. Describing People, Places, Objects and Events.
10. Reading Comprehension
11. Listening Comprehension
12. Information Transfer

Total Lab Slots: 10

TEXT BOOK:

1. Department Lab Manual

REFERENCE BOOKS:

1. D. Sudha Rani, *A Manual for English Language Laboratories*, Pearson Education.
2. D. Sudha Rani, *Advanced Communication Skills Laboratory Manual*, Pearson Education.
3. R. Manivannan and G. Immanuel, *Communication Skills Laboratory*, VK Publications, Sivakasi, 2013
4. Nira Kumar*, English Language Laboratories*, PHI Learning Pvt. Ltd., New Delhi, 2011.

SUGGESTED SOFTWARE:

1. ETNL Language Lab Software Version 4.0
2. GEMS – Globarena E- Mentoring System.
3. Speech Solutions.
4. English Pronunciation Dictionary by Daniel Jones.
5. Learn to Speak English 8.1, The Learning Company – 4 CDs.
6. Mastering English: Grammar, Punctuation and Composition.
7. English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
8. Dorling Kindersley Series - Grammar.
9. Language in Use 1, 2 & 3.
10. Cambridge Advanced Learner's Dictionary - 3rd Edition.
11. Centronix – Phonetics.
12. Let's Talk English, Regional Institute of English South India.

13. The Ultimate English Tutor.

I-B. Tech- I Semester
(16BT1BS31): **ENGINEERING CHEMISTRY LAB**

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE REQUISITE: Intermediate/Senior Secondary Chemistry

COURSE DESCRIPTION: Estimation of hardness, alkalinity, dissolved oxygen of water samples and estimation of Iron by volumetric methods, determination of effect of P^H on rate of corrosion, measurement of viscosity of lubricants; Instrumental methods like potentiometer, conductivity meter, P^H meter and colorimeter; synthesis of Polymers and Nano materials.

COURSE OUTCOMES:

After completion of the course, a successful student is able to:

CO1: Acquire basic Knowledge about the volumetric analysis and synthesis of materials used for engineering applications.

CO2: Acquire analytical skills in the estimation of hardness of water, alkalinity of water, dissolved oxygen in water and estimation of Iron through wet laboratory methods.

CO3: Develop designing skills for the synthesis of polymers and Nanomaterials.

CO4: Acquire skills to use instrumental techniques for the determination of Electrical conductance of electrolytes, EMF of a cell, PH of a solution, determination of viscosity of lubricants and estimation of iron in cement.

CO5: Provide solutions for environmental issues through determination of quality of water.

List of Experiments:

A minimum of any **Ten** experiments are to be conducted among the following:.

1. Estimation of Hardness of water by EDTA method.
2. Estimation of alkalinity of Water.
3. Estimation of Dissolved Oxygen in water.
4. Estimation of Ferrous Iron by Dichrometry.
5. Preparation of Novalac Resin.
6. Synthesis of Nano metal-oxide using sol– gel process.
7. Conductometric titration of strong acid Vs strong base
8. Estimation of Ferrous ion by Potentiometry.
9. Determination of amount of corrosion of metals in different medium
10. Measurement of viscosity of lubricants by Ostwald viscometer.
11. Determination of P^H of a given solution by P^H metry.
12. Estimation of Ferric iron in cement by Colorimetric method.

Total Time Slots: 12

I B. Tech. - I Semester

(16BT10331) COMPUTER AIDED ENGINEERING DRAWING

(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	1	6	3

PRE-REQUISITES: *None*

COURSE DESCRIPTION:

Engineering drawing conventions; importance of engineering drawing; fundamental concepts of sketching; computed aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.

COURSE OUTCOMES:

After completion of the course, a successful student is able to:

- CO1: Understand, write and read the language of engineering drawing in industry through International System of Standards.
- CO2: Develop the imagination and mental visualization ability for interpreting the geometrical details of engineering objects.
- CO3: Produce different views and projection in drawing.
- CO4: Use modern CAD software for design and drafting of drawings.
- CO5: Create multi-view drawings suitable for presentation to Engineering community.
- CO6: Introduce and communicate universally accepted conventions and symbols for their usage in technical drawing.

DETAILED SYLLABUS:

UNIT : I - BASICS OF ENGINEERING DRAWING PRACTICE, GEOMETRICAL CONSTRUCTIONS, CONICS AND SPECIAL CURVES (18 periods)

Introduction, drawing instruments and its uses, sheet layout, BIS conventions, lines, lettering and dimensioning practices. Geometrical constructions: Construction of regular polygons: Pentagon, Hexagon, Heptagon and Octagon. Conic sections**:** Introduction, construction of ellipse: rectangular method, eccentricity method. Construction of parabola: rectangular method, eccentricity method. Construction of hyperbola: eccentricity method. Special curves***:*** cycloid, involute.

UNIT: II – INTRODUCTION TO COMPUTER AIDED SKETCHING (18 periods)

Computer screen, layout of the software, creation of 2D/3D environment, selection of drawing size and scale, Standard tool bar/menus, Coordinate system, description of most commonly used toolbars, navigational tools: commands and creation of lines, Co-ordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination and perpendicularity.

UNIT: III – PROJECTION OF POINTS, STRAIGHT LINES AND PLANES (21 periods)

Introduction, method of projection, planes of projection, reference line and notations. Projection of points: Points in all the four quadrants. Projection of straight lines**:** lines inclined to HP / VP plane, inclined to both HP and VP planes (straight lines are assumed to be in first quadrant only)**.** Projection of planes**:** projection of triangle, square, rectangle, rhombus, pentagon, hexagon and circular plane for the condition inclined to HP / VP by change of position method.

UNIT IV –PROJECTION OF SOLIDS AND SECTION OF SOLIDS (21 Periods)

Projections of Solids: Introduction, projection of solids: prisms, pyramids, cylinders and cones with axis perpendicular to VP/HP and axis inclined to VP/HP only. Sections of solids**:** Introduction, Cutting plane, sectional views of right regular solids resting with base on HP: prisms, pyramids, cylinder and cone and true shapes of the sections.

UNIT V –ORTHOGRAPHIC AND ISOMETRIC PROJECTIONS AND DEVELOPMENT OF SURFACES (22 periods)

Orthographic projection: simple exercises. Isometric projection: Simple exercises.

Development of surfaces: prisms, pyramids, cylinders, cone and miscellaneous surfaces **Total Periods: *100***

Note: *Student shall practice Unit-I using sketch book only and remaining units using sketch book first and later CAD package.*

TEXT BOOKS:

1. D.M.Kulkarni, A.P.Rastogi, A.K.Sarkar, Engineering Graphics with AutoCAD, PHI Learning Private Limited, New Delhi, Revised Edition, 2010.
2. N D Bhat & V M Panchal, Engineering Drawing, Charotar Publishing House, Gujarat, 51st edition, 2013.

REFERENCE BOOKS:

1. Sham Tickoo, AutoCAD 2013 for Engineers and Designers, Dreamtech Press, 2013.
2. M.H.Annaiah & Rajashekar Patil, Computer Aided Engineering Drawing, New Age International Publishers, 4th Edition, 2012.
3. T.Jeyapoovan, Engineering Drawing and Graphics Using AutoCAD, Vikas Publishing House, 3rd Edition, 2010.

4. Jolhe, Engineering Drawing, Tata McGraw Hill Education Private Limited, 1st Edition, 2007.
5. Basant Aggarwal, Engineering Drawing, Tata McGraw Hill Education Private Limited, 1st Edition, 2008.

I B. Tech. - I Semester

(16BT10531) PROGRAMMING IN C LAB

(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES:-
A course on Programming in C

COURSE DESCRIPTION:
Hands on practice in developing and executing simple programs using C Programming constructs– Conditional statements, Loops, Arrays, Strings, Functions, Structures, Pointers and Functions.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

CO1. Demonstrate practical knowledge of using C language constructs:
. Selection and Repetition statements.
. Arrays, Strings and Functional statements.
. Derived data types, Files and Pointers

CO2. Analyze problems to develop suitable algorithmic solutions
CO3. Design Solutions for specified engineering problems
CO4. Use appropriate 'C' language constructs for solving engineering problems
CO5. Implement and execute programs using 'C' language
CO6. Document programs and communicate effectively while conducting Professional transactions.

List of Exercises:

1. a. Let a and b are two integer variables whose values are 10 and 13 respectively. Write a program to evaluate the following arithmetic expressions.
   i) a + b ii) a–b iii) a * b iv) a/b v) a % b

b. Write a program to evaluate the following algebraic expressions after reading necessary values from keyword.
   i) $(ax + b)/(ax - b)$ ii) $2.5 \log x + \text{Cos } 32^0 + | x^2 + y^2|$
   iii) $x^5 + 10 x^4 + 8$ and $x^3 + 4 x + 2$ iv) ae^{kt}

2. a. Mr. Gupta deposited Rs.1000 in a bank. The bank gives simple interest at the rate of 15% per annum. Write a program to determine the amount in Mr. Gupta's account at the end of 5 years. (Use the formula I = P T R / 100)
   b. A cashier has currency notes of denominations Rs.10, Rs. 50 and Rs. 100. If the amount to be withdrawn is input in hundreds, find the total number of notes of each denomination the cashier will have to give to the withdrawer.
   c. In a town, the percentage of men is 52. The percentage of total literacy is 48.If total percentage of literate men is 35 of the total population; write a program to find the total number of illiterate men and women if the population of the town is 8000.

3.a. Write a program that prints the given 3 integers in ascending order using if - else.
 b. Write a program to calculate commission for the input value of sales amount.
   Commission is calculated as per the following rules:
   i) Commission is NIL for sales amount Rs. 5000.
   ii) Commission is 2% for sales when sales amount is >Rs. 5000 and <= Rs. 10000.
   iii) Commission is 5% for sales amount >Rs. 10000.
 c. A character is entered through keyboard. Write a program to determine whether the character entered is a capital letter, a small case letter, a digit or a special symbol. The following table shows the range of ASCII values for various characters.

Characters	ASCII values
A - Z	65 - 90
a - z	97- 122
0 - 9	48 - 57
Special Symbols	0 - 47, 58 - 64, 91- 96, 123 - 127

4. a. If cost price and selling price of an item is input through the keyboard, write program to determine whether the seller has made profit or incurred loss. Also determine how much profit or loss he incurred in percentage.
   b. An insurance company calculates premium as follows:

i. If a person's health is excellent and the person is between 25 and 35 years of age and lives in a city and is a male then premium is Rs.4 per thousand and the policy amount cannot exceed Rs.2 lakhs.
ii. If a person satisfies all the above conditions and is female then the premium is Rs.3 per thousand and the policy amount cannot exceed Rs.1 lakh.
iii. If a person's health is poor and the person is between 25 and 35 years of age and lives in a village and is a male then premium is Rs.6 per thousand and the policy cannot exceed Rs. 10000.
iv. In all other cases the person is not insured.
Write a program to determine whether the person should be insured or not, his/her premium rate and maximum amount for which he/she can be insured.

5. a. Write a program, which takes two integer operands and one operator as input from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, %. Use switch statement)
   b. Write a program to find the grace marks for a student using switch. The user should enter the class obtained by the student and the number of subjects he has failed in. Use the following rules:
   i. If the student gets first class and the number of subjects failed is >3, then no grace marks are awarded. If the number of subjects failed is less than or equal to '3' then the grace is 5 marks per subject.
   ii. If the student gets second class and the number of subjects failed in is >2, then no grace marks are awarded. If the number of subjects failed in less than or equal to '3' then the grace is 4 marks per subject.
   iii. If the student gets third class and the number of subjects failed in is >1, then no grace marks are awarded. If the number of subjects failed in is equal to '1' then the grace is 5 marks per subject.
6. a. Write a program to find the sum of individual digits of a positive integer.
   b. A Fibonacci sequence is defined as follows:
   The first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a program to generate the first N terms of the sequence.
   Write a program to generate all the prime numbers between 1 and N, where N is a value supplied by the user.
7. a. Write a program to find the largest and smallest number in a given list of integers.
   b. Write a program to perform the following:
   i. Addition of two matrices.
   ii. Multiplication of two matrices.
   d. Write a program to count the number of lines, words and characters in a given text.
9.a Write a program to read list of student names and perform the following operations using functions.
   i. to print list of names
   ii. to sort them in ascending order
   iii. to print the list after sorting.
   b. Write a menu driven program to read list of student names and perform the following operations using array of character pointers.
   i. to insert a student name
   ii. to delete a name
   iii. to print the name
10. Write a program that uses functions to perform the following operations:
   i. Reading a complex number
   ii. Writing a complex number
   iii. Addition of two complex numbers
   iv. Multiplication of two complex numbers (**Note:** Represent complex number using a structure.)
11. a. Write a program to accept the elements of the structure as:
   Employee-name,Basic pay Display the same structure along with the DA, CCA and Gross salary for 5 employees.
   Note: DA=51% of Basic pay, CCA=Rs.100.consolidated.
   b. Define a structure to store employee's data with the following specifications:
   Employee-Number, Employee-Name, Basic pay, Date of Joining
   i. Write a function to store 10 employee details.
   ii. Write a function to implement the following rules while revising the basic pay.
   If Basic pay<=Rs.5000 then increase it by 15%.
   If Basic pay> Rs.5000 and <=Rs.25000 then it increase by 10%.
   If Basic pay>Rs.25000 then there is no change in basic pay.
   Write a function to print the details of employees who have completed 20 years of service from the date of joining.
12. a. Write a program which copies one 'text file' to another 'text file'.
   b.Write a program to reverse the first N characters of a given text file.

Note: The file name and N are specified through command line.

13. Write a program to print the output by giving the Customer_ID as an input.

REFERENCE BOOKS:

1. Byron Gottfried and Jitender Kumar C, *Programming with C*, 3rd edition, McGraw Hill Education(India) Pvt. ltd, New Delhi, 2016.
2. Pradip Dey and Manas Ghosh, *Programming in C*, 2nd Edition, Oxford University Press, New Delhi, 2007.

I B. Tech. - II Semester

(16BT1BS02) ENGINEERING PHYSICS

(Common to all branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: Intermediate / Senior Secondary Physics

COURSE DESCRIPTION: Lasers; optical fibers; principles of quantum mechanics; band theory of solids; semiconductors; dielectric properties of materials; acoustics of buildings; superconductors; crystallography and nanomaterials.

COURSE OUTCOMES:

After completion of the course, a successful student will be able to:

CO1. Acquire basic knowledge of lasers, optical fibers, quantum mechanics, dielectrics, semiconductors, and superconductors, acoustic of buildings, crystallography and nanomaterials.

CO2. Analyze the construction and working of various laser systems, semiconductor devices, various types of optical fibers and its communication system and nano materials properties.

CO3. Gain skills in designing lasers, optical fiber cable, semiconductor devices, acoustically good halls and nanomaterials.

CO4. Develop problem solving skills in engineering context.

CO5. Use relevant techniques for assessing ball milling, pulsed laser deposition, p-n junction and Laser.

DETAILED SYLLABUS:

UNIT I: LASERS AND FIBER OPTICS (11 periods)

Lasers: Introduction, characteristics of lasers, spontaneous and stimulated emission of radiation, Einstein's coefficients – condition for amplification, population inversion, Nd:YAG laser, Helium-Neon laser, semiconductor laser and applications of lasers.

Fiber optics: Introduction, principle of optical fiber, acceptance angle, acceptance cone and numerical aperture, classification of optical fibers, optical fiber communication system and applications of optical fibers.

UNIT II: PRINCIPLES OF QUANTUM MECHANICS AND BAND THEORY OF SOLIDS (07 periods)

Principles of Quantum Mechanics: Introduction, de-Broglie's hypothesis, Schrödinger's one dimensional wave equation (time independent), significance of wave function, particle in a one dimensional potential box, Fermi-Dirac distribution and effect of temperature (qualitative treatment).

Band Theory of Solids: Electron in a periodic potential, Kronig-Penney model (qualitative treatment), origin of energy bands formation in solids, distinction between conductors, semiconductors and insulators based on band theory.

UNIT III: SEMICONDUCTORS AND DIELECTRIC PROPERTIES OF MATERIALS (13 periods)

Semiconductors: Introduction, types of semiconductors, intrinsic carrier concentration, electrical conductivity in semiconductors, drift and diffusion currents, Einstein's relation, Hall effect and its applications, direct and indirect band gap semiconductors, p-n junction, energy band diagram of p-n diode, LED, photo diode and Solar cell.

Dielectric Properties of Materials: Introduction, dielectric constant, electronic, ionic and orientation polarizations (qualitative treatment), local field, frequency dependence of polarizability (qualitative treatment), ferroelectricity.

UNIT IV: ACOUSTICS OF BUILDINGS AND SUPERCONDUCTIVITY (07 periods)

Acoustics of Buildings: Introduction, basic requirement of acoustically good hall, reverberation and time of reverberation, Sabine's formula for reverberation time (qualitative treatment), absorption coefficient of sound and its measurement, factors affecting the architectural acoustics and their remedies.

Superconductivity: Introduction, General properties - Meissner effect, penetration depth, Type-I and Type-II superconductors, flux quantization, Josephson effects, BCS theory (qualitative treatment), applications of superconductors.

UNIT V: CRYSTALLOGRAPHY AND NANOMATERIALS (07 periods)

Crystallography: Introduction, crystal planes, crystal directions and Miller indices, separation between successive (hkl) planes, X-ray diffraction by crystal planes, Bragg's law- powder method.

Nanomaterials: Introduction, principles of nanomaterials, properties of nanomaterials, synthesis of nanomaterials by ball milling and pulsed laser deposition and applications of nanomaterials.

Total Periods: 45

TEXT BOOK:

1. P. K. Palaniswamy, *Engineering Physics*, Scitech Publications India Private Limited, 2nd Edition, 2009

REFERENCE BOOKS:

1. Dr. S. Mani Naidu, *Engineering Physics*, Pearson Education, 1st Edition, 2013.

2. M.N. Avadhanulu,P.G.Kshirsagar, *A textbook of Engineering Physics*, S.Chand & Company Ltd. Revised edition 2014.
3. K. Thyagarajan*, Engineering Physics-I*, McGraw-Hill Education (India) Pvt.Ltd. 2015

I B. Tech. - II Semester

(16BT2BS01) TRANSFORMATION TECHNIQUES AND PARTIAL DIFFERENTIAL EQUATIONS

(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITE: Intermediate /Senior secondary mathematics

COURSE DESCRIPTION: Fourier series; Fourier integrals and transforms; Laplace transforms; z – transforms; partial differential equations.

COURSE OUTCOMES:

After completion of the course a successful student is able to

CO1: Acquire basic knowledge in
- (a) Fourier series and Fourier transforms
- (b) Fourier integrals
- (c) Laplace transforms and their applications
- (d) z- transforms and their applications
- (e) solving partial differential equations

CO2: Develop skills in analyzing the
- (a) Properties of Fourier series for a given function
- (b) Partial differential equations through different evaluation methods
- (c) Difference equations through z – transforms
- (d) Engineering systems and processes involving wave forms and heat transfer

CO3: Develop skills in designing mathematical models for
- (a) Problems involving heat transfer and wave forms
- (b) Engineering concepts involving, Fourier transforms, Fourier integrals, Laplace transforms, z-transforms and difference equations

CO4: Develop analytical skills in solving the problems involving
- (a) Fourier series and Fourier transforms
- (b) Laplace transforms
- (c) Z-transforms and difference equations
- (d) Heat transfer and wave motion

CO5: Use relevant transformation techniques for
- (a) Obtaining Fourier transforms for different types of functions
- (b) Laplace transforms
- (c) Z- transforms
- (d) Partial differential equations

DETAILED SYLLABUS

UNIT- I : FOURIER SERIES (7 periods)

Fourier series: Determination of Fourier coefficients, convergence of Fourier series (Dirichlet's conditions), Fourier series of even and odd functions, Half-range Fourier sine and cosine expansions.

UNIT- II: FOURIER INTEGRALS AND FOURIER TRANSFORMS (8 periods)

Fourier integral theorem (statement only), Fourier sine and cosine integrals, Fourier transform, Fourier sine and cosine transforms –properties, Inverse transform and finite Fourier transforms.

UNIT-III: LAPLACE TRANSFORMS (12 periods)

Laplace transforms of standard functions. Properties of Laplace transforms. First and second shifting Theorems. Laplace transforms of derivatives and integrals. Inverse transforms. Convolution theorem (without proof), inverse Laplace transforms by convolution theorem. Laplace transform of periodic functions, Applications of Laplace transforms to ordinary differential equations of first and second order with constant coefficients.

UNIT-IV: Z- TRANSFORMS (9 periods)

Z – transforms, inverse Z– transforms, damping rule, shifting rule, initial and final value theorems. Convolution theorem (without proof), solution of difference equations by Z– transforms.

UNIT – V: PARTIAL DIFFERENTIAL EQUATIONS (9 periods)

Formation of Partial differential equations – Solutions of first order linear equations by method of grouping. First and second order equations by method of separation of variables – Solutions of one dimensional Wave equation, Heat equation.

Total no. of periods: 45

TEXT BOOKS:

1. T.K.V. Iyengar, B. Krishna Gandhi,S.Ranganadham and M.V.S.S.N. Prasad,***Engineering Mathematics, vol-1***, S. Chand & Company 13/e,2014.
2. T.K.V. Iyenger, B. Krishna Gandhi, S.Ranganadham and M.V.S.S.N.Prasad, ***Mathematical Methods,***S.Chand and Company, 8/e,2013.

REFERENCE BOOKS:

1. Grewal, B.S., ***Higher Engineering Mathematics***,Khanna publishers, Delhi, 42/e,2012.
2. Kreyszig, E., ***Advanced Engineering Mathematics***,John Wiley and Sons, Inc.,9/e,2013.

I B. Tech. - II Semester

(16BT20101) BUILDING MATERIALS AND CONSTRUCTION TECHNOLOGY

(Civil Engineering)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	0	3

PRE-REQUISITE: Engineering Chemistry

COURSE DESCRIPTION: Stones; Bricks; Tiles; Timber; Lime; Cement; Miscellaneous materials in construction; Masonry and Foundations; Building Components; Finishings; Shoring; Scaffolding and Formwork.

COURSE OUTCOMES:

On successful completion of this course the students will be able to

CO1. Identify building materials, building components and construction techniques.
CO2. Characterize building materials and construction techniques.
CO3. Recommend proper building materials and construction techniques.
CO4. Develop new construction materials and construction techniques.
CO5. Use modern tools and techniques in construction practice.
CO6. Ensure health and safety in construction practice.
CO7. Encourage sustainable and environmental friendly building materials and construction techniques.
CO8. Maintain ethical standards for quality in construction.
CO9. Promote cost effective building materials and construction techniques.
CO10. Engage in continuous learning of latest construction materials and techniques.

DETAILED SYLLABUS:

UNIT I: STONES, BRICKS, TILES AND TIMBER (09 periods)

Stones, Bricks and Tiles: Properties of building stones and structural requirements, Classification of stones, Stone quarrying, Blasting and dressing of stones, Composition of good brick earth, Manufacture of bricks, Qualities of a good brick, Efflorescence in bricks, Classification of bricks, Characteristics of good tile, Manufacturing methods - Types of tiles.

Timber: Structure, Properties, Seasoning of timber, Classification of various types of wood used in buildings, Defects in timber, Decay of timber, Mechanical treatment, Paints, Varnishes, Distempers, Bituminous wooden products in construction.

UNIT II: LIME, CEMENT AND CEMENT CONCRETE (09 periods)

Lime: Ingredients of lime, Constituents of lime stone, Classification of lime, Manufacture of lime.

Cement and Cement Concrete: Ingredients of cement, Manufacture of OPC, Types of cement and their properties, Various field and laboratory tests on cement, Ingredients of cement concrete, Grades of concrete and their importance.

UNIT III: MISCELENIOUS MATERIALS FOR CONSTRUCTION (08 periods)

Use of Materials like galvanized iron, steel, aluminum, gypsum, copper, glass, bituminous materials, rubber, fiber-reinforced plastics, ceramic products, asbestos and their quality.

UNIT IV: FOUNDATIONS, MASONRY AND BUILDING COMPONENTS (10 periods)

Foundations and Masonry: Foundations, Shallow foundations, Spread, combined, strap and mat footings, Types of masonry, English and Flemish bonds, Rubble and Ashlar masonry, Cavity walls, Partition walls.

Building Components: Beams, Columns, Lintels, Arches, Vaults, Stair Cases, Types of floors: Concrete, Mosaic and Terrazzo Floors, Pitched, Flat and Curved roofs, Lean–to–Roof, Coupled roofs, Trussed roofs, King and Queen post trusses, RCC Roofs, Madras Terrace/Shell Roofs.

UNIT V: FINISHINGS, SHORING, SCAFFOLDING AND FORM WORK (09 periods)

Finishings: Damp Proofing, water proofing, Termite proofing, Fire proof materials, Plastering, Pointing, White washing and distempering, Painting, Constituents of a paint, Types of paints, Painting of new/old Wood, Varnish.

Shoring, Scaffolding and Form Work: Types, Erection methodology, Latest equipment, Safety precautions.

Total Periods: 45

TEXT BOOKS:

1. S. K. Duggal, *Building Materials,* New Age International Publishers, 4th Edition, 2010.
2. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Building Construction*, 10th Edition, Laxmi Publications (P) Ltd., 2010.

REFERENCE BOOKS:

1. R. K. Rajput, *Engineering Materials*, 3rd Edition, S. Chand and Company Ltd., New Delhi, 2006.
2. S. P. Arora and S. P. Bindra, *Building Construction,* Dhanpat Rai and Sons, 2010.
3. Varghese P. C., Building Construction, PHI Learning Pvt. Ltd., 2008.
4. K. K. Chitkara, *Construction Project Management: Planning Scheduling and Controlling,* 2nd Edition, Tata McGraw-Hill Education Pvt. Ltd., New Delhi, 2009.

I B. Tech. - II Semester
(16BT20102) ENGINEERING MECHANICS
(Common to CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	4	1	-	4

PRE-REQUISITES: Intermediate Mathematics and Physics.
COURSE DESCRIPTIONS: statics of particles and rigid bodies; support reactions; analysis of perfect frames; friction; centroid, centre of gravity and moment of inertia; kinematics and kinetics.
COURSE OUTCOMES:
After successful completion of this course, the student will be able to:

- **CO1:** Apply the knowledge of engineering mechanics fundamentals to the solutions of basic engineering problems.
- **CO2:** Analyze
  - Multi-body systems under equilibrium and dynamic conditions.
  - Systems involving dry friction and computing the efficiency of the system of forces in frames under suitable assumptions.
  - Sectional properties of surfaces and solids.
- **CO3:** Design sustainable solutions to complex engineering problems using first principles of engineering mechanics.
- **CO4:** Exercise awareness to assess the safety of system related to engineering mechanics.
- **CO5:** Communicate effectively engineering and allied information through free body diagram.
- **CO6:** Sustain interest in engineering mechanics to upgrade knowledge and skills through self learning concepts in mechanics.

Detailed Syllabus:
UNIT–I: STATICS OF PARTICLES **(10 Periods)**
Basic concepts, System of units, System of concurrent coplanar forces in plane, Resultant of forces, Laws of mechanics, Equilibrium of forces, Lami's theorem, Vectorial representation of forces.
UNIT–II: STATICS OF RIGID BODIES **(14 Periods)**
Moment of a force, Varignon's theorem, Moment of a couple, Vectorial representation of moments and couples, Coplanar non-concurrent forces, Equilibrium of rigid bodies, Types of supports and loads, Types of frames, Perfect frame analysis, Method of joints, Method of sections, Principle of virtual work.
UNIT–III: FRICTION **(10 Periods)**
Frictional force, Types of friction, Laws of friction, Co-efficient of friction, Angle of friction, Angle of repose, Cone of friction, Applications: Body on horizontal/inclined plane, Two bodies in contact, Ladder friction, Wedge friction.
UNIT–IV: CENTROID, CENTRE OF GRAVITY AND MOMENT OF INERTIA **(12 Periods)**
Centroids of simple and composite areas, centre of gravity of bodies, Theorems of Pappus and Guldinus, Parallel axis and perpendicular axis theorems, Moment of Inertia of Composite areas, Radius of gyration – Section modulus, Mass Moment of Inertia of simple and composite masses.
UNIT–V: KINEMATICS AND KINETICS (**14 Periods)**
Kinematics of Particles Rectilinear and Curvilinear motion, Velocity, Acceleration, Motion of a projectile, Relative motion.
Kinetics of Particles and Rigid Bodies Kinetics of rectilinear motion, Newton's laws of motion, D'Alembert's principle, Work-energy method, Impulse-momentum equation, Kinetics of circular motion, Rotation.
Total Periods: 60

TEXT BOOKS:

1. S. S. Bhavikatti and K. G. Rajashekarappa, **Engineering Mechanics**, New Age International (P) Ltd., 3rd Edition, 2009.
2. J. L. Meriam and L. G. Kraige**, Engineering Mechanics: Statics** (Vol. 1), **Dynamics** (Vol. 2), John Wiley & Sons Ltd., 5th Edition, 2008.

REFERENCE BOOKS:

1. Arthur P. Boresi and Richard J. Schmidt, **Engineering Mechanics - Statics and Dynamics**, Cengage Learning, 1st edition, Indian Edition, 2008.
2. S. Rajasekaran and G. Sankarasubramanian, **Engineering Mechanics – Statics and Dynamics**, Vikas Publishing House Pvt. Ltd., 3rd edition, 2009.
3. K. Vijaya Kumar Reddy and J. Suresh Kumar, **Singer's Engineering Mechanics - Statics and Dynamics**,
BS Publications, 3rd edition, 2010.

4. S. Timoshenko, D. H. Young and J. V. Rao, **Engineering Mechanics,** Tata McGraw-Hill Education Pvt. Ltd., Revised 4th edition, Special Indian Edition, 2007.

I B. Tech. - II Semester

(16BT20241) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

(Common to CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Physics and Mathematics

COURSE DESCRIPTION: Basics of electrical DC and AC circuits; principle of operation and applications of DC machines, transformers, and induction motors; Transducers and measuring instruments; rectifier devices; bipolar transistors and its characteristics.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Demonstrate knowledge on
- Electrical and electronic circuits.
- Construction and operation of electrical machines, electrical and electronic instruments.

CO2: Analyze various electrical & electronic circuits and different transducers.

CO3: Evaluate the electrical and electronic circuit parameters and performance of electrical machines.

CO4: Select and apply various machines and transducers.

Detailed Syllabus:

UNIT-I: BASICS OF ELECTRICAL ENGINEERING (10 Periods)

Sources of electricity, basic circuit components, electric field, electric current, potential and potential difference, EMF, electric power, Ohm's law, node, path, loop, branch, resistive networks, inductive networks, capacitive networks, Kirchhoff's laws, series-parallel circuits, nodal analysis, mesh analysis, star-delta and delta-star transformations – problems.

UNIT–II: AC FUNDAMENTALS (9 Periods)

Production of alternating voltage, phase and phase difference, phasor representation of alternating quantities, behavior of AC series, parallel and series-parallel circuits, power in AC circuit - problems.

UNIT–III: DC AND AC MACHINES (10 Periods)

DC Machines: Construction and working of a DC Generator and DC motor and their types, EMF equation of a DC generator, torque equation of a DC motor, applications of DC generators and DC motors - problems.

Transformers: Construction and working of a single phase transformer, EMF Equation.

AC Machines: Construction and working of a three phase induction motor, applications of three phase induction motors.

UNIT–IV: TRANSDUCERS AND MEASURING INSTRUMENTS (8 Periods)

Transducers, Basic requirements of transducers, passive transducers - strain gauge, thermistor, Hall-Effect transducer, LVDT, and active transducers, Piezoelectric and thermocouple, Load cells, Data loggers, Data acquisition system (overview and concept only), Digital voltmeters, Digital ammeter, Digital multi-meters (elementary concepts only).

UNIT–V: RECTIFIER CIRCUITS AND BIPOLAR JUNCTION TRANSISTORS (8 Periods)

Rectifier Circuits: DC voltage and current, Peak Inverse Voltage (PIV), ripple factor, efficiency and regulation of half wave and full wave rectifiers.

Bipolar Junction Transistors: Formation of PNP / NPN junctions, Transistor as an amplifier, need for biasing, single stage CE amplifier.

Total Periods: 45

TEXT BOOKS

1. V.K. Mehta and Rohit Mehta, **Principles of Electrical and Electronics Engineering**, 2nd edition, S.Chand & Sons, New Delhi, 2007.
2. M.S. Naidu and S. Kamakshaiah, **Introduction to Electrical Engineering**, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2007.

REFERENCE BOOKS

1. Theraja B.L & Theraja A.K, **A Text Book of Electrical Technology**, Vol-1, S.Chand, New Delhi, 2009.
2. A. K. Sawhney, **Electrical & Electronics Measurement and Instrumentation**, Dhanpat Rai & Co.(P) Ltd, New Delhi, 15th edition, 2014.

3. K. Lal Kishore, **Electronic Devices and Circuits**, BS Publications, Hyderabad, 3rd edition, 2008.

I B. Tech. - II Semester

(16BT1BS32) ENGINEERING PHYSICS LAB

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Intermediate / senior secondary Physics.

COURSE DESCRIPTION:

Characteristics of p-n junction diode, Photodiode, LED, and semiconductor laser diode. Experimental determination of carrier concentration and energy gap of a semiconductor material, wave length of a laser source, size of fine particle, numerical aperture and acceptance angle of optical fiber. Determination of frequency of electrically vibrating tuning fork and A.C source using A.C sonometer, magnetic field along axial line of a current carrying coil and rigidity modulus of material of a wire using torsional pendulum.

COURSE OUTCOMES:

After completion of the course, a successful student will be able to:

CO1: Acquire basic knowledge about semiconductor materials, magnetic materials and lasers.

CO2: Acquire analytical skills in the estimation of carrier concentration of semiconductor materials and characterization of p-n junction.

CO3: Develop skills in designing electronic circuits using semiconductor components.

CO4: Acquire skills to use instrumental techniques in A.C sonometer and Melde's experiment.

CO5: Apply diffraction techniques for determination of size of tiny particles and wave length of lasers.

ENGINEERING PHYSICS LAB

Conduct a minimum of any **Ten** of the following experiments.

1. Determination of wavelength of a laser source using Diffraction Grating.
2. Determination of particle size by using a laser source.
3. Determination of Numerical aperture and acceptance angle of an optical fiber.
4. Melde's experiment - transverse & longitudinal modes.
5. Magnetic field along the axis of a current carrying coil- Stewart and Gee's method.
6. Calculation of A.C frequency using sonometer.
7. I-V Characteristics of a p-n Junction diode.
8. Energy gap of a material of a p-n Junction.
9. Characteristics of LED source.
10. Characteristics of Photo diode.
11. Hall Effect.
12. Determination of rigidity modulus of the material of the wire using torsional pendulum.

I B. Tech. - II Semester

(16BT20131) BUILDING MATERIALS AND CONSTRUCTION TECHNOLOGY LAB

(Civil Engineering)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITE: Building Materials and Construction Technology

COURSE DESCRIPTION: Exercises on Masonry; Bar bending; Painting; House wiring; Shuttering and scaffolding; Plumbing and sanitation; Building materials; Construction equipment.

COURSE OUTCOMES:

After completion of this course, a successful student will be able to:

CO1. Identify building materials, building components and construction techniques.
CO2. Characterize building materials and construction techniques.
CO3. Recommend proper building materials and construction techniques.
CO4. Develop new construction materials and construction techniques.
CO5. Use modern tools and techniques in construction practice.
CO6. Ensure health and safety in construction practice.
CO7. Encourage sustainable and environmental friendly building materials and construction techniques.
CO8. Maintain ethical standards for quality in construction.
CO9. Function effectively as an individual, and as a member or leader in teams.
CO10. Comprehend and write effective reports on building materials and construction techniques.
CO11. Promote cost effective building materials and construction techniques.
CO12. Engage in continuous learning of latest construction materials and techniques.

DETAILED SYLLABUS:

LIST OF EXERCISES:

A) MASONRY

1. Internal masonry
2. External masonry
3. Brick work – English bond
4. Brick work – Flemish bond

B) REINFORCEMENT

5. Demonstration of reinforcement skeleton for foundations, columns, beams, slabs, lintels, arches, vaults and stair cases.

C) BAR BENDING

6. Columns and beams
7. Slabs

D) PAINTING

8. External wall painting
9. Internal wall painting

E) HOUSE WIRING

10. 15 amps line
11. 5 amps line

F) SHUTTERING AND SCAFFOLDING

12. Shuttering for beams and slabs
13. Shuttering for columns and walls
14. Steel scaffolding
15. Single and double scaffolding

G) PLUMBING AND SANITATION

16. Single and double stack system including fittings and fixtures
17. Plumbing of water supply line with GI and PVC material including fittings and fixtures

H) BUILDING MATERIALS

18. Properties and identification of building materials
19. Market survey for building materials

I) CONSTRUCTION EQUIPMENT

20. Specifications and identification of construction equipment
21. Market survey for construction equipment

I B. Tech. - II Semester
(16BT20252) **MATLAB Practice for Civil Engineers**
(Civil Engineering)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	1	3	2

PRE-REQUISITE: Mathematics at Intermediate Level and Principles of Computer Programming.
COURSE DESCRIPTION: Exercises on MATLAB Basics; Arrays; Functions and Files; Programming Techniques; Plotting; Linear Algebraic Equations; Polynomials; Simulink.
COURSE OUTCOMES:
After successful completion of the course, student will be able to
CO1. Apply knowledge of MATLAB basics.
CO2. Carryout numerical computations and analysis.
CO3. Design solutions for engineering problems using MATLAB.
CO4. Develop solutions for complex civil engineering problems using MATLAB Programming and Simulation.
CO5. Use MATLAB Tool boxes for civil engineering applications.
DETAILED SYLLABUS:
LIST OF EXERCISES:
A) BASICS OF MATLAB
1. MATLAB Windows
2. Help
3. Input and Output
4. File types
5. Variables and Keywords
6. Arithmetic Operations on Scalars
7. Order by Precedence

B) CONTROL STRUCTURES
8. If, If ——Else If
9. While
10. For
11. Switch

C) MATRICES
12. Generation of Row/Column Vector
13. Generation of 2 Dimensional/Multidimensional Matrix
14. Arithmetic Operation on Arrays
15. Determination of Eigen Vector and Eigen Values of a Matrix
16. Determination of Rank of the Matrix

D) GRAPHICS
17. 2D Plot
18. 3D Plot
19. Mesh Plot and Surface Plots
20. Plotting of Wave Forms: Triangle, Square and Sine.

E) POLYNOMIALS
21. Determination of Roots of a Polynomial Equation
22. Arithmetic Operations on Polynomials
23. Least Square Curve Fitting
24. Interpolation

F) ALGEBRA, DIFFERENTIATION AND INTEGRATION
25. Determine the Solution of Linear and Non-Linear Equation
26. Determine the Solution for the First-Order and Higher- Order Differential Equations
27. Determine the Solution for Single Variable and two variableIntegration
28. Determine the Summation of Infinite and Finite Series

G) SIMULINK
29. Basics of Simulink
30. Simulink Model to Solve an Equation
31. Simulink Model to Solve Support Reaction of a Beam

H) SOLVING ENGINEERING PROBLEMS USING MATLAB
32. Centroid
33. Support Reactions of a Beam
34. Projectile

I) DEMONSTRATION ON TOOLBOXES FOR SPECIFIC CIVIL ENGINEERING APPLICATIONS

TEXT BOOKS:

1. Raj Kumar Bansal, Ashok Goel, Manoj Kumar Sharma, "*MATLAB and its Applications in Engineering*", Pearson Education, 2012.
2. Rudra Pratap, "*Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers*", Oxford University Press, New York, 2010.

REFERENCE BOOKS:

1. Amos Gilat, "*MATLAB-An Introduction with Applications*", Wiley India.
2. Stephen J.Chapman, "*Programming in MATLAB for Engineers*", Cengage Learning, 2011.
3. Math Works Tool Boxes, http://in.mathworks.com/support/documentation.

I B. Tech. - II Semester
(16BT20331) ENGINEERING WORKSHOP PRACTICE

(Common to CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: None

COURSE DESCRIPTION: Knowledge on various workshop hand and power tools; utilization in different manufacturing trades such as carpentry, fitting, house wiring, sheet metal forming, foundry; overview of metal cutting processes, plumbing and welding through live demonstrations.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

- **CO1:** Acquire knowledge on utilization of hand and power tools for engineering applications.
- **CO2:** Employ analytical skills for the production of a component for real time applications.
- **CO3:** Design and model different prototypes in the carpentry, fitting and sheet metal operations.
- **CO4:** Comprehend the usage of modern power tools.
- **CO5:** Abide by workshop safety regulations and adopt environmentally safe practices.
- **CO6:** Engage in self study for solving engineering related problems.

Detailed Syllabus:

1. **FITTING:** Introduction, types of fitting tools: holding tools, marking and measuring tools, cutting tools, finishing tools and miscellaneous tools, fitting operations, safety precautions, care and maintenance of hand tools.
   EXERCISES:
   - Square Mating
   - V- Mating
   - Half Round Mating
   - Dovetail Mating.
2. **CARPENTRY:** Introduction, types of wood, carpentry tools, wood working techniques, types of joints, safety precautions, care and maintenance of tools.
   EXERCISES:
   - Cross lap Joint
   - Briddle Joint
   - Dovetail Joint
   - Mortise and Tenon Joint.
3. **SHEET METAL FORMING:** Introduction, sheet metal materials, hand tools, sheet metal fabrication, safety and precautions.
   EXERCISES:
   - Fabrication of Tray
   - Fabrication of Square vessel
   - Fabrication of Funnel
   - Fabrication of Cylinder
4. **WIRING**: Introduction, elements of wiring, wiring methods, earthing, electrical fittings and accessories, types of wires and colors, safety and precautions.
   EXERCISES:
   - One Lamp Controlled by one One- way Switch
   - Two Lamps Controlled by one One-Way Switch in series/ parallel
   - One Lamp Controlled by two Two- way Switches (Stair case wiring)
   - Tube Light Connection
5. **FOUNDRY:** Introduction, moulding sand, properties of moulding sand, types of patterns and pattern , materials, foundry tools, safety and precautions.
   EXERCISES:
   - Mould Preparation with single piece pattern (cube)
   - Mould Preparation with single piece pattern (stepped pulley)
   - Mould Preparation with Split piece Pattern (Tumble)
   - Mould Preparation with Split piece Pattern (pipe bent)
6. **THEMES FOR DEMONSTRATION:** Machine shop, Plumbing, Welding and Power Tools.

Note: Student shall perform any **Two** exercises from each trade. **Total Periods: 42**

REFERENCE BOOKS:

1. P.Kannaiah and K.L.Narayana, **Workshop Manual,** SciTech Publishers, 2009.
2. K. Venkata Reddy, **Workshop Practice Manual,** BS Publications, 2008.

3. V. Ramesh Babu, **Engineering Workshop practice,** VRB Publishers Private Limited, 2009.

II B.Tech. – I Semester

(16BT3BS01) **PROBABILITY DISTRIBUTIONS AND STATISTICAL METHODS**

(Common to CSE, CSSE, IT, CE and ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITES: Intermediate/senior secondary mathematics

COURSE DESCRIPTION: Random variables; mathematical expectations; probability distributions; correlation and regressions; statistical quality control; sampling distributions; tests for small and large samples and their significances.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Acquire basic knowledge in
  a) probability distributions, correlation and regressions
  b) statistical quality control and testing of hypotheses
  c) Simple linear regression
  d) Tests of significance for small and large samples

CO2. Develop skills for analyzing the data with
  a) mathematical expectations for realistic results
  b) probability distributions for practical situations.
  c) control charts of statistical quality control
  d) correlation and regression concepts
  e) suitable tests of significance for practical situations.

CO3. Develop skills in designing
  a) probability distributions
  b) limitations of statistical quality control
  c) control charts,
  d) X, R, np, and c charts

CO4. Develop analytical skills for solving problems involving
  a) Probability distributions, means, variances and standard deviations
  b) statistical techniques employed for quality
  c) sampling techniques for decision making
  d) Tests of significances for small and large samples

CO5. Use relevant probability and statistical techniques for
  a) Mathematical expectations of desired results
  b) Fitting probability distributions for experimental data.
  c) Quality control and testing of hypothesis.

DETAILED SYLLABUS

UNIT - I: RANDOM VARIABLE AND MATHEMATICAL EXPECTATIONS (09 Periods)

Random Variables: Discrete and Continuous random variables, Distribution function of random variable, Properties, Probability mass function, Probability density function, Mathematical expectation, Properties of Mathematical expectations, Mean and Variance.

UNIT - II: PROBABILITY DISTRIBUTIONS (09 Periods)

Discrete Distributions: Binomial and Poisson Distributions, Mean, variance and standard deviations.

Continuous Distributions: Normal Distribution, Mean, Variance and properties

UNIT - III: CORRELATION, REGRESSION AND STATISTICAL QUALITY CONTROL (09 Periods)

Definition of correlation, correlation coefficient, Rank correlation. Simple linear regression, regression lines and properties. Introduction, advantages and limitations of statistical quality control, Control charts, specification limits,, R, np and c charts.

UNIT - IV: SAMPLING DISTRIBUTIONS AND TEST OF SIGNIFICANCE FOR LARGE SAMPLES (09 Periods)

Population and Sample, Parameter and Statistic, Sampling Distribution of Statistic, Standard Error of Statistic, Null and Alternative Hypothesis, Type I and II errors, Level of Significance, Critical region, Degrees of freedom.Tests of significance for proportions and means.

UNIT - V: TEST OF SIGNIFICANCE FOR SMALL SAMPLES (09 Periods)

Student's t-test: single mean, difference of means, F-test for equality of population variance, Chi-Square Test for Goodness of fit, contingency table, Chi-Square Test for Independence of Attributes.

Total no. of Periods: 45

TEXT BOOKS:

1. T.K.V. Iyengar, B. Krishna Gandhi, S.Ranganatham and M.V.S.S.N. Prasad, *Probability and Statistics*, S. Chand & Company, 4/e, 2013.
2. S.P.Gupta, *Statistical Methods*, Sultan and Chand, New Delhi, 28/e, 2005.

REFERENCE BOOKS:

1. S.C.Gupta and V.K.Kapoor, *Fundamentals of Applied Statistics*, Sultan and Chand, New Delhi, 11/e, 2004.
2. ShahnazBathul, *A Text Book of Probability and Statistics,* RidgePublications, 2/e, 2007.

II B.Tech. – I Semester

(16BT3HS02) MANAGERIAL ECONOMICS AND PRINCIPLES OF ACCOUNTANCY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITES: -

COURSE DESCRIPTION: Managerial Economics; Demand and Elasticity of Demand; Production Functions; Markets and Pricing Policies; Formation of different types of Business Organizations; Basic concepts of Accounting (Journal, Ledger and Trial balance); Trading Account, Profit and Loss Account and Balance sheet with simple adjustments; Computerized Accounting.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Acquire Knowledge in
- a) Tools and concepts of Micro Economics.
- b) Basic Principles and concepts of Accountancy.
- c) Provides life skills for effective utilization of scarce resources.
- d) Financial Accounting.
- e) Significance of Economics and Accountancy

CO2. Develop skills in managerial decision making of an organization.
CO3. Apply the Economic theories i.e., Demand, Production, Cost, Markets and Price.
CO4. Develop effective communication in Business and Accounting transactions.
CO5. Ascertain the profitability and soundness of an organization.
CO6. Practice Financial Accounting

DETAILED SYLLABUS:

UNIT – I: INTRODUCTION TO MANAGERIAL ECONOMICS, DEMAND ANALYSIS (09 Periods)

Definition, Nature and Scope of Managerial Economics. **Demand:** Determinants of demand – Demand function - Law of demand, assumptions and exceptions - Elasticity of demand – Types of elasticity of demand - Demand forecasting and methods of demand forecasting.

UNIT – II: THEORY OF PRODUCTION AND COST ANALYSIS (09 Periods)

Production Function: Isoquants and Isocosts – Input-output relationship - Law of returns. **Cost Concepts:** Total, Average and Marginal Cost **-** Fixed vs. Variable costs – Opportunity Costs Vs Outlay Costs– Separable Costs Vs Joint Costs, Urgent Costs Vs Postponable Costs- Avoidable Costs Vs Unavoidable Costs - **Break Even Analysis (BEA)** – Assumptions, Merits and demerits - Determination of Break Even Point (Simple problems).

UNIT – III: INTRODUCTION TO MARKETS AND PRICING (09 Periods)

Market Structure: Types of Markets - Features of perfect competition - Monopoly and monopolistic competition - Price and Output determination in perfect competition, monopoly and monopolistic Markets.
Pricing: Objectives and policies of pricing – Sealed bid pricing - Marginal cost pricing - Cost plus pricing - Going rate pricing – penetration Pricing –skimming Pricing - Block pricing – Peak load pricing - Cross subsidization.

UNIT – IV: INTRODUCTION TO PRINCIPLES OF ACCOUNTING & CAPITAL (09 Periods)

Accountancy: Introduction – Concepts – Conventions – Double Entry Book Keeping – Journal – Ledger - Trial Balance (Simple problems).
Capital: Significance - Types of capital – Sources of Capital.

UNIT – V: FINAL ACCOUNTS - COMPUTERIZATION OF ACCOUNTING SYSTEM (09 Periods)

Introduction to Final Accounts - Trading account - Profit and Loss account and Balance Sheet with simple adjustments (Simple problems). **Computerization of Accounting System:** Manual Accounting *Vs* Computerized Accounting – Advantages and Disadvantages of Computerized Accounting.

Total Periods: 45

TEXT BOOKS:

1. A.R. Aryasri, *Managerial Economics and Financial Analysis*, Tata Mc-Graw Hill, New Delhi, 3rd Edition, 2007.
2. R.Cauvery, U.K. Sudhanayak, M. Girija and R. Meenakshi, *Managerial Economics*, S. Chand and Company, New Delhi,2nd Edition, 2010.

REFERENCE BOOKS:

1. Varshaney and Maheswari, *Managerial Economics,* Sultan Chand and Sons, New Delhi, 19th Edition, 2005.
2. Ms. Samba Lalita, *Computer Accouting Lab Work*1stEdition, Kalyani Publishers, Ludhiana, 2009.
3. S.P. Jain and K.L. Narang, *Financial Accounting*, Kalyani Publishers, Ludhiana, 6th Edition, 2002.

II B.Tech. – I Semester

(16BT30101) CONSTRUCTION PLANNING AND PROJECT MANAGEMENT

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Building Materials and Construction Technology.
COURSE DESCRIPTION: Construction planning and organization; Resource management - Manpower, Materials, Machinery; Project management; Elements and development of network; PERT and CPM.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate the knowledge on construction planning and project management.
CO2. Identify critical activities and critical paths in a construction project and analyze networks.
CO3. Develop the network for analyzing critical path by using programme evaluation techniques.
CO4. Solve complex construction planning and management problems through proper interpretation of data.
CO5. Use appropriate tools and techniques for better construction planning and management.
CO6. Plan and manage construction ensuring safety.
CO7. Use environmentally sustainable approach in construction planning and management.
CO8. Maintain ethics in construction planning and management following rules and regulations.
CO9. Plan, monitor and control the finance in civil engineering construction.

DETAILED SYLLABUS

UNIT – I: CONSTRUCTION PLANNING AND ORGANIZATION (08 Periods)
Basic concepts in the development of construction plans, Choice of technology and construction method, Planning for construction projects, Steps involved in planning, Types of plans, Stages of planning by different agencies, Types of organization, Labour legislation in India, Workmen's Compensation Act of 1923 and Minimum Wages Act of 1948, Subsequent amendments, Safety in construction.

UNIT – II: RESOURCE MANAGEMENT (10 Periods)
Manpower: Resource smoothing, Resource leveling, Establishing labour productivity. **Materials:** Objectives of material management, Costs, Functions of material management departments, ABC classification of materials, Inventory of materials, Material procurement, Stores management.
Machinery: Classification of construction equipment, Earth moving equipment, Excavation equipment, Hauling equipment, Earth compaction equipment, Hoisting equipment, Concreting plant and equipment, Selection of equipment, Task consideration, Cost consideration, Factors affecting the selection, Factors affecting cost owning and operating the equipment, Equipment maintenance.

UNIT – III: PROJECT MANAGEMENT (09 Periods)
Project planning, Scheduling, Controlling, Role of decision in project management, Techniques for analyzing alternatives, Operation research, Methods of planning and programming problems, Development of bar chart, Illustrative examples, Shortcomings of bar charts and remedial measures, Milestone charts, Development of PERT network problems.

UNIT – IV: ELEMENTS AND DEVELOPMENT OF NETWORK (09 Periods)
Introduction, Event, Activity, Dummy, Graphical guidelines for network, Common partial situations in network, Numbering the events, Cycles problems, Planning for network construction, Modes of network construction, Steps in development of network, Work breakdown structure, Hierarchies, Illustrative examples.

UNIT – V: PERT AND CPM (09 Periods)
Network analyses, PERT, Slack, Critical path, Illustrative examples, Probability of meeting scheduled date problems, CPM Process, CPM Networks, Activity time estimate, Earliest event time, Latest allowable occurrence time, Combined tabular computations for TE and TL, Start and finish times of activity, Float, Critical activities and critical path, Resource allocation, Leveling, Crashing, Illustrative examples.

Total Periods: *45*

TEXT BOOKS:

1. K. K. Chitkara, *Construction Project Management:Planning, Scheduling and Controlling*, Tata McGraw-Hill Education Pvt. Ltd., 3rd Edition, 2014.
2. B. C. Punmia and K. K. Khandelwal, *Project Planning andControl with PERT and CPM,* Lakshmi Publications (P). Ltd., 4thEdition, 2010.

REFERENCE BOOKS:

1. Chris Hendrickson and Tung Au, *Project Management for Construction – Fundamentals Concepts for Owners,Engineers,Architects and Builders*, Prentice Hall, Pitsburgh, 2008.
2. Jha, *Construction Project Management,* Pearson Pubilications, 2011.
3. S. Seetharaman, *Construction Engineering and Management,* Umesh Publications, 3rd Edition, 2010.

4. R. Chudly, Roger Greno, Mike Hurst and Simon Topliss, *Construction Technology,* Vol. I and Vol. II*,* Longman, 5th Edition, 2011.

II B.Tech. – I Semester

(16BT30102) FLUID MECHANICS AND HYDRAULIC MACHINERY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Engineering Mechanics, Multi–Variable Calculus and Differential Equations.

COURSE DESCRIPTION: Properties of fluids and pressure measurement; Hydrostatic forces; Fluid kinematics; Fluid dynamics; Closed conduit flow; Measurement of flow; Laminar and Turbulent flow; Hydraulic similitude and Model testing; Boundary layer theory; Open channel flow; Impact of jets; Hydraulic turbines; Centrifugal pumps.

COURSE OUTCOMES: On successful completion of this course, the students will able to:

CO1 Demonstrate the knowledge on basic properties of fluids, classification of flows and hydraulic machinery.

CO2 Analyze fluids, flows and forces in hydraulics.

CO3 Design piping systems, open channels and hydraulic machinery.

CO4 Address the problems and faults in the prototype preparation using the model analysis and provide suitable solutions.

CO5 Use of flow and pressure measurement devices in channels and hydraulic machinery.

CO6 Consider safety issues in the analysis and design of channels, pipes and hydraulic machinery.

DETAILED SYLLABUS:

UNIT - I: PROPERTIES OF FLUIDS AND PRESSURE MEASUREMENTS (09 Periods)

Dimensions and units, Physical properties of fluids, Pressure at a point, Pascal's law, Hydrostatic law, Atmospheric, gauge and absolute pressures, Measurement of pressure, Manometers and mechanical gauges, Hydrostatic forces on submerged plane surfaces, Total pressure and centre of pressure on plane and curved surfaces, Buoyancy, Centre of buoyancy.

UNIT - II: FLUID KINEMATICS AND DYNAMICS (08 Periods)

Description of fluid flow, Stream line, Path line and streak line, Stream tube, Classification of flows, Equation of continuity, Stream and Velocity potential functions, Flow net and its uses, Surface and body forces, Euler's and Bernoulli's equations, derivation, Practical applications, Momentum equation and its application, Orifices and Mouthpieces, Notches and Weirs, Latest velocity measuring devices, Introduction to boundary layer, Separation and prevention.

UNIT - III: CLOSED CONDUIT FLOW AND HYDRAULIC SIMILITUDE (09 Periods)

Laws of fluid friction, Darcy–Weisbach equation, Minor losses, Pipes in series, Pipes in parallel, Total energy line and Hydraulic gradient line, Moody's chart, Dimensional analysis, Rayleigh's method and Buckingham's Π theorem, Model studies, Geometric, kinematic and dynamic similarities, Dimensionless numbers, Model laws, Scale effects, Flow around submerged bodies, Drag and lift.

UNIT - IV: OPEN CHANNEL FLOW (09 Periods)

Types of flows, Types of channels, Velocity distribution, Chezy's, Manning's and Bazin's formulae for uniform flow, Most Economical sections, Critical flow, Specific Energy, Critical depth, Computation of critical depth, Critical, subcritical and supercritical flows, Non uniform flow, Dynamic equation for gradually varied flow, Types of slopes, Surface profiles, Rapidly varied flow, Hydraulic jump and its applications.

UNIT - V: TURBINES AND PUMPS (10 Periods)

Jet on plane and curved surfaces, Classification of turbines, Pelton wheel, Francis turbine, Kaplan turbine, Working proportions, Velocity diagrams, Work done and efficiency, Hydraulic design, Draft tube theory, Governing of turbines, Specific speed, Performance characteristics, Geometric similarity, Cavitation, causes, effects, Pump, Classification of centrifugal pumps, Work done, Minimum starting speed, Specific speed, Multistage pumps, Pumps in parallel and series, Performance of pumps, Characteristic curves, Net positive suction head(NPSH).

Total Periods: 45

TEXT BOOKS:

1. R. K. Rajput, *A Textbook of Fluid Mechanics*, S. Chand Publishers, 5th Edition, 2013.
2. R. K. Bansal, *Fluid Mechanics and Hydraulic Machines*, Laxmi Publishers, 9th Edition, 2011.

REFERENCE BOOKS:

1. P. N. Modi and S. M. Seth, *Hydraulics and Fluid Mechanics Including Hydraulic Machines*, Standard Book House, 20th Edition, 2011.
2. J. F. Douglas, J.M. Gaserek and J.A. Swaffirld, *Fluid Mechanics,* 5th Edition, Longman, 2010.
3. S. K. Som and G. Biswas, *Introduction to Fluid Machines*, Tata McGraw–Hill Publishers Pvt. Ltd, 2nd Edition, 2010.

4. Domkundwar and Domkundwar, *A Textbook of Fluid Mechanics and Hydraulic Machines*, Dhanpat Rai and Co, 6th Edition, 2014.

II B.Tech. – I Semester
(16BT30103) MECHANICS OF SOLIDS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Engineering Mechanics
COURSE DESCRIPTION: Simple stresses and strains; Strain energy; Shear force and bending moment; Stresses in beams; Combined direct and bending stresses; Torsion; Springs; Thin cylinders; Thick cylinders.
COURSE OUTCOMES: On successful completion of this course, the students will be able to

CO1. Acquire the knowledge on simple stresses and strains, shear force, bending moment, stresses in beams, torsion, springs, thin cylinders and thick cylinders.
CO2. Analyze bars, beams, shafts, springs and cylinders for stresses, strains, strain energy, shear force and bending moment distributions.
CO3. Design beams, shafts, springs and cylinders for various loading conditions.
CO4. Solve complex engineering problems associated with beams, shafts, springs and cylinders through proper investigation and interpretation of stresses, strains, shear force and bending moment.
CO5. Use appropriate methods in analyzing bars, beams, shafts and cylinders.
CO6. Consider safety and stability issues in analyzing bars, beams, shafts, springs and cylinders.

DETAILED SYLLABUS:
UNIT – I: SIMPLE STRESSES AND STRAINS (09 Periods)
Elasticity and plasticity, Types of stresses and strains, Hooke's law, Stress-strain diagram for mild steel, Working stress, Factor of safety, Lateral strain, Poisson's ratio, Volumetric strain, Types of elastic moduli and relations, Bars of varying section, Composite bars, Temperature stresses, Strain energy - Gradual, sudden and impact loadings, Simple applications.
UNIT – II: SHEAR FORCE AND BENDING MOMENT (09 Periods)
Types of beams, Supports and loads, Concept of shear force and bending moment, SF and BM diagrams - Cantilever, Simply supported, Overhanging beams subjected to point loads, Uniformly distributed load, Uniformly varying load and its combination, Point of contra–flexure, Relation between SF and BM, Rate of loading at a section of beam.
UNIT – III: STRESSES IN BEAMS, DIRECT AND BENDING STRESSES (10 Periods)
Stresses in Beams: Theory of simple bending, Basic bending equation, Neutral axis, Bending stresses, Section modulus of different cross sections, Design of simple beam sections, Strain energy due to bending, Basic shear stress equation, Shear stress distribution for different cross sections, Strain energy due to shear.
Direct and Bending Stresses: Stresses under the combined action of direct loading and bending moment, Core of a section, Stresses in chimneys, Conditions for stability, Stresses due to direct loading and bending moment about both axes.
UNIT – IV: TORSION AND SPRINGS (09 Periods)
Torsion: Theory of pure torsion, Torsional equation, Torsional moment of resistance, Polar section modulus, Power transmitted by shafts; Combined bending, torsion and end thrust; Design of shafts.
Springs: Deflection of close and open coiled helical springs under axial load and axial twist, Springs in series and parallel.
UNIT – V: THIN AND THICK CYLINDERS (08 Periods)
Thin Cylinders: Thin cylindrical shells, Longitudinal and circumferential stresses; Hoop, Longitudinal and volumetric strains; Changes in dimensions of thin cylinders.
Thick Cylinders: Lame's theory, Distribution of hoop and radial stresses across thickness, Design of thick cylinders, Compound cylinders, Difference of radii for shrinkage.

Total Periods: 45

TEXT BOOKS:

1. Punmia, B. C., Ashok Kumar Jain and Arun Kumar Jain, *Mechanics of Materials*, Laxmi Publications Pvt. Ltd., 2001.
2. Bhavikatti, S. S., *Strength of Materials*, Vikas Publishing House, 3rd Edition, 2010.

REFERENCE BOOKS:

1. Rajput, R. K., *Strength of Materials (Mechanics of Solids),* S. Chand & Company LTD, 5th Edition, 2006.
2. Basu, A. R., *Strength of Materials,* Dhanpat Rai & Co.(P) LTD., 2nd Revised Edition, 2015.

3. Junnarkar, S. B. and Shah, H. J., Mechanics of Structures – Vol. I (Strength of Materials), Charotar Publishing House Pvt. Ltd., 27th Revised and Enlarged Edition, 2008.
4. Khurmi, R. S., Strength of Materials, S. Chand & Company Ltd., 23rd Edition, 2005.

II B.Tech. – I Semester

(16BT30104) **SURVEYING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Matrices and Numerical Methods, Engineering Physics.
COURSE DESCRIPTION: Chain surveying; Compass surveying; Plane tabling; Levelling and contouring; Theodolite surveying; Tachometric surveying; Computation of areas and volumes; Curves; Electronic distance measurement.
COURSE OUTCOMES: On successful completion of this course, the students will able to:
CO1. Demonstrate the knowledge on chain, compass, plane table, auto level, theodolite, teacheometer and EDM surveying; areas and volumes; curves.
CO2. Analyze surveying techniques, tools and survey data.
CO3. Design different types of curves and prepare contour maps.
CO4. Solve complex engineering survey problems through proper survey and interpretation.
CO5. Use appropriate modern tools in surveying.
CO6. Follow ethics in surveying practice.

DETAILED SYLLABUS:
UNIT - I: CHAIN AND COMPASS SURVEYING (09 Periods)
Chain Surveying: Classification of surveying, Objectives, Principles of surveying, Distance measurement, Accuracy and errors, Chain and its types, Optical square, Cross staff, Reconnaissance and site location-, Locating ground features by offsets, Field book, Chaining for outline of structures, Methods for overcoming obstacles, Conventional symbols, Plotting chain survey, Computation of areas, Errors in chain surveying and their elimination.
Compass Surveying: Types of compass, Bearings, Included angles, Errors and adjustments.
UNIT - II: PLANE TABLE SURVEYING, LEVELING AND CONTOURING (09 Periods)
Plane Table Surveying: Equipment, Methods of plane tabling, Errors, Two and three point problems.
Leveling and Contouring: Types of leveling, Types of leveling instruments, Temporary and permanent adjustments, Height of instrument and rise and fall methods, Plotting longitudinal sections and cross sections, Effect of curvature and refraction, , Characteristics of contours, Uses of contour maps.
UNIT - III: THEODOLITE AND TACHEOMETRIC SURVEYING (08 Periods)
Theodolite Surveying: Description of theodolite, Temporary and permanent adjustments of vernier transit, Measurement of horizontal and vertical angles, Heights and distances, Traversing, Closing error and distribution, Gale's traverse table, Omitted measurements.
Tacheometric Surveying: Principle of stadia method, Distance and elevation formulae for staff held vertical and normal, Instrumental constants, Anallactic lens, Tangential method.
UNIT - IV: COMPUTATION OF AREAS AND VOLUMES, CURVES (10 Periods)
Computation of Areas: Areas dividing into number of triangles, By offsets to a base line, By coordinates, Areas from maps.
Computation of Volumes: Volume from cross-section, Embankments and cutting for a level section and two level sections with and without transverse slopes, Determination of the capacity of reservoir.
Curves: Different types and their characteristics, Setting out, Design of curves by Rankines and offset methods - Circular, Transition, Combined and vertical curve.
UNIT - V: ELECTRONIC DISTANCE MEASUREMENT (EDM) (09 Periods)
EDM Principle, Modern electronic surveying equipment - Digital levels, Digital theodolites, Total station; Total station - Working principle, Applications: Measurement of distance, Area, Height, Angles, Gradients, Traversing, Contouring, Stake out, Data analysis.

Total Periods: 45

TEXT BOOKS:
1. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Surveying – Vol. I, II and III*, Laxmi Publications (P) Ltd., 17th Edition, 2016.
2. R. Subramanian, *Surveying and Leveling,* Oxford University Press, 2nd Edition, 2012.

REFERENCE BOOKS:
1. S. K. Duggal, *Surveying – Vol. I and II*, Tata McGraw–Hill Publishing Co. Ltd., 4th Edition, 2013.
2. Arthur R. Benton and Philip J. Taetz, *Elements of Plane Surveying,* McGraw-Hill, 3rd Edition, 2010.
3. Arora, K. R., *Surveying – Vol. I and II,* Standard Book House, 14th Edition, 2011.

4. T. P. Kanetkar and S. V. Kulakarni, *Surveying and Leveling*, Pune Vidyarthi Griha Prakashan, Pune, 24th Edition, 2013.

II B.Tech. – I Semester
(16BT30131) FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Course on Fluid Mechanics and Hydraulic Machinery

COURSE DESCRIPTION: Calibration of flow meters; Verification of Bernoulli's equation; Performance of turbines and pumps; Losses through pipes.

COURSE OUTCOMES: On successful completion of this course, the students will able to:

CO1. Demonstrate practical knowledge on flow measuring devices, losses in pipes and hydraulic machinery.
CO2. Analyze fluids, flows and forces in hydraulics.
CO3. Interpret the experimental results and suggest suitable solutions.
CO4. Use of flow and pressure measurement devices in channels and hydraulic machinery.
CO5. Consider safety issues in performing experiments.
CO6. Function effectively as an individual and as a team member in solving fluid mechanics and hydraulic machinery problems.
CO7. Communicate effectively on the experimental results in written, oral and graphical forms.

LIST OF EXPERIMENTS:

1. Calibration of Venturimeter
2. Calibration of Orificemeter
3. Determination of coefficient of discharge for a small orifice by a constant head and variable head method
4. Calibration of rectangular notch
5. Determination of loss of head due to sudden contraction
6. Determination of coefficient of friction for pipes
7. Verification of Bernoulli's equation
8. Study of impact of jet on vanes
9. Study of hydraulic jump
10. Performance test on Pelton wheel
11. Performance test on Francis turbine
12. Performance test on Kaplan turbine
13. Performance test on single stage centrifugal pump
14. Performance test on multi stage centrifugal pump
15. Performance test on reciprocating pump

II B.Tech. – I Semester
(16BT30132) STRENGTH OF MATERIALS LAB
(Common to CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Course on Mechanics of Solids/Strength of Materials.

COURSE DESCRIPTION: Tension test; Compression test; Bending test; Shear test; Torsion test; Hardness test; Maxwell reciprocal theorem.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Acquire the knowledge on conducting experiments for testing strength of materials such as steel, timber, metals, beams and springs.
CO2. Analyze test results on steel, timber, metals, beams and springs.
CO3. Recommend suitable materials for construction after interpreting test results.
CO4. Use appropriate method of testing construction materials.
CO5. Consider safety in construction material testing with societal perspective.
CO6. Follow ethics in reporting exact testing results.
CO7. Function effectively as an individual and as a team member in construction material testing.
CO8. Communicate effectively on construction material testing in written, oral and graphical forms.

LIST OF EXPERIMENTS:
1. Tension test on mild steel / HYSD bar
2. Compression test on wood
3. Compression test on coiled spring
4. Tension test on coiled spring
5. Bending test on carriage spring
6. Brinell and Rockwell hardness tests
7. Charpy and Izod impact tests
8. Shear test on mild steel
9. Bending test on simply supported beam
10. Bending test on cantilever beam
11. Bending test on fixed beam
12. Bending test on continuous beam
13. Bending test on overhanging beam
14. Verification of Maxwell's reciprocal theorem
15. Torsion test on mild steel

II B.Tech. – I Semester

(16BT30133) **SURVEYING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Courses on Matrices and Numerical Methods, Engineering Physics.

COURSE DESCRIPTION: Exercises on chain surveying; Compass surveying; Plane table surveying; Auto Levelling; Theodolite surveying; Total station surveying; Area by planimeter.

COURSE OUTCOMES: On successful completion of this course, the students will able to:

CO1. Demonstrate the knowledge on chain, compass, plane table, auto level, theodolite, and total station surveying setting out works, area measurement by planimeter.
CO2. Analyze surveying techniques, tools and survey data.
CO3. Design simple curves; and develop survey plots and contour maps.
CO4. Solve complex engineering survey problems through proper survey and interpretation.
CO5. Use appropriate modern tools in surveying.
CO6. Follow ethics in surveying practice.
CO7. Function effectively as an individual and as a team member in surveying.
CO8. Communicate effectively on surveying in written, oral and graphical forms.

LIST OF EXERCISES:

A. CHAIN SURVEY

1. Cross staff survey and plotting
2. Chain traversing and plotting

B. COMPASS SURVEY

3. Determination of area by radiation method and 4plotting
4. Compass traversing and plotting

C. PLANE TABLE SURVEY

5. Resection – Two point and three point problems

D. LEVELLING

6. Longitudinal and cross–sectioning of a road profile and plotting
7. Contour plan of given area

E. THEODOLITE SURVEY

8. Measurement of horizontal angles by method of repetition and reiteration.
9. Trigonometric leveling – Measurement of heights and distances
10. Setting out a simple curves by Rankine's method of tangential angles
11. Setting out works for buildings and pipe lines.

F. TOTAL STATION SURVEY

12. Determination of area using total station
13. Determination of remote height using total station
14. Distance, gradient, and differential height between two inaccessible points using total station.
15. Stake-out using total station
16. Traversing using total station
17. Contouring using total station

G. AREA BY PLANIMETER

18. Determination of area of irregular figure by using planimeter

II B.Tech - II semester

(16BT3HS01) **ENVIRONMENTAL STUDIES**

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	0	-	3

PRE-REQUISITES: Course on Engineering Chemistry

COURSE DESCRIPTION: Multidisciplinary nature of environment; Natural resources; Ecosystems; Biodiversity; Environment pollution and control; Social issues and environment; Human population and environment; Field studies.

COURSE OUTCOMES: On successful completion of this course, the students will be able to

CO1. Acquire knowledge on nature of environment, natural resources, ecosystems, biodiversity, environmental pollution and control, social issues and human population.

CO2. Analyze natural resources, ecosystems, biodiversity, environmental pollution and control, social issues and human population.

CO3. Develop strategies for environmental pollution control and natural resource management.

CO4. Solve environmental problems through proper analysis and interpretation of environmental data.

CO5. Choose appropriate techniques in environmental pollution control and natural resource management.

CO6. Understand the impact of social issues and population on environment.

CO7. Provide solutions to individuals, industries and government for environmental sustainable development.

CO8. Follow environmental protection laws for sustainable development.

CO9. Communicate effectively on environmental issues in the form reports.

DETAILED SYLLABUS:

UNIT - I: MULTIDISCIPLINARY NATURE OF ENVIRONMENT AND NATURAL RESOURCES (11 Periods)

Multidisciplinary Nature of Environment: Multidisciplinary nature of environment, Segments of environment - Lithosphere, Hydrosphere, Atmosphere, Biosphere; Need for public awareness.

Natural Resources: Renewable and non-renewable resources and associated problems - (a) Forest resources: Use and over exploitation, Deforestation-causes, effects and remedies, Case studies, (b) Water resources: Use and over utilization of surface and groundwater, Conflicts over water, Benefits and problems of large dams, Case studies, (c) Mineral resources: Mining, Adverse effects, Case studies, (d) Food resources: World food problems, Changes caused by agriculture and overgrazing, Effects of modern agriculture, Water logging and salinity, Case studies, (e) Energy resources: Growing needs, Renewable energy resources – Solar, Wind, Hydropower, Hydrogen fuel; Non-renewable energy resources - Coal, Natural gas, Nuclear energy, Role of an individual in conservation of natural resource and equitable use of resources for sustainable lifestyles.

UNIT - II: ECOSYSTEMS AND BIODIVERSITY (10 Periods)

Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem - Producers, Consumers, Decomposers; Food chains, Food webs, Ecological pyramids – Types; Characteristic features, Structure and functions of forest ecosystem, Desert ecosystem, Aquatic ecosystem, Energy flow in the ecosystem, Ecological succession.

Biodiversity: Concept and value of biodiversity, Role of biodiversity in addressing new millennium challenges, Hot spots of biodiversity, Threats to biodiversity, Man-wild life conflicts, Endemic, Endangered and extinct species of India, Conservation of biodiversity – In-situ and ex-situ.

UNIT - III: ENVIRONMETAL POLLUTION AND CONTROL (8 Periods)

Causes, Adverse effects and control measures of pollution - Air pollution, Water pollution, Soil pollution, Noise pollution, Thermal pollution, Nuclear pollution; Solid waste management – Causes, Effects and control measures of urban and industrial wastes; Hazards and disaster management – Floods, Earthquakes, Tsunamis, Case studies.

UNIT - IV: SOCIAL ISSUES AND THE ENVIRONMENT (8 Periods)

Sustainable development, Urban problems related to energy, Environmental ethics –Issues, Solutions; Global warming, Acid rain, Ozone layer depletion, Nuclear accidents and case studies, Wasteland reclamation, Consumerism and waste products, Concept of green technologies, Environment protection act, Air act, Water act, Wildlife protection act, Forest conservation act, Issues involved in enforcement of environmental legislation, Public environmental awareness.

UNIT - V: HUMAN POPULATION AND THE ENVIRONMENT (8 Periods)

Population growth, Population characteristics and variation among nations, Population explosion, Family welfare programme, Environment and human health, Human rights, Value education, HIV/AIDS, Women and child welfare, Role of information technology in environment and human health, Case studies, Field Work/Assignment/Seminar: Environmental assets – Pond/Forest/Grassland/ Hill/Mountain/Environment impact assessment procedures for local environmental issues. **Total Periods: 45**

TEXT BOOKS:

1. A. Kaushik and C. P. Kaushik, *Environmental Studies*, New Age International (P) Ltd Publications, 4th Edition, 2014.
2. Erach Barucha, *Environmental Studies*, Orient Blackswan, 2nd Edition, 2013.

REFERENCE BOOKS:

1. R. Rajagopalan, *Environmental Studies*, Oxford University Press, 2nd Edition, 2011.

2. Benny Joseph, *Environmental Studies*, Tata McGraw-Hill, 2nd Edition, 2009.
3. B. S. Chauhan, *Environmental Studies*, University Science Press, 2008.
4. M. Anji Reddy, *Text Book of Environmental Sciences and Technology*, BS Publications, 2007.

II B. Tech. – II Semester

(16BT40101) CONCRETE TECHNOLOGY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Building Materials and Construction Technology.
COURSE DESCRIPTION: Cement and admixtures; Aggregates; Fresh and hardened concrete; Tests on concrete; Elasticity, Creep and Shrinkage; NDT; Mix design- ACI and IS methods; Special concretes.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate the knowledge on properties of cement, admixtures, aggregates, fresh and hardened concrete; elasticity, creep and shrinkage of concrete; special concrete.
CO2. Characterize the constituent materials of concrete in choice of mix proportion.
CO3. Design the concrete mix using IS-10262 and ACI method.
CO4. Conduct various tests on fresh and hardened concrete.
CO5. Make use of modern tools in Non-Destructive testing of concrete.
CO6. Encourage the use of sustainable and environmental friendly constituent materials in manufacture of concrete.
CO7. Maintain ethical standards for quality in concrete.

DETAILED SYLLABUS:
UNIT - I: CEMENT, ADMIXTURES AND AGGREGATES (09 Periods)
Cements and Admixtures: Portland cement, Grades of cement, Admixtures - mineral admixtures, chemical admixtures, Effects of admixtures on concrete properties.
Aggregates: Classification of aggregate, Physical properties, Mechanical properties, Bond strength, Bulking of sand, Deleterious substance in aggregate, Soundness of aggregate, Alkali aggregate reaction, Thermal properties, Sieve analysis, Gradation, Maximum aggregate size.
UNIT - II: FRESH AND HARDENED CONCRETE (10 Periods)
Workability, Factors affecting, Measurement of workability, Setting times of concrete, Effect of time and temperature on workability, Segregation and bleeding, Mixing and vibration, Manufacture of concrete, Ready mix concrete, Quality of mixing water, Water/Cement ratio, Abram's Law, Gel space ratio, Curing, Nature of strength of concrete, Maturity concept, Strength in tension and compression, Factors affecting strength, Tests on hardened concrete, Relation between compressive and tensile strength.
UNIT - III: ELASTICITY, CREEP, SHRINKAGE AND NDT (08 Periods)
Modulus of elasticity, Dynamic modulus of elasticity, Poisson's ratio, Creep, Relation between creep and time, Nature of creep, Effects of creep, Shrinkage, Types of shrinkage, Non-destructive testing methods – Rebound hammer, Ultrasonic pulse velocity method, Pullout; Codal provisions for NDT.
UNIT - IV: MIX DESIGN (10 Periods)
Factors in the choice of mix proportions, Durability of concrete, Quality control of concrete, Statistical methods, Acceptance criteria, Proportioning of concrete mixes by various methods – ACI method and IS 10262 method.
UNIT - V: SPECIAL CONCRETES (08 Periods)
Light weight aggregates; Applications, types and properties - Light weight aggregate concrete, Cellular concrete, No-fines concrete, High density concrete, Fibre reinforced concrete, Polymer concrete, High performance concrete, Self consolidating concrete, SIFCON, Bacterial concrete (Self-healing concrete).

Total Periods: *45*

TEXT BOOKS:
1. M. S. Shetty, *Concrete Technology*, S. Chand and Company Ltd., New Delhi, 2003.
2. A. M. Neville, *Properties of Concrete*, Pearson Publication, 5th Edition, 2012.

REFERENCE BOOKS:
1. A. R. Santhakumar, *Concrete Technology*, Oxford University Press, New Delhi, 2006.
2. M. L. Gambir, *Concrete Technology*, Tata McGraw-Hill Publishing Co. Ltd, New Delhi, 3rd Edition, 2007.
3. Gupta, B. L. and Amit Gupta, *Concrete Technology*, Jain Book Agency, 4th Edition, 2014.
4. ACI 211.1-91: Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete (Reapproved 2009).

CODE:

Pages 1 to 4 from IS: 10262–2009: Concrete Mix Proportioning – Guidelines, **are to be permitted into the examination hall.**

II B.Tech. – II Semester

(16BT40102) ENGINEERING GEOLOGY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: General geology and weathering; Mineralogy and petrology; Structural geology and geophysical studies; Groundwater; Earthquake and landslides; Dams; Reservoirs; Tunnels; Bridges.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate basic knowledge on weathering, minerals, rocks, geological structures, geophysical methods, groundwater, earthquakes and landslides and site selection for civil engineering structures.

CO2. Analyze minerals, rocks, geological structures and failure of structures due to geological considerations.

CO3. Conduct geological investigations and give recommendations for the site suitability for construction.

CO4. Use modern methods and apply suitable techniques in geological study for civil engineering applications.

CO5. Demonstrate causes and effects of natural hazards and suggest remedial measures for the societal safety.

CO6. Consider environmental sustainability in exploitation of groundwater and construction materials using suitable methods.

CO7. Communicate effectively on geological maps and reports to the engineering community.

DETAILED SYLLABUS:

UNIT – I: GENERAL GEOLOGY AND WEATHERING (8 Periods)

General Geology: Relevance of geology in civil engineering, Failures of civil engineering constructions due to geological draw backs, Case histories, Geological report for different phases of site investigations.

Weathering: Types of weathering, Effects of weathering of rocks, Engineering classification of weathered rock masses, Importance of weathering with reference to dams, reservoirs, tunnels and bridges.

UNIT – II: MINERALOGY AND PETROLOGY (10 Periods)

Mineralogy: Methods of study of minerals, Advantages of study of minerals by physical properties, Physical properties of minerals - Feldspar, Quartz, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite.

-Petrology: Origin, Geological classification, Structures, Textures of rocks; Megascopic study of rocks - Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sandstone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble, Slate; Engineering properties of rocks.

UNIT – III: STRUCTURAL GEOLOGY AND GEOPHYSICAL STUDIES (10 Periods)

Structural Geology: Outcrop, Strike and dip, Classification and effects - Folds, Faults, Unconformities, Joints; Problems - Thickness, Strike and dip of beds; Structural geology maps.

Geophysical Studies: Gravity methods, Magnetic methods, Electrical resistivity methods, Seismic refraction methods, Radiometric methods and geothermal methods, Civil engineering applications.

UNIT – IV: GROUNDWATER, EARTHQUAKES AND LANDSLIDES (9 Periods)

Groundwater: Hydrological cycle, Types of groundwater, Hydrological properties of rocks, Cone of depression, Geological controls of groundwater movement.

Earthquakes: Intensity and magnitude scales, Shield areas and seismic zones, Causes and effects, Precautions to be taken for building construction in seismic areas.

Landslides: Classification, Causes and effects, Measures to be taken to prevent their occurrence.

UNIT – V: DAMS, RESERVOIRS, TUNNELS AND BRIDGES (8 Periods)

Geological considerations in a dam and reservoir sites, Analysis of dam failures of the past, Factors contributing to the success of a reservoir, Geological considerations in tunneling and in a bridge site, Effects of tunneling on the ground. **Total Periods: 45**

TEXT BOOKS:

1. N. Chenna kesavulu, *Engineering Geology*, Mc–Millan India Ltd., 2nd Edition, 2014.
2. Parbin Singh, *A Text Book of Engineering and General Geology*, S. K. Kataria and Sons, 8th Edition, 2012.

REFERENCE BOOKS:

1. D. Venkata Reddy, *Engineering Geology*, Vikas Publications, 2014.
2. Subinoy Gangopadhyay, *Engineering Geology*, Oxford university press, 3rd Edition, 2015.
3. Vasudev Kanithi, *Engineering Geology*, University Press, 2012.

4. S. K. Dhuggal, H. K. Pandey, N. Rawal, *Engineering Geology*, McGraw-Hill Education Pvt. Ltd., 2^{nd} Edition, 2014.

II B.Tech.– II Semester
(16BT40103) **ENGINEERING HYDROLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Fluid Mechanics and Hydraulic Machinery

COURSE DESCRIPTION: Hydrologic cycle; Applications and history; Weather and seasons in India; Precipitation; Evaporation; Evapotranspiration; Runoff; Groundwater hydrology; Hydrograph analysis; Design flood; Erosion; Reservoir sedimentation.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Acquire the basic knowledge on surface and groundwater hydrology.
CO2. Analyze problems associated with surface and groundwater hydrology.
CO3. Design of floods using Muskingum's method.
CO4. Provide solutions for complex engineering problems in hydrology through proper interpretation data.
CO5. Use appropriate techniques for solving issues related to hydrology
CO6. Address the safety issues in flood routing, erosion and reservoir sedimentation.
CO7. Understand the effect of erosion and reservoir sedimentation on the environment and provide solutions to ensure environmental sustainability.

DETAILED SYLLABUS:
UNIT - I: INTRODUCTION TO HYDROLOGY AND PRECIPITATION (09 Periods)
Scope of hydrology, Hydrologic cycle, Practical applications and historical development, Precipitation - Types and forms, Weather and seasons in India, Measurement of rainfall, Recording and non recording type of rain gauges, Errors in measurement, Analysis and interpretation of rainfall data, Methods of calculation of mean precipitation over an area.
UNIT - II: EVAPORATION AND INFILTRATION (09 Periods)
Process of evaporation, Factors affecting evaporation, Estimation, Methods of reduction, Factors affecting infiltration, Infiltration equation and indices, Interception, Evapotranspiration - Factors affecting, Measurement.
UNIT - III: RUNOFF AND GROUNDWATER HYDROLOGY (09 Periods)
Components, Factors affecting runoff, Rainfall–runoff relationships, Flow mass curve, Flow duration curve, Mass curve of rainfall, Hyetograph, Double mass curve, Stream flow measurement – Stage, Discharge - Area velocity method, Moving boat method, Current meter, Float method; Groundwater hydrology - Steady state well hydraulics and aquifers, Application of Darcy's law.
UNIT - IV: HYDROGRAPH ANALYSIS AND DESIGN FLOOD (09 Periods)
Components of hydrograph, Unit hydrograph, Derivation, Use and limitation of unit hydrograph, Flood – Methods, Envelope curves, Empirical formulae, Rational method, Unit hydrograph method, S-Curve unit hydrograph, Frequency analysis, Flood routing – Muskingum's method.
UNIT - V: EROSION AND RESERVOIR SEDIMENTATION (09 Periods)
Erosion process, Estimation of sheet erosion, Channel erosion, Movement of sediment from watersheds, Sediment yield from watersheds, Trap efficiency, Density of sediment deposits, Distribution of sediment in reservoir, Life of a reservoir, Reservoir sedimentation control, Erosion and reservoir sedimentation problems in India.

Total Periods: 45

TEXT BOOKS:
1. K. Subramanya, *Engineering Hydrology*, Tata McGraw–Hill Education Pvt. Ltd., 4^{th} Edition, 2013.
2. P. Jaya Rami Reddy, *A Text Book of Hydrology,* University Science Press, An Imprint of Laxmi Publications Pvt. Ltd., 3^{rd} Edition, 2011.

REFERENCE BOOKS:
1. H. M. Raghunath, *Ground Water,* Wiley Eastern Ltd., 3^{rd} Edition, 2009.
2. David Keith Todd, *Groundwater Hydrology,* Wiley India Pvt. Ltd., 2^{nd} Edition, 2010.
3. V. T. Chow., *Hand Book of Applied Hydrology,* McGraw–Hill Education Pvt. Ltd., 2^{nd} Edition, 2000.

4. C. S. P. Ojah, R. Berndtsson, P. Bhunya, *Engineering Hydrology,* Oxford Higher Education, 5th Edition, 2008.

II B.Tech. – II Semester
(16BT40104) STRUCTURAL ANALYSIS – I

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Engineering Mechanics, Mechanics of Solids.

COURSE DESCRIPTION: Principal stresses and strains; Deflection of beams, Macaulay's method and double integration method; Columns and struts; Indeterminate Beams; Theories of failure; Unsymmetrical bending and shear centre.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Elucidate the knowledge on principal stresses and strains, slopes and deflections of beams using double integration, Macaulay's and moment area method; columns and struts, fixed and propped cantilever beams, continuous beams, theories of failure and unsymmetrical bending and shear centre.

CO2. Analyze different beams, columns and struts, unequal sections and theories of failure.

CO3. Solve complex problems linked with different beams, columns and channel sections.

CO4. Use appropriate methods to analyze the beams and columns.

CO5. Ensure safety in the analysis of beams and columns.

CO6. Present the results of analysis such as stresses, bending moment, shear force, slope and deflections effectively in written and graphical forms.

DETAILED SYLLABUS:

UNIT – I: PRINCIPAL STRESSES AND STRAINS (09 Periods)

Stresses on an inclined plane under axial loading, Compound stresses, Normal and tangential stresses on an inclined plane for biaxial stresses, Two perpendicular normal stresses accompanied by a state of simple shear, Mohr's circle of stresses, Triaxial state of stresses, Principal stresses and strains.

UNIT – II: DEFLECTION OF BEAMS (10 Periods)

Bending into a circular arc, Slope, deflection and radius of curvature, Differential equation for the elastic curve of a beam, Double integration and Macaulay's methods, Mohr's theorems, Moment area method, Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, U.D.L. and uniformly varying loads.

UNIT – III: COLUMNS AND STRUTS (09 Periods)

Short, medium and long columns, Axially loaded compression members, Euler's theorem for long columns, Euler's critical load, Equivalent length of a column, Slenderness ratio, Limitations of Euler's theory, Rankine–Gordon formula, Long columns subjected to eccentric loading, Secant formula.

UNIT – IV: INDETERMINATE BEAMS (09 Periods)

Fixed and Propped Cantilever Beams: Shear force and bending moment diagrams for fixed end moment due to - Point loads, Uniformly distributed load, Uniformly varying load, Couple and combination of loads; Deflection of fixed beams, Effect of sinking and rotation of support, Shear force and bending moment diagrams of propped cantilever.

Continuous Beams: Continuous beams **–** Clapeyron's theorem of three moments, Analysis of continuous beams with one or both ends fixed, Continuous beams with overhang.

UNIT – V: THEORIES OF FAILURE, UNSYMMETRICAL BENDING AND SHEAR CENTRE (08 Periods)

Theories of Failure: Maximum principal stress theory, Maximum principal strain theory, Maximum shear stress theory, Maximum strain energy theory, Maximum shear strain energy theory.

Unsymmetrical Bending and Shear Centre: Centroidal principal axes of section, Stress in beams due to unsymmetrical bending, Principal axes, Location of neutral axis, Shear centre of channel section and unequal section.

Total Periods: 45

TEXT BOOKS:

1. V. N. Vazirani, M. M. Ratwani and S. K. Duggal, *Analysis of Structures– Vol. I and Vol. II*, Khanna Publications, 17th Edition, 2013.
2. Ramamrutham, S. and Narayanan, R., *Theory of Structures*, Dhanpat Rai Publishing Co. Ltd., 9th Edition, 2014.

REFERENCE BOOKS:

1. Khurmi, R. S., *Theory of Structures*, S. Chand & Company Ltd., 22nd Edition, 2013.
2. Bhavikatti, S. S., *Structural Analysis– Vol. I*, I. K. International Publishing House Pvt. Limited, 3rd Edition, 2008.

3. Pandit, G., Gupta, S. and Gupta, R., *Theory of Structures – Vol. I*, Tata Mc–Graw Hill Publishing Co. Ltd., 2nd Edition, 1999.
4. Basu, A. R., *Strength of Materials,* Dhanpat Rai & Co. (P) Ltd., 2nd Revised Edition, 2015.

II B.Tech. II Semester
(16BT40105) **WATER SUPPLY ENGINEERING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Environmental Studies, Fluid Mechanics and Hydraulic Machinery.
COURSE DESCRIPTION: Water sources; Quality; Quantity; Demand; Collection; Conveyance and distribution; Water treatment; Distribution; Water supply arrangements in buildings.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Acquire the basic knowledge on sources, quality, quantity, demand, conveyance, treatment systems, storage and distribution of water; and water supply arrangements in buildings.
CO2. Analyse problems associated with water supply engineering.
CO3. Design water conveyance, treatment, storage and distribution systems.
CO4. Solve water supply engineering problems through proper investigations and interpretation.
CO5. Use appropriate techniques in solving water supply engineering problems.
CO6. Provide solutions to water supply engineering problems ensuring health and safety.
CO7. Maintain quality standards in analysis, treatment and distribution of water in water supply schemes.

DETAILED SYLLABUS:
UNIT – I: WATER SOURCES AND QUALITY (08 Periods)
Importance of water supply engineering, Need for protected water supply, Objectives of water supply systems, Flow diagram of water supply systems, Different sources of water, Quantity and quality of different sources – Physical, chemical and biological impurities and their testing parameters.
UNIT – II: QUANTITY, DEMAND, COLLECTION AND CONVEYANCE (10 Periods)
Types and variation in water demand, Factors affecting water demand, Design period, Forecasting of population, different methods and their suitability, Water quality standards – Drinking, Construction; Intake works for collection of surface water, Conveyance of water – Gravity and pumping methods; Different materials used for conveying conduits and their suitability.
UNIT – III: WATER TREATMENT (09 Periods)
Conventional water treatment processes – Units and their functions; Aeration, Coagulation, Flocculation, Clarification, Determination of optimum dose of alum for coagulation of water, Theory of filtration, Different types of filters and their design, Disinfection – Disinfectants, Mechanism of disinfection, Different methods of disinfection, Break point chlorination, Types of chlorination, Dose of disinfectant.
UNIT – IV: ADVANCED TREATMENT METHODS AND DISTRIBUTION (09 Periods)
Advanced Treatment Methods: Removal of fluorides, arsenic, hardness, iron and manganese, salinity, colour, organic chemical and biological residues; Adsorption with activated carbon, ion–exchange resins; Membrane processes, Chemical oxidation.
Distribution: Distribution**-** Systems of distribution, Distribution reservoirs, Distribution networks, Design of simple networks, Pipe accessories, Valves and their location and suitability, EPANET software.
UNIT – V: WATER SUPPLY ARRANGEMENTS IN BUILDINGS (09 Periods)
Definition of technical terms used in water supply arrangements, House water connection, Water storage, Water piping systems in buildings, Connection from water main to building, Water supply fittings, Principles and precautions in laying pipe lines in the premises of buildings, Detection and prevention of leakages.

Total Periods: 45

TEXT BOOKS:
1. S. K. Garg*, Environmental Engineering, Vol. I: Water Supply Engineering,* Khanna Publishers, 20th Edition, 2011.
2. G. S. Birdie and J. S. Birdie, *Water Supply and Sanitary Engineering*, Dhanpat Rai and Sons Publishers, 9th Edition, 2011.

REFERENCE BOOKS:
1. K. N. Duggal, *Elements of Environmental Engineering*, S. Chand Publishers, 2010.
2. H. S. Peavy and D. R. Rowe, *Environmental Engineering*, McGraw–Hill Publishing Company, 2nd Edition, 1984.

3. P. N. Modi, *Water Supply Engineering*, Standard Book House, 3rd Edition, 2010.
4. S. K. Duggal, *Elements of Water Supply Engineering,* S. Chand & Co, 2010.

II B.Tech. – II Semester
(16BT40131) CONCRETE TECHNOLOGY LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Course on Concrete Technology.

COURSE DESCRIPTION: Testing of cement and sand; Testing of fresh and hardened concrete mixes; Non-destructive tests on concrete.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate knowledge on test for cement, sand and concrete.
CO2. Characterize the constituent material of concrete in the choice of mix proportion.
CO3. Design the concrete mix using IS-10262.
CO4. Conduct various tests on cement, sand and concrete in fresh and hardened state.
CO5. Make use of modern tools in non-destructive testing of concrete.
CO6. Maintain ethical standards for quality in concrete.
CO7. Function effectively as an individual and as a team member in concrete technology using modern tools and techniques.
CO8. Communicate effectively on concrete technology in written, oral and graphical forms.

LIST OF EXPERIMENTS:

1. Normal consistency test of cement
2. Test for initial and final setting time of cement
3. Soundness test of cement
4. Specific gravity test of cement
5. Compressive strength test of cement
6. Test for fineness of cement by dry sieving
7. Test for fineness of cement by Blaine's permeability apparatus
8. Bulking of sand test
9. Concrete mix design – IS 10262
10. Slump cone test
11. Compaction factor test
12. Vee-Bee consistometer test
13. Compressive strength test of concrete
14. Test for modulus of elasticity of concrete
15. Flexural strength test of concrete
16. Split tensile strength test of concrete
17. Rebound hammer test
18. PUNDIT
19. Concrete core test
20. Rapid chloride permeability test for durability of concrete

II B.Tech. – II Semester
(16BT40132) **ENGINEERING GEOLOGY LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: -

COURSE DESCRIPTION: Study of physical properties and identification of minerals and rocks; Rock forming minerals; Ore forming minerals; Igneous rocks; Sedimentary rocks; Metamorphic rocks; Geological maps; Problems on structural geology; CIPW norm calculations; Resistivity survey.

COURSE OUTCOMES: On successful completion of this course the students will be able to:

CO1. Apply the knowledge on identification of minerals and rocks, structural geology problems and maps and geophysical studies.
CO2. Analyze different minerals, rocks, geophysical data for engineering applications.
CO3. Interpret the geological maps and geophysical data with emphasis on practical applications in civil engineering.
CO4. Use modern tools for geologic investigations on the availability of minerals, rocks and groundwater.
CO5. Consider safety in geological investigations.
CO6. Follow standards in geological investigations.
CO7. Function effectively as an individual, and as a member or leader in teams to solve engineering geology problems.
CO8. Communicate effectively on geological information in written, oral and graphical forms.

LIST OF EXERCISES:

A) MINERALS

1. Study of physical properties and identification of rock forming minerals
2. Study of physical properties and identification of ore forming minerals

B) ROCKS

3. Study of physical properties and identification of common igneous rocks
4. Study of physical properties and identification of common sedimentary rocks
5. Study of physical properties and identification of common metamorphic rocks

C) GEOLOGICAL MAPS

6. Study of geological maps, drawing and interpretation of geological sections in horizontal beds
7. Study of geological maps, drawing and interpretation of geological sections in vertical beds
8. Study of geological maps, drawing and interpretation of geological sections in beds with fault plane

D) STRUCTURAL GEOLOGY PROBLEMS

9. Thickness
10. Strike and dip
11. Bore hole

E) NORM FORM CALCULATIONS

12. Normative minerals analysis

F) GEOPHYSICAL STUDIES

13. Electrical resistivity survey (not for the examination) Seismic surveys (not for the examination)

II B.Tech. – II Semester

(16BT4HS31) **SOFT SKILLS LAB**

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: English Language Laboratory in I B.Tech or English Laboratory at Diploma Level.

COURSE DESCRIPTION: Body Language; Assertiveness; Goal Setting; Creative Thinking; Interpersonal Skills; Team Work; Conflict Management; Etiquette; Report Writing; Group Discussions; Interviewing Skills.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Acquire knowledge in
- a) Goal Setting
- b) Creative Thinking
- c) Leadership Skills and
- d) Team Work

CO2. Analyse the situations and develop skills for
- a) Body Language
- b) Personality Development and
- c) Stress Management

CO3. Apply the techniques of soft skills in a problem situation enhanced through multimedia software.

CO4. Function effectively as an individual and as a member in diverse teams.

CO5. Communicate effectively in public speaking in formal and informal forums.

LIST OF EXERCISES:
1. Body Language
2. Assertiveness
3. Goal Setting
4. Creative Thinking
5. Interpersonal Skills
6. Team Work
7. Conflict Management
8. Etiquette
9. Report Writing
10. Resume Writing
11. Group Discussions
12. Interviewing Skills

TEXT BOOK:
1. Department Lab Manual.

REFERENCE BOOKS:

1. R. C. Sharma & Krishna Mohan, *Business. Correspondence and Report Writing*, Tata McGraw-Hill Publishing Company Limited, Third Edition, New Delhi, 2012.
2. Gopalswamy Ramesh and Mahadevan Ramesh, *The Ace of Soft Skills*, Pearson, Noida, 2010.
3. Jeff Butterfeild, *Soft Skills for Everyone*, Cengage learning, Delhi, 2011.
4. Barun K. Mitra, *Personality Development and SoftSkills*,Oxford University Press, Noida, 2012.

SUGGESTED SOFTWARES:
1. ETNL Language Lab Software Version 4.0
2. GEMS – Globarena E- Mentoring System
3. Speech Solutions.
4. English Pronunciation Dictionary by Daniel Jones.
5. Learning to Speak English 8.1, The Learning Company – 4 CDs.
6. Mastering English: Grammar, Punctuation and Composition.
7. English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
8. Dorling Kindersley Series of Grammar, Punctuation, Composition etc.
9. Language in Use 1, 2 & 3.
10. Cambridge Advanced Learner's Dictionary - 3rd Edition.
11. Centronix – Phonetics.
12. Let's Talk English, Regional Institute of English South India.
13. Ultimate English Tutor.

III B.Tech. – I Semester
(16BT50101) **IRRIGATION ENGINEERING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Fluid Mechanics and Hydraulic Machinery, Engineering Hydrology.

COURSE DESCRIPTION: Irrigation and soil moisture; Diversion head works; Gravity and earth dams; Canal structures; Cross drainage works.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Identify the importance of various irrigation practices and irrigation structures.
CO2. Analyze irrigation structures.
CO3. Design irrigation structures.
CO4. Provide solutions to the various types of failures of hydraulics structures.
CO5. Use appropriate techniques in solving irrigation engineering problems.
CO6. Ensure safety and stability of irrigation structures.
CO7. Follow IS codes in the design of irrigation structures.
CO8. Consider environmental sustainability in the analysis and design of irrigation structures.

DETAILED SYLLABUS:

UNIT - I: IRRIGATION AND SOIL MOISTURE (09 Periods)
Necessity and importance, Advantages and disadvantages, Types of irrigation, Application of irrigation water, Standards for irrigation water, Soil–water–plant relationship, Vertical distribution of soil moisture, Soil moisture constants, Consumptive use, Duty–delta relationship, Factors affecting duty, Irrigation efficiency.

UNIT - II: DIVERSION HEAD WORKS (09 Periods)
Types of diversion head works – Weirs, Barrages; Layout of diversion works, Causes and failure of hydraulic structures on permeable foundations, Bligh's creep theory, Khosla's theory - Design principles of various weirs.

UNIT - III: GRAVITY AND EARTH DAMS (10 Periods)
Gravity Dams: Forces acting on gravity dam, Causes of failure of gravity dams, Elementary profile and practical profile of gravity dam, Limiting height of a low gravity dam, Stability analysis of gravity dam, Spillways–Types, Design of Ogee spillway.
Earth Dams: Types, Causes of failure, Criteria for safe design, Seepage through earth dam, Measures of seepage control, Stability analysis.

UNIT - IV: CANAL STRUCTURES (09 Periods)
Types of canals, Lining of Canals, Design of canals, Kennedy's and Lacey's theory, Falls – Types, Design of Sarda type fall; Canal regulation works, Canal outlets – Types.

UNIT - V: CROSS DRAINAGE WORKS (08 Periods)
Types, Design and selection of site for aqueducts, super passages, level crossing; River training works.

TEXT BOOKS:
1. S. K. Garg, *Irrigation Engineering and Hydraulic Structures,* Khanna Publishers, 24th Edition, 2012.
2. P. N. Modi, *Irrigation Water Resources and Water Power Engineering,* Standard Book House, 7th Edition, 2008.

REFERENCE BOOKS:
1. K. R. Arora, *Irrigation, Water Power a*nd *Water Resources Engineering*, Standard Publishers Distributers, 4th Edition, 2013.
2. G. L. Asawa*, Irrigation a*nd *Water Resources Engineering,* New Age International Limited, 2012.
3. R. K. Sharma and T. K. Sharma, *Irrigation Engineering,* S. Chand Publishers, 3rd Edition, 2007.

4. B. C. Punmia and P. B. B. Lal*, Irrigation a*nd *Water Power Engineering,* Laxmi Publications, 16th Edition, 2011.

III B.Tech. – I Semester
(16BT50102) **REINFORCED CEMENT CONCRETE STRUCTURES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Building Materials and Construction Technology, Engineering Mechanics, Mechanics of Solids, Structural Analysis – I, Structural Analysis – II.

COURSE DESCRIPTION: Beams (Working stress and limit state methods); Shear, torsion and bond; Slabs; Columns; Shallow footings and Stair case.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate the knowledge concepts, techniques and applications of design of reinforced cement concrete structural elements: beams, slabs, columns, footings, stair cases.
CO2. Analyze different reinforced cement concrete structural elements.
CO3. Design different reinforced cement concrete structural elements.
CO4. Recommend suitable structural elements for reinforced cement concrete structures.
CO5. Use appropriate method to design RCC structural elements.
CO6. Ensure the RCC design as per safety and serviceability requirements.
CO7. Uphold Ethics in RCC design.

DETAILED SYLLABUS:

UNIT - I: BEAMS (09 Periods)
Beams (Working Stress Method): Behaviour of RCC beam in bending, Concept of working stress method, Design of beams - Rectangular, T, L.
Beams (Limit State Method): Concept of limit state method, Design of beams for flexure, shear, torsion - Rectangular, T and L beams.

UNIT - II: SHEAR, TORSION AND BOND (08 Periods)
Limit state analysis and design of section for shear and torsion; Concept of bond, anchorage and development length; I.S. code provisions, Design of simply supported and continuous beams, Detailing; Limit state design for serviceability for deflection, cracking and codal provision.

UNIT - III: SLABS (LIMIT STATE METHOD) (08 Periods)
Limit state design of one way, two way and continuous slabs.

UNIT - IV: COLUMNS (LIMIT STATE METHOD) (08 Periods)
Design of axially and eccentrically loaded short and long column.

UNIT - V: SHALLOW FOOTINGS AND STAIRCASES (LIMIT STATE METHOD) (12 Periods)
Shallow Footings: Design of isolated square and rectangular footings for axially and eccentrically loaded columns, Design of combined footing.
Staircases: Types of staircases, Stairs spanning longitudinally and transversally.

Total Periods: 45

TEXT BOOKS:

1. S. Unnikrishna Pillai and Devdas Menon, *Reinforced Concrete Design*, Tata Mc. Graw Hill, 3rd Edition, 2010.
2. S. K. Roy and N. C. Sinha, *Fundamentals of Reinforced Concrete*, S. Chand & Company Ltd., 5th Edition, 2010.

REFERENCE BOOKS:

1. P. C. Varghese, *Limit State Designed of Reinforced Concrete*, Prentice Hall of India, 2nd Edition, 2010.
2. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Reinforced Concrete structures – Vol. I*, Laxmi Publications Pvt. Ltd., 19th Edition, 2010.
3. N. Krishna Raju and R. N. Pranesh, *Reinforced Concrete Design*, CBS Publishers Distributors, 3rd Edition, 2010.
4. M. L. Gambhir, *Fundamentals of Reinforced Concrete Design,* Prentice Hall of India Pvt. Ltd., 2010.

CODE:
IS: 456–2000: Plain and Reinforced Concrete, **is to be permitted into the examination hall.**

III B.Tech. – I Semester
(16BT50103) **SOIL MECHANICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Engineering Mechanics, Engineering Geology.

COURSE DESCRIPTION: Basic principles of soil mechanics and their application in engineering practice; Index properties; Engineering properties - Permeability and Seepage, Stress distribution and Compaction, Consolidation, Shear strength.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Gain knowledge on classification and engineering behavior of soils.
CO2. Analyze properties and engineering behavior of soils.
CO3. Address complex problems associated with soils and suggest suitable solutions.
CO4. Use appropriate techniques to determine the soil properties.
CO5. Consider safety through proper assessment of engineering behavior of soils.
CO6. Demonstrate the need of soil testing for sustainable development.
CO7. Practice soil engineering in accordance with IS Codes.
CO8. Communicate effectively on soil engineering problems in written and graphical forms.

DETAILED SYLLABUS:

UNIT – I: INDEX PROPERTIES OF SOILS (09 Periods)

Soil formation, Types of soils, Soil structure and clay mineralogy, Adsorbed water, Volume–weight relationships,Three–phase diagram, Moisture content, Specific gravity, In–situ density, Relative density, Grain size analysis – Sieve and hydrometer methods, Plasticity of soils, Consistency limits and indices, I.S. Classification of soils, Sensitivity, Thixotropy, Activity of soil, Field identification of soils, Latest methods.

UNIT – II: PERMEABILITY AND SEEPAGE THROUGH SOILS (09 Periods)

Permeability: Soil water, Capillary rise, Flow of water through soils, Darcy's law, Permeability, Factors affecting permeability, Laboratory determination of coefficient of permeability, Permeability of layered systems.

Seepage through Soils: Effective stress principle, Effective stress under different loading conditions, Seepage pressure, Quicksand condition, Seepage through soils, Flownets– Characteristics and uses;Seepage through earth dams with horizontal filter, Critical hydraulic gradient.

UNIT – III: STRESS DISTRIBUTION IN SOILS AND COMPACTION (09 Periods)

Stress Distribution in Soils: Boussinesq's theory - Point loads, Line loads, Circular and rectangular loaded areas; Westergaard's theory, Newmark's influence chart, Approximate methods, Contact pressure distribution.

Compaction: Mechanism of compaction, Optimum moisture content and maximum dry density, Factors affecting compaction, Effects of compaction on soil properties, Laboratory determination of OMC and MDD, Field compaction methods, Compaction control.

UNIT – IV: CONSOLIDATION OF SOILS (09 Periods)

Initial, Primary and secondary consolidation, Spring analogy for primary consolidation, Consolidation test– e–p and e–log p curves; Terzaghi's theory of one dimensional consolidation – Coefficient of consolidation; Pre-consolidation pressure, Secondary consolidation.

UNIT – V: SHEAR STRENGTH OF SOILS (09 Periods)

Mohr–Coulomb failure theories, Types of laboratory shear strength tests, Strength tests based on drainage conditions and their field applicability, Shear strength of cohesionless soils, Critical void ratio, Liquefaction, Shear strength of cohesive soils, Skempton's pore pressure coefficients.

Total Periods: 45

TEXT BOOKS:

1. Gopal Ranjan and A. S. R. Rao, *Basic and Applied Soil Mechanics,* New Age International Pvt. Ltd., 2nd Revised Edition, 2014.
2. K. R. Arora, *Soil Mechanics and Foundation Engineering,* Standard Publishers and Distributors, 7th Edition, 2014.

REFERENCE BOOKS:

1. Braja M. Das, *Principles of Geotechnical Engineering,* Cengage Learning India, 7th Edition, 2009.
2. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Soil Mechanics and Foundation,* Laxmi Publications Pvt. Ltd., 16th Edition, 2014.

3. C. Venkatramaiah, *Geotechnical Engineering,* New Age International Publishers, 3rd Edition, 2010.
4. Lambe, T. W. and Whitman, R. V., *Soil Mechanics,* John Wiley and Sons, Singapore, 2000.

III B.Tech. – I Semester

(16BT50104) STRUCTURAL ANALYSIS – II

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Structural Analysis – I.

COURSE DESCRIPTION: Shear force and bending moment for moving loads; Influence lines; Slope–deflection method; Moment distribution method; Kani's method; Energy method; Redundant pin–jointed frames; Plastic analysis.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate the knowledge on moving loads, influence lines, slope deflection method, moment distribution method, Kani's method, energy method and plastic analysis.

CO2. Analyze beams and frames using slope-deflection method, moment distribution method and Kani's method; beams subjected to moving loads, trusses.

CO3. Address complex problems associated with the analysis of beams for collapse loads using plastic theory.

CO4. Use appropriate method to analyze civil engineering structures.

CO5. Follow the analyzing principles to ensure safety of the structures.

CO6. Present the results of analysis such as bending moment and shear force distributions and deflections effectively in written and graphical forms.

DETAILED SYLLABUS:

UNIT - I: MOVING LOADS AND INFLUENCE LINES (10 Periods)

Moving Loads: Maximum shear force and bending moment at a given section and absolute maximum SF and BM due to single concentrated load, UDL longer than the span, UDL shorter than the span, two point loads and several point loads; Equivalent uniformly distributed load, Focal length.

Influence Lines: Influence line for support reaction, SF and BM; Load position for maximum SF and for maximum BM at a section; Loading - Point loads, UDL longer than the span, UDL shorter than the span; Influence lines for forces in members of Pratt and Warren trusses.

UNIT - II: INDETERMINATE BEAMS (10 Periods)

Slope–Deflection Method: Basic concepts, Slope deflection equation, Application to continuous beams with and without settlement of supports.

Moment Distribution Method: Basic concepts, Stiffness factor, Carryover factor, Application to continuous beams with and without settlement of supports.

UNIT - III: KANI'S METHOD AND ENERGY METHOD (09 Periods)

Kani's Method: Analysis of continuous beams including settlement of supports, Single bay- single storey portal frames with and without side sway.

Energy Method: Strain in linear elastic system, Expression of strain energy due to axial load, BM and SF, Castigliano's first theorem, Deflections of simple beams and pin-jointed plane trusses.

UNIT - IV: REDUNDANT PIN–JOINTED FRAMES (08 Periods)

Indeterminate frames, Static and kinematic indeterminacies, Castigliano's theorem, Analysis of pin–jointed frames up to two degrees of internal and external indeterminacies.

UNIT - V: PLASTIC ANALYSIS (08 Periods)

Introduction to plastic analysis, Shape factor, Plastic hinge; Collapse loads for simply supported beams, Upper bound and lower bound theorems, propped cantilevers and two span continuous beams.

Total Periods: *45*

TEXT BOOKS:

1. R. Vaidyanathan and P. Perumal, *Structural Analysis* - Vol. I and II, Laxmi Publications, 4th Edition, 2016.
2. V. N. Vazirani, M. M. Ratwani and S. K. Duggal, *Analysis of Structures* – Vol. II, Khanna Publications, 16th Edition, 2013.

REFERENCE BOOKS:

1. Ramamrutham, S. and Narayanan, R., *Theory of Structures*, Dhanpat Rai Publishing Co. Ltd., 9th Edition, 2014.
2. S. S. Bhavikatti, *Structural Analysis* – Vol. I and II, Vikas Publishing House Pvt Ltd., 4th Edition, 2010

3. Punmia, B. C., Ashok Kumar Jain and Arun Kumar Jain, SMTS–II – *Theory of Structures*, Laxmi Publications (P) Ltd., 13th Edition, 2017.
R. S. Khurmi, *Theory of Structures*, S. Chand & Company Ltd., 22nd Edition, 2010.

III B.Tech. – I Semester
(16BT50105) WASTEWATER TECHNOLOGY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Course on Water Supply Engineering.
COURSE DESCRIPTION: Wastewater collection systems and sewer design; Sewage characteristics; Preliminary and primary treatment of sewage; Secondary treatment of sewage; Tertiary treatment; Sludge management; Effluent disposal.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge on sewage collection systems, characteristics, treatment, sludge management and effluent disposal.
CO2. Analyze characteristics, treatment methods and disposal techniques of wastewater.
CO3. Design sewer pipeline and storm water drain, wastewater treatment plant units.
CO4. Investigate and recommend suitable solutions to complex wastewater treatment and disposal problems.
CO5. Use appropriate techniques to treat and dispose wastewater.
CO6. Understand the effectsof improper wastewater treatment and disposal on health and safety.
CO7. Encourage environmental friendly sustainable approach in wastewater treatment and disposal.
CO8. Maintain ethical standards for wastewater treatment and disposal following relevant IS Codes.
CO9. Communicate effectively on wastewater engineering problems in written and graphical forms.
DETAILED SYLLABUS:
UNIT – I: WASTEWATER COLLECTION AND DESIGN OF SEWERS (11 Periods)
Sanitation, Systems of sanitation – Dry conservancy and water carriage systems; Systems of sewerage, Sources of wastewater, Estimation of quantity of municipal wastewater and storm water, Different types of sewers, Design flows through sanitary sewers, Storm sewers and combined sewers, Hydraulic design of sewers, Sewer appurtenances, House drainage and plumbing systems.
UNIT–II:CHARACTERISTICS, PRELIMINARY AND PRIMARY TREATMENT OF SEWAGE (10 Periods)
Sewage Characteristics: Sampling of sewage, Characteristics of sewage – physical, Chemical and biological, Total solids, C.O.D, and B.O.D; Equation and factors affecting the BOD, Rate of reaction and population Equivalent - problems.
Preliminary and Primary Treatment of Sewage: Concept of sewage treatment - Primary, secondary and tertiary treatment, Conventional treatment process flow diagram of municipalwastewater treatment plant, Functions of each unit, Principles and design - Screens, Grit chamber, Primary settling tank.
UNIT – III: SECONDARY TREATMENT OF SEWAGE (08 Periods)
Principles of biological treatment, Nutritional requirement of biological treatment systems, Factors affecting biological treatment systems; Design, Construction, Operation and maintenance - Trickling filter, Rotating biological contactors, Activated sludge process, Oxidation ditch, Stabilization ponds.
UNIT – IV: TERTIARY TREATMENT, SLUDGE MANAGEMENT (08 Periods)
Tertiary Treatment: Removal of nitrogen, Phosphorus, Refractory organics, Heavy metals, Suspended solids and pathogenic bacteria.
Sludge Management: Sludge characteristics, Types and quantity; Sludge conditioning and dewatering, Sludge handling, Treatment, Utilization and disposal.
UNIT – V: EFFLUENT DISPOSAL (08 Periods)
Standards for disposal of effluent into surface water bodies, Self-purification of river, Zones of pollution - Dissolved oxygen sag curve, Streeter Phelps equation; Marine disposal, On land disposal systems – Overflow, Flooding, Irrigation; Onsite disposal system, Septic tank - Soak pits and dispersion trench systems.
Total Periods: 45
TEXT BOOKS:
1. Garg, S. K., *Environmental Engineering (Vol. II): Sewage Disposal and Air Pollution Engineering*, Khanna Publishers, 27th Edition, 2013.
2. Birdie, G. S. and Birdie, J. S., *Water Supply and Sanitary Engineering*, Dhanpat Rai and Sons Publishers, 8th Edition, 2010.
REFERENCE BOOKS:
1. Peavy, H. S, Rowe, D. R., and Tchobanoglous, G., *Environmental Engineering,* McGraw-Hill Inc., 1985.
2. Met Calf and Eddy, *Wastewater Engineering*, TMH Education Pvt. Ltd., 4th Edition, 2010.

3. Modi, P. N., *Sewage Treatment Disposal and Wastewater Engineering*, Standard Publishers Distributors, 3rd Edition, 2011
4. Punmia, B. C. and Ashok Jain, *Waste water Engineering*, Laxmi Publications, 2nd Edition, 2014.

III B.Tech. – I Semester

(16BT50441) PRINCIPLES OF IMAGE PROCESSING

(Interdisciplinary Elective -1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: -

COURSE DESCRIPTION:

Fundamentals of digital image processing; Image transforms; Image enhancement techniques in spatial and frequency domains; Restoration techniques & image segmentation techniques; Morphological operations; Representation and description; Pattern recognition.

COURSE OUTCOMES: On successful completion of the course, the students will be able to:

CO1. Demonstarte knowledge in
- a. Image Fundamentals
- b. Image Enhancement & Restoration Techniques
- c. Image Segmentation Techniques
- d. Morphological operations.
- e. Representation and description
- f. Pattern recognition

CO2. Analyze different images using various processing techniques.

CO3. Develop various image processing algorithms to process the images in various Real Time Applications.

CO4. Solve problems related to images for feasible and optimal solutions in the core area of Image Processing.

CO5. Apply appropriate techniques to restore degraded images in the field of image processing.

CO6. Understand the impact of the image processing for societal needs.

DETAILED SYLLABUS:

UNIT - I: DIGITAL IMAGE FUNDAMENTALS (09 Periods)

Fundamental steps in digital Image Processing, Image sampling & quantization, some basic relationships between pixels, arithmetic operations, Logical operations, Spatial operations.

Image Transforms: 2D-DFT and properties, Walsh Transform, Hadamard Transform, Discrete Cosine Transform.

UNIT - II: IMAGE ENHANCEMENT (09 Periods)

Basic Intensity transformation functions, Histogram processing, Fundamentals of Spatial Filtering, Smoothing spatial filters, Sharpening spatial filters, Basics of filtering in frequency domain, Image smoothing using frequency domain filters, Image sharpening using frequency domain filters, Homomorphic filtering.

UNIT - III: IMAGE RESTORATION AND SEGMENTATION (09 Periods)

Image degradation/Restoration model, Estimating the degradation function, Inverse filtering, Weiner filtering, Constrained least squares filtering, Detection of discontinuities - Point, line and edge Detection; Thresholding - Global thresholding, Adaptive thresholding, Region based Segmentation.

UNIT - IV: MORPHOLOGICAL PROCESSING (09 Periods)

Preliminaries, Erosion and Dilation, opening and closing, Some basic morphological algorithms- boundary extraction, extraction of connected components, thining, thickening, skeletons, pruning, morphological reconstruction; gray scale morphology- Erosion and Dilation, opening and closing, gray scale morphology algorithms.

UNIT - V: REPRESENTATION, DESCRIPTION AND RECOGNITION (09 Periods)

Chain codes, polygonal approximation, signatures, boundary segments, skeletons, boundary descriptors, regional descriptors, Pattern and pattern classes, recognition based on decision Theoretic methods-matching, optimum statistical classifiers.

Total Periods: 45

TEXT BOOKS:

1. Rafael C. Gonzalez and Richard E. Woods, *Digital Image Processing*, 3rd Edition, Pearson Education, 2008.
2. Anil K. Jain, *Fundamentals of Digital Image Processing*, Prentice Hall, 2007.

REFERENCE BOOKS:

1. William K. Pratt, *Digital Image Processing*, John Wiley & Sons Inc. 3rd Edition, 2001.
2. Earl Gose, Richard Johnsonbaugh, and Steve Jost, *Pattern Recognition and Image Analysis*, Pearson Education Services Pvt. Ltd, 2015.

III B.Tech. – I Semester

(16BT5HS01) COSTING AND FINANCE MANAGEMENT FOR CIVIL ENGINEERS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: -

COURSE DESCRIPTION: Cost Planning; Contract Costing; Budgeting; Capital Budgeting; Estimation of Cash Flows; Working Capital Management.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Acquire knowledge in
- a) The basic concepts of finance
- b) Basic principles of costing
- c) Provides skills for effective utilization of costing concepts for quoting tenders
- d) Framing budgets in relation to construction

CO2. Develop skills in analyzing problems for
- a) Quoting tenders in relation to civil engineering
- b) Budgeting finance for construction industry
- c) Enhancing ability in calculating working capital requirement
- d) Improvising ability in estimating cash flows

CO3. Develop effective communication in relation to costing and finance

CO4. Design solutions for effective decisions in investment

DETAILED SYLLABUS:

UNIIT – I: COST PLANNING (09 Periods)

Cost predication and estimating in civil engineering projects – Approximate estimating – Preliminary estimating – Detailed estimating – Cost plan inclusions

UNIT – II: CONTRACT COSTING (10 Periods)

Meaning – Definition – Simple Contract Accounts – Comparative Contract Accounts – Contract Accounts with Balance Sheet – Estimation of Contracts (Simple problems)

UNIT – III: BUDGETING (08 Periods)

Concept of Budget – Classifications of Budgets – Considerations in preparing Budgets – Concept of Budgetary Control – Objectives and benefits of Budgetary Control – Essentials of a good Budgetary Control

UNIT – IV: CAPITAL BUDGETING (10 Periods)

Introduction – Nature of Capital Budgeting – Types of Capital Budgeting Decisions – Investment Evaluation Criteria – NPV – IRR – PI (simple problems)

Estimation of Cash Flows: Introduction – Cash Flows – Incremental Cash Flows – Capital and Depreciation for tax purpose

UNIT – V: WORKING CAPITAL MANAGEMENT (08 Periods)

Introduction – Concepts of Working Capital – Operating Cycle and Cash Conversions cycle – Determination of Working Capital – Sources of Working Capital Finance – Trade Credit – Accrued expenses and differed income – Bank Finance for Working Capital

Total Periods: 45

TEXT BOOKS:

1. S.P. Jain and K.L. Narang, *Cost Accounting*, Kalyani Publishers, Ludhiana, 12th Edition, 2008.
2. I.M. Pandey, *Financial Management*, Vikas Publishing House Pvt. Ltd., 11th Edition, 2015.

REFERENCE BOOKS:

1. The Institute of Company Secretaries of India, Cost and Management Study Material, New Delhi.
2. James C Van Horne and John M Wachowicz, *Fundamentals of Financial Management,* Prentice-Hall of India/Pearson, 13th Edition, 2009.

III B.Tech. – I Semester

(16BT50241) **RENEWABLE ENERGY**

(Interdisciplinary Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Engineering Physics and Basic Electrical and Electronics Engineering
COURSE DESCRIPTION: Various renewable energy sources; Different energy conversion techniques; Storage methods and applications.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate knowledge on
   a) various renewable energy sources.
   b) different conversion techniques, energy storage methods and applications.

CO2. Analyze
   a) various solar energy collectors.
   b) horizontal and vertical axis windmills.
   c) ocean energy conversions
   d) various biogas digesters.

CO3. Design suitable accessories / controllers for desired operating conditions.

CO4. Explore relevant renewable sources to generate electrical power and provide valid solutions.

CO5. Assess societal and safetyissues and the consequent responsibilities relevant to therenewable sources engineering practice.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO ENERGY SOURCES **(09 Periods)**
Energy sources and their availability - conventional energy sources, renewable energy sources-solarenergy, windenergy, geothermal energy, ocean energy, biomass and biogas; Solar radiations-extraterrestrial and terrestrial; solar radiation geometry.

UNIT - II: SOLAR ENERGY **(11 Periods)**
Energy Collectors: Flat platecollector - liquid and air collectors; concentrating collectors- classification of concentrating collectors, advantages and disadvantages.
Energy Storage: Classification-thermal, electrical, chemical and mechanical energy storage, solar ponds.
Solar Applications: Solar water heating, space heating, space cooling, solar distillation, pumping, furnace, cooking and solar photovoltaics.

UNIT - III: WIND AND GEOTHERMAL ENERGY **(09 Periods)**
Wind Energy: Sources and potentials, horizontal and vertical axis windmills, performance of wind machines, generating systems and environmental aspects.
Geothermal Energy: Resources, types of wells, methods of harnessing the energy, potential in India.

UNIT - IV: OCEAN ENERGY **(08 Periods)**
OTEC, principles of utilization, setting of OTEC plants.
Tidal and Wave Energy: Conversion techniques, site requirements, mini and micro hydel power plants and their economics.

UNIT - V: BIOMASS **(08 Periods)**
Principles of bio-conversion, anaerobic/aerobic digestion, types of biogas digesters, gas yield, combustion characteristics of biogas, utilization for cooking, CI engine and SI engine operation.

Total Periods: 45

TEXT BOOKS:
1. G.D. Rai, *Non-conventional Energy Sources*, Khanna Publishers, 5th Edition, Delhi, 2011.
2. G.N. Tiwari and M.K. Ghosal, *Renewable Energy Resources: Basic Principles and Applications*, Alpha Science International Ltd., 2005.

REFERENCE BOOKS:
1. JhonTwidell and Tony Wier, *Renewable Energy Resources*, Taylor & Francis, 2nd Edition, London and Newyork, 2006.
2. K.M. Mittal, *Non-conventional Energy Systems-Principles*, Progress and Prospects, Wheeler Publications, 1997.

3. S.K. Dubey and S.K. Bhargava, *Non-conventional Energy Resources,* Dhanpat Rai & Co., 1st Edition, Delhi, 2011.

III B.Tech. – I Semester
(16BT70308) COMPUTATIONAL FLUID DYNAMICS
(Interdisciplinary Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Multi-Variable Calculus and Differential Equations and Fluid Mechanics.

COURSE DESCRIPTION:
Introduction to Computational Fluid Dynamics (CFD); Various Numerical methods; Solution methods for governing equations; Finite difference method and its application to heat transfer problems; Errors and stability analysis; Study flow analysis; Simple CFD techniques.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate the knowledge of CFD techniques, basic aspects of discretization and grid generation in solving partial differential equations.
CO2. Analyze CFD problems and offer probable solutions using Finite Differential approach.
CO3. Develop mathematical models and flow simulations for CFD problems.
CO4. Conduct investigations on complex CFD problems using different techniques.
CO5. Apply modern flow simulation codes for solving governing equations of computational fluid dynamics.
CO6. Use CFD techniques for critical decision making in various applications in the society to eliminate the need for expensive and complex prototypes.

UNIT – I: GOVERNING EQUATIONS (09 Periods)
Introduction, applications of CFD in diverse fields, Governing equations of fluid dynamics – Continuity, Momentum and energy equations; Generic differential and integral form for governing equations, Initial and Boundary conditions, Differences between Finite element method, Finite difference method and Finite volume method, Classification of partial differential equations – Hyperbolic, Parabolic, Elliptic and Mixed types; Applications and relevance.

UNIT – II: DISCRETIZATION TECHNIQUES (09 Periods)
Basic Aspects of Discretization: Introduction to finite differences, Finite difference equations using Taylor series expansion and polynomials, Explicit and implicit approaches, Uniform and unequally spaced grid points.

Grids with Appropriate Transformation: General transformation of the equations, Metrics and Jacobians, The transformed governing equations of the CFD, Boundary fitted coordinate systems, Algebraic and elliptic grid generation techniques, Adaptive grids.

UNIT – III: FINITE DIFFERENCE FORMULATIONS (09 Periods)
Parabolic Partial Differential Equations: Finite difference formulations, Explicit methods – FTCS, Richardson and DuFort-Frankel methods, Implicit methods – Laasonen, Crank-Nicolson and Beta formulation methods, Approximate factorization, Fractional step methods, Consistency analysis, Linearization.

Stability Analysis: Discrete Perturbation Stability analysis, von Neumann Stability analysis, Error analysis, Modified equations, Artificial dissipation and dispersion.

UNIT – IV: ELLIPTIC AND HYPERBOLIC EQUATIONS (09 Periods)
Elliptic Equations: Finite difference formulation, solution algorithms: Jacobi-iteration method, Gauss-Siedel iteration method, point- and line-successive over-relaxation methods, alternative direction implicit methods.

Hyperbolic Equations: Explicit and implicit finite difference formulations, splitting methods, multi-step methods, applications to linear and nonlinear problems, linear damping, flux corrected transport, monotone and total variation diminishing schemes, tvd formulations, entropy condition, first-order and second-order TVD schemes.

UNIT – V: FINITE VOLUME METHOD (09 Periods)
Introduction, Finding the flux at interface, Central schemes - Lax-Friedrichs Method, Lax-Wendroff Method, Two-Step Lax-Wendroff Method and MacCormack Method; Upwind Method in Finite Volume methods - Flux Splitting Method Steger and Warming, vanLeer, Roe's Method and finding Roe's Averages; Numerical procedure for SIMPLE algorithm, Boundary conditions for the pressure correction method; Stream function, Vorticity method.

TEXT BOOKS:
1. John. D. Anderson, *Computational Fluid Dynamics*, the Basics with Applications, McGraw-Hill, 6th Edition, 1995.
2. Hoffman, K.A., and Chiang, S.T., *Computational Fluid Dynamics*, Vol. I, II and III, Engineering Education System, Kansas, USA, 2000.

REFERENCE BOOKS:

1. Tapan K. Sengupta, *Fundamentals of Computational Fluid Dynamics*, 1st Edition, Universities Press, 2004.
2. Suhas V. Patankar, *Numerical Heat Transfer and Fluid Flow*, 1st Edition, CRC, 1980.

III B.Tech. – I Semester

(16BT50131) COMPUTER AIDED BUILDING PLANNING AND DRAWING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	1	3	2

PRE-REQUISITES: Course on Building Materials and Construction Technology.

COURSE DESCRIPTION: Exercises on Conventional signs and symbols used in building; Planning and computer aided drawing of load bearing walls; RCC framed structures; Industrial buildings.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Explain knowledge on computer aided building drawing to develop the 2D and 3D views of structures using AutoCAD.

CO2. Analyze the given data for the developing the plans, elevations, cross-sectional view of the structures.

CO3. Design and develop the buildings plans, elevations, sectional views using AutoCAD.

CO4. Use appropriate drafting tools for developing the plans, elevation, sectional views using AutoCAD.

CO5. Utilize contextual knowledge for preparing the structural elements and building plans as per the engineering practice.

CO6. Follow building bye-laws and principles for promoting building plans, elevation, sectional views using AutoCAD.

CO7. Function effectively as an individual and as a team member to develop plan, elevation, cross sectional view of the structural elements and buildings using AutoCAD.

CO8. Communicate effectively on the building planning and drawing using AutoCAD in written, oral and graphical forms.

CO9. Promote cost effective building plans by management principles using AutoCAD.

DETAILED SYLLABUS:

SOFTWARE: AutoCAD

LIST OF EXERCISES:

1. Conventional signs in building drawing
2. Elevation and sectional view of windows and ventilators
3. Elevation and sectional view of doors
4. Isolated footings details.
5. Plan, elevation and sectional views of building (Load bearing wall structure)
6. Elevation and sectional view of RCC framed structures
7. North light roof truss details
8. King post truss details
9. Queen post truss details
10. Perspective view of one storey buildings
11. Perspective view of two storey buildings

TEXT BOOKS:

1. Varma B. P., *Civil Engineering Drawing and House Planning,* Khanna Publishers, 10th Edition, 2008.
2. Balagopal and T. S. Prabhu, *Building Drawing and Detailing*, Spades Publishers, 1987.

REFERENCE BOOKS:

1. Shah, M. G., *Building Drawing*, Tata McGraw–Hill, 2007.
2. Kumaraswamy N. and KameswaraRao A., *Building Planning and Drawing*, Charotar Publishing, 4th Edition, 2010.
3. Kale and Patki, Shah, *Building Drawing with Integrated Approach to Built Environment*, Tata McGraw–Hill, 2002.
4. K. V. Natarajan, *A Text Book of Engineering Graphics*, N. Dhanalakshmi Publishers, 2015.

III B.Tech. – I Semester
(16BT50132) **ENVIRONMENTAL ENGINEERING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Courses on Water Supply Engineering, Wastewater Technology.

COURSE DESCRIPTION: Experimental analysis of physical, chemical and biological parameters of water and wastewater.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate the knowledge on experimental analysis of water and wastewater.

CO2. Analyse water and wastewater.

CO3. Solve complex problems associated with water and wastewater through proper investigations and interpretation of data.

CO4. Use appropriate techniques in the analysis of water and wastewater.

CO5. Provide solutions to the problems of water and wastewater ensuring health and safety.

CO6. Consider environmental sustainability in solving water and wastewater problems.

CO7. Follow standards in water and wastewater analysis.

CO8. Function effectively as an individual, and as a member or leader in teams to solve the water and wastewater problems.

CO9. Communicate effectively on water and wastewater analysis in written, oral and graphical forms.

LIST OF EXPERIMENTS:

1. Determination of pH, turbidity and electrical conductivity
2. Determination of colour
3. Determination of alkalinity and acidity
4. Determination of total suspended solids and total dissolved solids
5. Determination of total solids, volatile and fixed solids.
6. Determination of chlorides
7. Determination of iron and fluorides
8. Determination of optimum coagulant dose
9. Determination of residual chlorine
10. Determination of Dissolved Oxygen
11. Determination of B.O.D
12. Determination of C.O.D
13. Determination of nitrogen
14. Determination of total phosphorus
15. Determination of sulphates
16. Bacterial examination

III B. Tech. – I Semester
(16BT50133) **GEOTECHNICAL ENGINEERING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Course on Soil Mechanics.

COURSE DESCRIPTION: Experiments on the determination of index properties and engineering properties of soil.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate knowledge on laboratory testing of soils.
CO2. Analyze characteristics and engineering behavior of soils.
CO3. Conduct experiments on soils to find its suitability for any civil engineering construction.
CO4. Select an appropriate experimental method based on soil, ease of testing and application.
CO5. Establish soil properties with societal responsibility.
CO6. Give solutions to the problems of soil which are environmental friendly.
CO7. Follow IS Codes in soil testing.
CO8. Work effectively as an individual or in a group to determine soil properties.
CO9. Communicate effectively on soil properties in written, oral and graphical forms.

DETAILED SYLLABUS:

LIST OF EXPERIMENTS:

1. Determination of water content
2. Determination of specific gravity
3. Grain size analysis – sieve analysis and hydrometer analysis
4. Tests for Atterberg's limits
   (a) Determination of liquid limit – Casagrande's method and cone penetrometer method
   (b) Determination of plastic limit
   (c) Determination of shrinkage limit
5. Determination of field density – core cutter method and sand replacement method
6. Relative density test
7. Standard Proctor's compaction test
8. CBR Test
9. Permeability of soil – constant head test and variable head test
10. Consolidation test
11. Direct shear test
12. Unconfined compression test
13. Tri–axial compression test
14. Vane shear test

III B.Tech. – II Semester
(16BT60101) **FOUNDATION ENGINEERING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Soil Mechanics.

COURSE DESCRIPTION: Soil exploration- Subsurface sampling and characterization methods; Lateral earth pressure; Earth retaining structures; Stability of earth slopes; Bearing capacity of shallow foundations; Pile foundations; Caissons and well foundations.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Acquire knowledge on geotechnical site investigation, types of footings, bearing capacity and settlement of shallow and deep footings.
CO2. Analyze soil exploration techniques, slopes; and footings for bearing capacity and settlements.
CO3. Decide and design all types of foundations.
CO4. Interpret the data obtained from soil investigations and suggest suitable foundation.
CO5. Select appropriate techniques to solve foundation engineering problems.
CO6. Consider safety measures in soil exploration, design and construction of foundations, earth slopes and retaining walls.
CO7. Perform soil exploration and design of footings as per IS Code.
CO8. Communicate effectively on foundation engineering problems in written and graphical forms.
CO9. Plan cost effective soil exploration programs.

DETAILED SYLLABUS:

UNIT – I: SOIL EXPLORATION (09 Periods)

Need, Planning, Methods of soil exploration- Geophysical methods, Open excavation methods, Boring and sampling methods; Types of soil samples, Field tests- SPT, CPT, Plate load test, In–situ vane shear test; Borehole logging, Soil investigation report.

UNIT – II: LATERAL EARTH PRESSURE (09 Periods)

Types of earth pressures, Plastic equilibrium in soils, Rankine's theory- Earth pressures in cohesionless and cohesive soils; Coulomb's wedge theory, Earth pressure on retaining walls of simple configurations, Graphical methods (Rebhann and Culmann), Types of earth retaining structures, Stability considerations of gravity and cantilever retaining walls.

UNIT – III: STABILITY OF EARTH SLOPES (08 Periods)

Infinite and finite earth slopes, Types of failures, Factor of safety of infinite slopes, Stability analysis of finite slopes, Bishop's simplified method, Taylor's stability number, Stability of slopes of earth dams under different conditions, Improving stability of slopes.

UNIT - IV: BEARING CAPACITY OF SHALLOW FOUNDATIONS (10 Periods)

Types and choice of foundation, Depth of foundation, Types of shear failure, Safe bearing capacity, Bearing capacity theories- Terzaghi, Meyerhof, Skempton and IS methods; Effect of groundwater table on bearing capacity, Bearing capacity from SPT and CPT, Allowable bearing pressure, Safe bearing capacity and settlement from plate load test, Allowable settlements of structures, Settlement analysis.

UNIT – V: PILE FOUNDATIONS, CAISSONS AND WELL FOUNDATIONS (09 Periods)

Pile Foundations: Types of pile foundations, Factors influencing the selection of pile, Load carrying capacity of piles in granular and cohesive soils, Static and dynamic pile formulae, Pile load test, Negative skin friction, Load carrying capacity of pile groups in sands and clays, Settlement of pile groups.

Caissons and Well Foundations: Types of caissons, Bearing capacity, Construction, Advantages and disadvantages, Well foundations - Shapes, Components, Sinking, Tilts and shifts. **Total Periods: 45**

TEXT BOOKS:

1. C. Venkatramaiah, *Geotechnical Engineering,* New Age International Publishers, 3rd Edition, 2010.
2. K. R. Arora, *Soil Mechanics and Foundation Engineering*, Standard Publishers and Distributors, 7th Edition, 2010.

REFERENCE BOOKS:

1. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Soil Mechanics and Foundations*, Laxmi Publications Pvt. Ltd., 16th Edition, 2005.
2. Gopal Ranjan and A. S. R. Rao, *Basic and Applied Soil Mechanics,* New Age International Pvt. Ltd., 2nd Revised Edition, 2010.
3. Braja M. Das, *Principles of Foundation Engineering,* Cengage Learning India, 6th Edition, 2007.
4. Bowles, J. E., *Foundation Analysis and Design,* McGraw–Hill Publishing Company, 5th Edition, 2001.

III B.Tech. – II Semester

(16BT60102) HIGHWAY AND TRAFFIC ENGINEERING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Surveying, Soil Mechanics.

COURSE DESCRIPTION: Highway development and planning; Highway geometric design; Highway materials; Pavement design; Traffic engineering; Traffic measurement and analysis; Highway capacity; Traffic regulation, control and control devices.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate knowledge on highway and traffic engineering.
CO2. Analyze highway materials, pavements, traffic and parking facilities.
CO3. Design highway geometry, pavements and traffic signals.
CO4. Provide solutions to complex highway and traffic engineering problems through investigations.
CO5. Use appropriate methods to assess highway materials, traffic; and design pavements.
CO6. Follow IS and IRC Codes in the design of highway and traffic engineering systems.
CO7. Maintain ethical standards for quality in highway and traffic engineering practice.
CO8. Communicate effectively on highway and traffic engineering in written and graphical forms.

DETAILED SYLLABUS:

UNIT - I: HIGHWAY DEVELOPMENT, PLANNING AND GEOMETRIC DESIGN (10 Periods)

Highway Development and Planning: Highway development in India, Highway planning, Different road development plans, Classification of roads, Road network patterns, Highway alignment – Factors affecting, Engineering surveys, Drawings and reports.

Highway Geometric Design: Importance of geometric design, Design controls and criteria, Highway cross sectional elements, Sight distance elements, Stopping sight distance, Overtaking sight distances, Design of horizontal curves - Design of super elevation and extra widening; Design of transition curves, Design of vertical alignment, Gradients, Vertical curves.

UNIT - II: HIGHWAY MATERIALS AND PAVEMENT DESIGN (09 Periods)

Highway Materials: Soil, Aggregates and bitumen – Desirable properties, Tests on subgrade soil – CBR test, Tests on aggregate and bitumen; Specifications, Aggregate-bitumen mixes – Desirable properties, Mix design by Marshal method; Cement and cement concrete.

Pavement Design: Pavements – Types, Functions and components; Design factors, Flexible pavement design methods – G.I, CBR and Triaxial method; Design of rigid pavements, Critical load positions, Westergaard's stress analysis, Computing radius of relative stiffness and equivalent radius of resisting section, Stresses in rigid pavements, Design of expansion and contraction joints in CC pavements, Design of dowel bars and tie bars.

UNIT - III: TRAFFIC ENGINEERING (08 Periods)

Traffic Engineering: Significance and scope, Characteristics of road users – Driver and vehicle characteristics, Skid resistance and braking efficiency; Components of traffic engineering - Road, Traffic and land use characteristics.

Traffic Characteristics: Basic characteristics of traffic - Human characteristics, Vehicle characteristics - Volume, Speed and density, Relationship among traffic parameters.

UNIT - IV: TRAFFIC MEASUREMENT, ANALYSIS AND HIGHWAYCAPACITY (09 Periods)

Traffic Measurement: Traffic volume studies – Objectives, Types; Concept of PCU, Data collection and presentation, Speed studies – Objectives, Types, Methods; Data collection and presentation, Origin and destination studies, Pedestrian studies, Basic principles of traffic flow.

Highway Capacity: Definition and Importance, Factors, Levels of service – Concept, Types; Concept of service volume.

UNIT-V: PARKING FACILITIES, TRAFFIC REGULATION, CONTROL AND CONTROL DEVICES (09 Periods)

Parking Facilities: Types of parking facilities, Parking studies, Analysis of parking data and parking characteristics, Design standards.

Traffic Regulation and Control: Traffic problems in urban areas, Accident studies and analysis, Traffic control measures – Channelization, Principle and design of intersections, grade separations and interchanges; Traffic control aids and street furniture and lighting.

Traffic Control Devices: Traffic signs - Types, Specifications; Traffic signals – Signal design, Computer applications in signal design; Traffic Islands – Channelizing islands; Pavement markings – Types, Specifications.

Total Periods: 45

TEXT BOOKS:

1. Khanna, S. K., Justo, C. E. G. and Veeraragavan, A., *Highway Engineering, Nem* Chand & Bros, Roorkee, Revised 10th Edition, 2014.
2. Kadiyali, L. R., *Traffic Engineering and Transport Planning,* Khanna Technical Publications, Delhi, 7th Edition, 2010.

REFERENCE BOOKS:

1. Jotin Khisty, C. and Kent Lall, B., *Transportation Engineering –An Introduction,* Prentice Hall of India Pvt. Ltd., 3rd Edition, 2006.
2. Partha Chakroborthy and Animesh Das, *Principles of Transportation Engineering,* Prentice Hall of India Pvt. Ltd, 2005.
3. Papacostas, C. S. and Prevedouros, P. D., *TransportationEngineering and Planning,* Prentice Hall of India Pvt. Ltd., 2006.
4. Mannering, F. L. and Washburn, S. S., *Principles of Highway Engineering and Traffic Analysis*, John Wiley & Sons, Inc., 5th Edition, 2013.

CODES:

1. IRC: 37-2012: Guidelines for the Design of Flexible Pavements, Third Revision, Indian Roads Congress, New Dellhi,
2. IRC: 58-2015: Guidelines for the Design of Plain Jointed Rigid Pavements for Highwways, Indian Roads Congress, New Dellhi, **are to be permitted into the examination hall.**

III B.Tech. – II Semester

(16BT60103) STEEL STRUCTURES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Engineering Mechanics, Mechanics of Solids, Structural Analysis-I, Structural Analysis-II.

COURSE DESCRIPTION: Bolted connections; Welded connections; Beams; Tension members; Compression members; Built-up Compression members; Column foundations, Roof trusses; Tubular trusses.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Attain the basic knowledge on design of steel structures and their elements by limit state method.
CO2. Analyze the steel structures and their elements.
CO3. Design steel structures and their elements.
CO4. Provide solutions to complex engineering problems associated with steel construction through proper analysis and design.
CO5. Use appropriate techniques to analyze and design of steel structures and their elements.
CO6. Ensure safety and stability in the design of steel structures and their elements.
CO7. Follow IS codes in the design of steel structures and their elements.

DETAILED SYLLABUS:

UNIT - I: BOLTED AND WELDED CONNECTIONS (10 Periods)

Bolted Connections: Strength and efficiency of a joint, Lap Joint, Butt joint, Eccentric connections.

Welded Connections: Strength of welds, Butt and fillet welds, Design of fillet welds subjected to axial load, Design of fillet welds subjected to moment acting in the plane and at right angles to the plane of the joints, Beam to beam and beam to column connections.

UNIT - II: BEAMS (09 Periods)

Bending, Shear and bearing strength, Design of simple beams, Design of compound beams, Design of connection of cover plates with the flanges of beams.

UNIT - III: TENSION AND COMPRESSION MEMBERS (09 Periods)

Tension Members: Net effective sectional area for angle and tee sections, Design of tension members, Lug angles.

Compression Members: Effective length, Radius of gyration and slenderness of compression members, Design strength, Design of axially loaded compression members.

UNIT - IV: BUILT–UP COMPRESSION MEMBERS AND COLUMN FOUNDATIONS (9 Periods)

Built–up Compression Members: Design of built–up compression members, Design of lacings and battens, Design principles of eccentrically loaded columns, Splicing of columns.

Column Foundations: Design of slab base and gusseted bases, Column bases subjected moment.

UNIT - V: ROOF AND TUBULAR TRUSSES (8 Periods)

Roof Trusses: Different types of trusses, Design loads, Load combinations, IS Code recommendations, Structural details, Design of simple roof trusses involving the design of purlins, members and joints.

Tubular Trusses: Design of tension members, Compression members, Connections.

Total Periods: 45

TEXT BOOKS:

1. S. S. Bhavikatti, *Design of Steel Structures*, I. K. International Publishing House Pvt. Ltd., 3rd Edition, 2010.
2. S. K. Duggal, *Limit State Design of Steel Structures*, Mc.Graw Hill, 2nd Edition, 2014.

REFERENCE BOOKS:

1. N. Subramanian, *Design of Steel Structures*, Oxford University Press, 2010.
2. N. Krishna Raju, *Structural Design and Drawing*, Universities Press, Hyderabad, 3rd Edition, 2009.
3. S. Ramachandra, *Design of Steel Structures*, Dhanpat Rai Publishing Company, 2nd Edition, 2007.
4. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Design of Steel Structures,* Laxmi Publications, 2nd Edition, 2013.

CODES/TABLES:

1. IS: 800–2007: General Construction in Steel – Code of Practice,
2. IS: 875– Part III: Code of Practice for Design Loads (Other than Earthquake) For Buildings and Structures,
3. IS: 1161-1998: Steel Tubes for Structural Purposes –Specifications,

4. Steel Tables, **are to be permitted into the examination hall.**

III B.Tech. – II Semester

(16BT40502) DATABASE MANAGEMENT SYSTEMS

(Common to CE & ECE) (Interdisciplinary Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Database Systems; Database Design; Relational Model; SQL Queries, Constraints and Triggers; Schema Refinement and Normal Forms; Transaction Management; Concurrency Control; Overview of Storage and Indexing.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate knowledge on
   a) Data models and Database Languages
   b) Database design
   c) Normal forms
   d) Storage and Indexing

CO2. Analyze databases using normal forms to provide solutions for real time applications.

CO3. Design solutions for database problems using database design, views design and framing queries.

CO4. Use database techniques for designing databases, managing databases and its security.

CO5. Select SQL, Hash based Indexing and Tree based Indexing to manage data in databases.

CO6. Apply contextual knowledge to develop database applications related to societal applications like Information Retrieval Systems, Banking and Financial systems.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO DATABASE SYSTEMS & DATABASE DESIGN (9 Periods)

Database Systems: Database system applications, Purpose of database systems, View of data-Data abstraction, Instances and Schemas, Data models; Database languages - DDL, DML; Database architecture, Database users and administrators.

Database Design: ER diagrams, Beyond ER design, Entities, Attributes and entity sets, Relationships and relationship sets, Additional features of ER model, Conceptual design with ER model.

UNIT - II: THE RELATIONAL MODEL & RELATIONAL ALGEBRA AND CALCULUS (8 Periods)

Relational Model: Integrity constraints over relations, Enforcing integrity constraints, Querying relational data, Logical database design,

Introduction to views, Destroying/altering tables and views.

Relational Algebra and Calculus: Preliminaries, Relational Algebra operators; Relational Calculus - Tuple and Domain Relational Calculus; Expressive power of Algebra and calculus.

UNIT - III: SQL & SCHEMA REFINEMENT (10 Periods)

SQL: Form of basic SQL query- Examples of basic SQL queries; Nested queries- Introduction to nested queries, Correlated nested queries, Set-comparison operators; Aggregate operators, NULL values-Comparison using NULL values, Logical connectives AND, OR and NOT, Impact on SQL constructs, Outer joins, Disallowing NULL values; Complex integrity constraints in SQL ,Triggers and active databases.

Schema Refinement: Problems caused by redundancy, Decompositions, Problem related to decomposition, Functional dependencies, Reasoning about FDS, Normal forms – First, second and third normal forms, BCNF; Multi valued dependencies, Fourth normal form, Join dependencies, Fifth normal form.

UNIT - IV: TRANSACTIONS AND CONCURRENCY CONTROL (9 Periods)

Transactions: Transaction concept, Transaction state, Implementation of atomicity and durability, Concurrent executions, Serializability, Recoverability, Implementation of isolation, Testing for serializability.

Concurrency Control: Lock based protocols, Timestamp based protocols, Validation based protocols, Multiple granularity, Deadlock handling.

UNIT - V: STORAGE AND INDEXING (9 Periods)

Storage and Indexing: Data on external storage, File organization and indexing – Clustered indexes, Primary and secondary indexes; Index data structures – Hash based indexing, Tree based indexing; Comparison of file organizations.

Tree Structured Indexing: Intuition for tree indexes, Indexed Sequential Access Method (ISAM), B+ Trees- A dynamic index structure; Search, Insert, Delete; B-Tree index files. **Total Periods: 45**

TEXT BOOKS:

1. Raghu Ramakrishnan and Johannes Gehrke, *Database Management Systems*, Tata McGraw-Hill, Third Edition, 2014.
2. A. Silberschatz, H.F.Korth and S. Sudarshan, *Database System Concepts*, Tata McGraw-Hill, Fifth Edition, 2006.

REFERENCE BOOKS:

1. Ramez Elmasri and Shamkant B. Navathe, *Database Systems*, Pearson Education, Sixth Edition, 2013.

2. Peter Rob and Carlos Coronel, *Database Systems Design, Implementation and Management*, Cengage Learing, Seventh Edition, 2009.

III B.Tech. – II Semester

(16BT50341) OPTIMIZATION TECHNIQUES

(Common to CSE, CSSE & CE)
(Interdisciplinary Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Multi-variable Calculus and Differential Equations

COURSE DESCRIPTION: Introduction to optimization; Classical optimization techniques; Classification of optimization problems; Linear programming; transportation and assignment problem; Non-linear programming; Un-constrained non-linear programming; Constrained non-linear programming; Dynamic programming.

COURSE OUTCOMES: On successful completion of this course, the student will be able to:

CO1. Demonstrate the knowledge on Optimization techniques for Linear, Nonlinear and Dynamic programming problems.
CO2. Analyze and quantify a system architecture or product design problem for selecting appropriate objective function, design variables, parameters and constraints.
CO3. Develop mathematical models for real time optimization problems.
CO4. Conduct investigations on complex problems and make recommendations based on solutions, analysis and limitations of models.
CO5. Use optimization techniques for solving complex problems of real time applications.
CO6. Optimize the resources in organizations for sustainable development.

DETAILED SYLLABUS:

UNIT - I: CLASSICAL OPTIMIZATION TECHNIQUES (09 Periods)

Introduction, Engineering applications of optimization, Statement of an optimization problem, Design vector, Design constraints, Constraint surface, Objective function, Classification of optimization problems, Single variable optimization, Multi variable optimization without constraints, Multi variable optimization with equality constraints - Lagrange multipliers method; Multi variable optimization with inequality constraint - Kuhn Tucker conditions.

UNIT - II: LINEAR PROGRAMMING (09 Periods)

Introduction, Formulation, Graphical solution, Simplex method, Big M-method, Two–phase method, Duality principle, Dual simplex method.

Unit - III: TRANSPORTATION AND ASSIGNMENT PROBLEMS (09 Periods)

Transportation problems: Formulation, Initial basic feasible solution - North–West corner rule, Least cost method, and Vogel's approximation method; Optimal solution using Modified distribution method - Unbalanced transportation problem, Degeneracy.

Assignment Problems: Formulation, Solution of assignment problem and its variants, Traveling salesman problem.

Unit – IV: NON-LINEAR PROGRAMMING (09 Periods)

One dimensional minimization methods, classification - Fibonacci method, quadratic interpolation method; classification of unconstrained minimization methods - Powell's method, steepest descent method (Cauchy's method); classification of constrained optimization techniques - interior and exterior penalty function methods.

Unit – V: DYNAMIC PROGRAMMING (09 Periods)

Multistage decision processes, Concept of sub optimization and Principle of optimality, Computational procedure in dynamic programming - calculus method, Tabular method; Linear Programming problem by dynamic programming approach, Applications - reliability problem, shortest path problem, and capital budgeting problem. **Total Periods: 45**

TEXT BOOKS:

1. Singiresu S Rao, *Engineering Optimization: Theory and Practice*, New Age International, 3rd Edition, 2010.
2. A.Ravindran, K.M.Ragsdell, G.V.Reklaitis, *Engineering Optimization: Methods and Applications*, Wiley India Pvt. Ltd., 2nd Edition2006.

REFERENCE BOOKS:

1. C Mohan and Kusum Deep, *Optimization Techniques*, New Age International Publishers, 1st Edition, 2010.

2. Hamdy A. Taha, *Introduction to Operations Research*, PHI, 9th edition, 2013.

III B.Tech. – II Semester

(16BT60104) FIRE ENGINEERING

(Interdisciplinary Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Engineering Chemistry, Building Materials and Construction Technology, Environmental Studies.

COURSE DESCRIPTION: Physics and chemistry of fire; Fire prevention and protection; Industrial fire protection systems; Building fire safety; Explosion protecting systems.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Acquire the knowledge on fire characteristics, fire detection, fire protection and explosion protection.
CO2. Analyze fire characteristics, fire detection systems, fire and explosion protection systems.
CO3. Design building elements and develop fire and explosion protection systems.
CO4. Solve fire engineering problems through proper investigation and interpretation.
CO5. Use appropriate techniques to solve fire engineering problems.
CO6. Ensure health and fire safety in solving fire engineering problems.
CO7. Consider environmental sustainability in fire and explosion protection systems.
CO8. Follow rules and regulations in fire engineering practice.
CO9. Prepare layouts and diagrams in fire engineering.
CO10. Manage effectively fire and explosion protection systems.

DETAILED SYLLABUS:

UNIT - I: PHYSICS AND CHEMISTRY OF FIRE (09 Periods)

Fire properties of solid, liquid and gases; Fire spread, Toxicity of products of combustion, Theory of combustion and explosion, Vapour clouds, Flash fire, Jet fires, Pool fires, Unconfined vapour cloud explosion, Shock waves, Auto-ignition, Boiling liquid expanding vapour explosion, Case studies.

UNIT - II: PRINCIPLES OF FIRE PREVENTION, DETECTION AND WARNING (09Periods)

Sources of ignition, Fire triangle, Principles of fire extinguishing, Various classes of fires – A, B, C, D & E, Types of fire extinguishers, Fire stoppers, Alarm and detection systems, Fire station - Fire alarms and sirens, Maintenance of fire trucks, Foam generators, Escape from fire rescue operations, Fire drills, Notice, First aid for burns.

UNIT - III: INDUSTRIAL FIRE PROTECTION SYSTEMS (09 Periods)

Active and passive fire protection systems, Sprinkler-hydrants-stand pipes, Special fire suppression systems like deluge and emulsifier, Selection criteria of the above installations, Reliability, Maintenance, Evaluation and standards, Hydrant pipes, Hoses, monitors, Fire watchers, Layout of stand pipes, Other suppression systems, CO2 system, Foam system, Dry chemical powder (DCP) system, Halon system, Need for halon replacement, Smoke venting, Portable extinguishers, Flammable liquids, Tank farms, Indices of inflammability, Fire fighting systems.

UNIT - IV: BUILDING FIRE SAFETY (09 Periods)

Design of building elements for passive fire protection, Fire load, Fire resistant material and fire testing, Structural fire protection, Structural integrity, Classification of buildings based on occupancy, Concept of egress design, Exit requirements, Width calculations, fire certificates, Fire safety requirements for high rise buildings, Snookers.

UNIT - V: EXPLOSION PROTECTING SYSTEMS (09 Periods)

Principles of explosion, Detonation and blast waves, Explosion parameters, Explosion Protection, Containment, Flame Arrestors, Isolation, Suppression, Venting, Explosion relief of large enclosure, Explosion venting, Inert gases, Plant for generation of inert gas, Rupture disc in process vessels and lines explosion, Suppression system based on carbon dioxide (CO2) and halons-hazards in LPG, ammonia (NH3), sulphur dioxide (SO2), chlorine (CL2) etc. **Total Periods: 45**

TEXT BOOKS:

1. V. K. Jain, *Fire Safety in Buildings*, New Age international Publishers, 2010.
2. Akhil Kumar Das, *Principles of Fire Safety Engineering*, Prentice Hall India Learning Pvt. Ltd., 2014.

REFERENCE BOOKS:

1. Gupta, R. S., *Hand Book of Fire Technology,* Orient Longman, Bombay 1977.
2. S. Rao, R. K. Jain and H. I. Saluja, *Electrical Safety, Fire Safety Engineering and Mangament*, Kanna Publications, New Delhi, 2012.
3. John A. Purkiss and Long-yuan Li, Fire Safety Engineering Design of Structures, CRC Press, 3rd Edition, 2013.
4. Butcher, E. G. and Parnell, A. C, *Designing of Fire Safety*, John Wiley and Sons Ltd., 1983.
5. Derek W. B. James, *Fire Prevention Hand Book*, Butter Worths and Company, 1986.

III B.Tech. – II Semester

(16BT60241) **ENERGY AUDIT AND CONSERVATION**

(Interdisciplinary Elective – 2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Principles of energy audit and conservation; Energy efficiency in buildings; Energy efficient motors, lighting, instruments and significance of energy economics.

COURSE OUTCOMES: On successful completion of this course, the students will be able to

CO1. Demonstrate knowledge on auditing practices, conservation measures and economics of energy.
CO2. Analyze auditing practices, conservation measures and economics of energy.
CO3. Design an appropriate energy conservation measures in commercial and industrial applications.
CO4. Provide feasible solutions for problems associated with energy auditing and conversion through proper investigation and interpretation of data.
CO5. Use appropriate techniques for energy auditing and conservation.
CO6. Solve energy auditing and conservation problems with societal relevance.
CO7. Consider environment and sustainability in energy auditing and conservation.
CO8. Follow relevant rules and regulations in practicing energy audit and conservation.
CO9. Communicate effectively on energy audit in written and graphical forms.
CO10. Consider financial issues in energy audit and conservation.

DETAILED SYLLABUS:

UNIT - I: ENERGY AUDIT PRINICPLES (09 Periods)

Energy audit - Definitions, Concept, Types of audit, Energy index, Cost index, Pie charts, Sankey diagrams; Load profiles, Energy audit of industries, Energy saving potential, Energy audit of process industry, Building energy audit, IE rules and regulations for energy audit.

UNIT - II: ENERGY CONSERVATION PRINCIPLES (09 Periods)

Rules for efficient energy conservation, Technologies for energy conservation, Energy scenario, Principles of energy conservation, Resource availability, Energy savings, Current energy consumption in India, Roles and responsibilities of energy managers in industries.

UNIT - III: ENERGY EFFICIENCY IN BUILDINGS (11 Periods)

Introduction, Definition and concepts, Energy and water as a resource - Heating, Ventilating and Air conditioning systems; Energy economic analysis, Domestic energy consumption, Savings, Energy use in buildings, Residential and commercial buildings, Green buildings, Smart buildings, Rating of buildings, Efficient use of buildings, Solar passive architecture, Eco-housing concepts.

UNIT – IV: ENERGY AUDIT INSTRUMENTS AND ENERGY EFFICIENT MOTORS (08 Periods)

Energy Audit Instruments: Watt meter, Data loggers, Thermocouples, Pyrometers, Lux meters, Tongue testers, PLCs and applications.

Energy Efficient Motors: Factors affecting efficiency, Loss distribution, Constructional details, Characteristics, Variable speed, Variable duty cycle systems, Applications of life cycle costing analysis, Return on investment.

UNIT - V: ECONOMIC ASPECTS AND ANALYSIS (08 Periods)

Economic concepts, Computation of economic aspects calculation of simple payback method, Net present worth method, Depreciation Methods, Time value of money, Rate of return, Present worth method, Replacement analysis, Life cycle costing analysis. **Total Periods: 45**

REFERENCE BOOKS:

1. Ashok V. Desai, Wiley Eastern, *Energy Demand – Analysis, Management and Conservation Hand Book on Energy Auditing* - TERI (Tata Energy Research Institute), 2005.
2. Albert Thumann, William J. Younger, *Handbook of Energy Audits*, Taylor & Francis Ltd, 7th Edition, 2008.
3. Ashok V. Desai, Wiley Eastern, *Energy Demand – Analysis, Management and Conservation* Hand Book on Energy Auditing - TERI (Tata Energy Research Institute), 2005.
4. Dale R. Patrick, Stephen W. Fardo, Ray E. Richardson, Steven R. Patrick, *Energy Conservation Guide Book*, Taylor & Francis Ltd, 2nd Edition,2007.
5. Ashok V.Desai, *Energy Economics,* Wiley Eastern, 1st Edition, 1990.
6. *Industrial Energy Conservation Manuals*, Cambridge, MIT Press, 1982.
7. Frank Kreith, Ronald E. West, *Handbook of Energy Efficiency,* CRC Press, 1st Edition, 1996.
8. *Energy Efficiency In Buildings,* CIBSE Guide F, 3rd Edition, May, 2012.
9. Nilesh Y. Jadhav, *Green and Smart Buildings: Advanced Technology Options*, Springer Science Business Media, Singapore, 2016.

III B.Tech. – II Semester

(16BT60105) ADVANCED REINFORCED CEMENT CONCRETE STRUCTURES

(Program Elective – 1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Building Materials and Construction Technology, Engineering Mechanics, Mechanics of Solids, Structural Analysis – I, Structural Analysis – II, Reinforced Cement Concrete Structures.

COURSE DESCRIPTION: Foundations; Flat slabs; Water tanks; Retaining walls; Bunkers; Silos; Chimneys.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate the knowledge concepts, techniques and applications of design of reinforced cement concrete structures; foundations, flat slabs, water tanks, retaining walls, bunkers, silos, chimneys.

CO2. Analyze different reinforced cement concrete structures.

CO3. Design different reinforced cement concrete structures.

CO4. Recommend suitable structural elements for reinforced cement concrete structures

CO5. Use appropriate method to design RCC structures.

CO6. Ensure the RCC design as per safety and serviceability requirements.

CO7. Uphold Ethics in RCC design

DETAILED SYLLABUS:

UNIT - I: FOUNDATIONS (10 Periods)

Design of Strap footings, Raft foundations, Pile foundations, Pile cap.

UNIT - II: FLAT SLABS (08 Periods)

Properties of flat slabs, Behaviour of flat slab, Shear in flat slabs, Design of flat slabs.

UNIT - III: RETAINING WALLS (09 Periods)

Lateral earth pressure, Design of cantilever and counterfort retaining walls.

UNIT - IV: WATER TANKS (09 Periods)

Types of water tanks, IS Code provisions, Design of water tanks with flexible base and rigid base.

UNIT - IV: MISCELLANEOUS STRUCTURES (09 Periods)

Design of Bunkers, Silos, Chimneys.

Total Periods: 45

TEXT BOOKS:

1. S. Unnikrishna Pillai and Devdas Menon, *Reinforced Concrete Design*, Tata Mc. Graw Hill, 3rd Edition, 2010.
2. S. K. Roy and N. C. Sinha, *Fundamentals of Reinforced Concrete*, S. Chand & Company Ltd., 5th Edition, 2010.

REFERENCE BOOKS:

1. N. Krishna Raju and R. N. Pranesh, *Reinforced Concrete Design*, CBS Publishers Distributors, 3rd Edition, 2010.
2. P. C. Varghese, *Limit State Designed of Reinforced Concrete*, Prentice Hall of India, 2nd Edition, 2010.
3. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Reinforced Concrete structures – Vol. I*, Laxmi Publications Pvt. Ltd., 19th Edition, 2010.
4. M. L. Gambhir, *Fundamentals of Reinforced Concrete Design,* Printice Hall of India Pvt. Ltd., 2010.

CODES:

1. IS: 456–2000: Plain and Reinforced Concrete,
2. IS: 3370-2009: Concrete Structures for Storage Of Liquids,

3. IS: 4995 (I & II): Criteria for Design of Reinforced Concrete Bins for the Storage of Granular and Powdery Materials, **are to be permitted into the examination hall.**

III B.Tech. – II Semester

(16BT60106) ADVANCED STRUCTURAL ANALYSIS

(Program Elective - 1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Structural Analysis – I, Structural Analysis –II.

COURSE DESCRIPTION: Arches: two and three hinged arches; Portal frames; Flexibility method; Stiffness method; Curved beams.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate the knowledge on the analysis of arches, portal frames, beams (flexibility and stiffness methods) and curved beams.
CO2. Analyze arches, portal frames, beams and curved beams.
CO3. Solve complex problems in analyzing arches, portal frames, beams and curved beams for different loading.
CO4. Select appropriate technique for analyzing arches, portal frames, beams and curved beams.
CO5. Ensure safety in the analysis of arches, portal frames, beams and curved beams.
CO6. Present the results of analysis such as bending moment, shear force effectively in written and graphical forms.

DETAILED SYLLABUS

UNIT – I: ARCHES (10 Periods)

Three Hinged Arches: Types of arches, Elastic theory of arches, Eddy's theorem; Determination of horizontal thrust, bending moment, normal thrust and radial shear; Effect of temperature.

Two Hinged Arches: Determination of horizontal thrust bending moment, normal thrust and radial shear; Rib shortening and temperature stresses, Tied arches, Fixed arches.

UNIT – II: PORTAL FRAMES AND APPROXIMATE METHODS (09 Periods)

Portal Frames: Substitute frame method for vertical loads, Analysis for portal frames.

Approximate Methods: Portal method and cantilever method for lateral loads.

UNIT - III: FLEXIBILITY METHOD (09 Periods)

Flexibility coefficients, Flexibility matrices, Sign convention, Application to continuous beams, Temperature stresses, Lack of fit, Support settlements.

UNIT – IV: STIFFNESS METHOD (09 Periods)

Stiffness coefficients, Stiffness matrices, Application to continuous beams, Effect of support displacements, Temperature stresses.

UNIT – V: BEAMS CURVED IN PLAN (08 Periods)

Circular beams loaded uniformly and supported on symmetrically placed columns, Semi–circular beams simply supported on three equally spaced supports.

Total Periods: 45

TEXT BOOKS:

1. Thandavamoorthy, T. S., *Structural Analysis*, Oxford University Press, 5th Edition, 2011.
2. Ramamrutham, S. and Narayanan, R., *Theory of Structures*, Dhanpat Rai Publishing Co. Ltd., 9th Edition, 2014.

REFERENCE BOOKS:

1. H. J. Shah and S. B. Junnarkar, *Mechanics of Structures– Vol. II*, Charotar Publishing House, 21st Edition, 2010.
2. Pandit, G., Gupta, S. and Gupta, R., *Theory of Structures– Vol. II*, Tata Mc–Graw Hill Publishing Co. Ltd., 1st Edition, 1999.
3. Punmia, B. C., Ashok Kumar Jain and Arun Kumar Jain, *SMTS–II – Theory of Structures*, Laxmi Publications (P) Ltd.,12th Edition, 2004.
4. R. S. Khurmi, *Theory of Structures*, S. Chand & Company Ltd., 22nd Edition, 2010.

III B.Tech. – II Semester

(16BT60107) ADVANCED SURVEYING

(Programme Elective – 1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Matrices and Numerical Methods, Engineering Physics, Surveying.

COURSE DESCRIPTION: Astronomical surveying; Construction and boundary surveys; Theory of errors; Land surveys; Triangulation and baseline measurements; GPS surveying.

COURSE OUTCOMES: On successful completion of this course, the students will able to:

CO1. Demonstrate the knowledge on advanced surveying techniques.
CO2. Analyze advanced surveying techniques, tools and survey data.
CO3. Prepare survey maps.
CO4. Solve complex engineering survey problems through proper survey and interpretation.
CO5. Use appropriate modern tools in advanced surveying practice.
CO6. Follow ethics in surveying practice.
CO7. Communicate effectively on advanced surveying issues in written and graphical forms.

DETAILED SYLLABUS:

UNIT - I: ASTRONOMICAL SURVEYING (08 Periods)

Astronomical coordinate systems, Terrestrial coordinate systems, Astronomical triangle, Determination of azimuth, Determination of latitude and longitude, Time correlations.

UNIT-II: CONSTRUCTION AND BOUNDARY SURVEYS (09 Periods)

Equipment for construction surveys, Setting out pipe line, Setting out buildings and structures, Setting out a highway.

UNIT-III: THEORY OF ERRORS AND LAND SURVEYS (10 Periods)

Theory of Errors: Types and sources of errors, Loss of accidental errors, Loss of weights, Theory of least squares, Method of weights, Method of correlates, Angle and station adjustment, Figure adjustment.

Land Surveys: Layouts, Measurements

UNIT - IV: TRIANGULATION AND BASELINE MEASUREMENTS (10 Periods)

Principle and classification of triangulation systems, Selection of base line and stations, Orders of triangulation, Station marks, Signals, Towers, Baseline measurement - Rigid bars, Flexible apparatus, Problems; Satellite station and reduction to centre.

UNIT - V: GPS SURVEYING (08 Periods)

Principles of GPS surveying and methods, Components of GPS-Space segment, Receiver segment, User segment; Errors in observations and corrections, Mapping with GPS, Application of GPS, Advantages over conventional methods, DGPS.

Total Periods: 45

TEXT BOOKS:

1. Arora, K. R., *Surveying – Vol. III,* Standard Book House, 11th Edition, 2013.
2. A. M. Chandra, Higher *Surveying,* New Age International (P) Limited, Publishers, 3rd Edition, 2015.

REFERENCE BOOKS:

1. S. K. Duggal, *Surveying – Vol. I and II*, Tata McGraw–Hill Publishing Co. Ltd., 4th Edition, 2013.
2. Arthur R. Benton and Philip J. Taetz, *Elements of Plane Surveying,* McGraw-Hill, 3rd Edition, 2010.
3. B. C. Punimia, Ashok K. Jain and Arun K. Jain, *Surveying – Vol. II,* Laxmi publications(P) Ltd., 17th Edition, 2016.

4. T. P. Kanetkar and S. V. Kulakarni, *Surveying and Leveling*, Pune Vidyarthi Griha Prakashan, Pune, 24th Edition, 2013.

III B.Tech. – II Semester

(16BT60108) GEOENVIRONMENTAL ENGINEERING

(Program Elective – 1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Soil Mechanics, Environmental Engineering.

COURSE DESCRIPTION: Fundamentals of geoenviromental engineering; Soil–water–contaminant interaction; Waste containment system; Contaminant site remediation; Advanced soil characterization.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Acquire knowledge on fundamentals of geoenvironmental engineering, site characterization, waste containment systems and remediation.

CO2. Characterize contaminated site and analyze waste containment systems and remediation techniques.

CO3. Design waste containment systems and remediation techniques.

CO4. Solve complex geoenvironmental problems through proper investigations.

CO5. Use appropriate techniques for site characterization and remediation.

CO6. Propose geoenvironmental solutions considering health and safety issues.

CO7. Protect environment through sustainable remediation techniques.

CO8. Follow ethics in geoenvironmental engineering practice.

DETAILED SYLLABUS:

UNIT – I: FUNDAMENTALS OF GEOENVIROMENTAL ENGINEERING (09 Periods)

Scope of geoenvironmental engineering, Multiphase behavior of soil, Role of soil in geoenvironmental applications, Importance of Soil physics, Soil chemistry, Hydrogeology, Biological process; Sources and type of ground contamination, Impact of ground contamination on geoenvironment, Case histories on geoenvironmental problems.

UNIT – II: SOIL–WATER–CONTAMINANT INTERACTION (09 Periods)

Soil mineralogy characterization and its significance in determining soil behavior, Soil–water interaction and concepts of double layer, Forces of interaction between soil particles, Concepts of unsaturated soil, Importance of unsaturated soil in geoenvironmental problems, Measurement of soil suction, Water retention curves, Water flow in saturated and unsaturated zone, Soil–water–contaminant interactions and its implications, Factors affecting retention and transport of contaminants.

UNIT – III: WASTE CONTAINMENT SYSTEM (09 Periods)

Evolution of waste containment facilities and disposal practices, Site selection based on environmental impact assessment, Different roles of soil in waste containment, Different components of waste containment system and its stability issues, Property evaluation for checking soil suitability for waste containment, Design of waste containment facilities.

UNIT – IV: CONTAMINANT SITE REMEDIATION (09 Periods)

Site characterization, Risk assessment of contaminated site, Soil remediation technologies– Soil vapor extraction, Soil washing, Stabilization/solidification, Electrokinetic remediation, Thermal desorption, Vitrification, Bioremediation, Phytoremediation; Groundwater remediation technologies – Pump and treat, In–situ flushing, Permeable reactive barriers, In–situ air sparging, Monitored natural attenuation, Bioremediation; Selection and planning of remediation technologies, Some examples of in–situ remediation.

UNIT – V: ADVANCED SOIL CHARACTERIZATION (09 Periods)

Contaminant analysis, Water content and permeability measurements, Electrical and thermal property evaluation, Use of GPR for site evaluation, Introduction to geotechnical centrifuge modeling.

Total Periods: 45

TEXT BOOKS:

1. Reddi, L. N. and Inyang, H. I., *Geoenvironmental Engineering Principles and Applications*, Marcel. Dekker, Inc., 2000.
2. Sharma, H. D. and Reddy, K. R., *Geoenvironmental Engineering: Site Remediation, Waste Containment, and Emerging Waste Management Technologies*, John Wiley & Sons, Inc., USA, 2004.

REFERENCE BOOKS

1. Rowe, R. K., *Geotechnical and Geoenvironmental Engineering Handbook*, Kluwer Academic, 2001.
2. Yong, R. N., *Geoenvironmental Engineering, Contaminated Soils, Pollutant Fate, and Mitigation*, CRC Press, New York, 2001.
3. Phillip B. Bedient, Refai, H. S. and Newell, C. J., *Ground Water Contamination*, Prentice Hall Publications, 4th Edition, 2008

4. LaGrega, M. D., Buckingham, P. L. and Evans, J. C., *Hazardous Waste Management*, McGraw–Hill, 2001.

III B.Tech. – II Semester

(16BT60109) GROUNDWATER DEVELOPMENT AND MANAGEMENT

(Program Elective – 1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Engineering Hydrology, Engineering Geology, Irrigation Engineering.

COURSE DESCRIPTION: Groundwater occurrence and movement; Analysis of pumping test data; Saline water intrusion in an aquifer; Artificial recharge of groundwater; Groundwater exploration.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate the knowledge on ground water occurrence, exploration, movement, pollution, and recharge methods.
CO2. Analyze problems associated with occurrence, pumping test data, artificial recharge and exploration of groundwater and saline water intrusion.
CO3. Design and develop artificial groundwater recharge sites using various techniques.
CO4. Conduct investigations on occurrence of groundwater and saline water intrusion in a basin.
CO5. Use appropriate tools and techniques in exploration, development and management of groundwater.
CO6. Solve groundwater issues related to saline water intrusion considering societal issues.
CO7. Consider environmental sustainability in solving groundwater problems.

DETAILED SYLLABUS:

UNIT - I: GROUNDWATER OCCURRENCE AND MOVEMENT (09 Periods)

Groundwater hydrologic cycle – Origin of groundwater; Vertical distribution of groundwater, Geological formations as aquifers, Types of aquifers, Aquifer parameters; Darcy's law, Groundwater flow equation; Groundwater flow contours and their applications.

UNIT - II: ANALYSIS OF PUMPING TEST DATA (10 Periods)

Steady groundwater flow towards a well in confined and unconfined aquifers, Unsteady radial flow towards a well, Non equilibrium equations – Thies solution, Jacob and Chow's solutions; Yield of an open well.

UNIT - III: SALINE WATER INTRUSION IN AN AQUIFER (08 Periods)

Saline water intrusion, Ghyben–Herzberg relation, Shape of interface, Effects and control of sea water intrusion, Recognition of sea water in groundwater.

UNIT - IV: ARTIFICIAL RECHARGE OF GROUNDWATER (08 Periods)

Artificial recharge - Recharge methods, Merits, Application of GIS and Remote Sensing in artificial recharge of groundwater along with case studies; Conjunctive use.

UNIT - V: GROUNDWATER EXPLORATION (10 Periods)

Groundwater exploration, Surface methods - Electrical resistivity and seismic refraction methods; Subsurface methods – Geophysical logging and resistivity logging; Field survey using electrical resistivity method.

Total Periods: 45

TEXT BOOKS:

1. H. M. Raghunath, *Groundwater*, Wiley Eastern Ltd., 3rd Edition, 2009.
2. David Keith Todd, *Groundwater Hydrology*, Wiley India Pvt. Ltd., 2nd Edition, 2010.

REFERENCE BOOKS:

1. K. R. Karanth, *Groundwater Assessment, Development and Management*, TMH, 2003.
2. R. Willis and W. W. G. Yeh, *Groundwater System Planning and Management*, PHI, 1987.
3. V. C. Agarwal, *Groundwater Hydrology*, PHI, 2012.
4. Bhagu R. Chahar, *Groundwater Hydrology*, Mc. Graw Education Pvt. Ltd., 2014.

III B.Tech. – II Semester
(16BT60110) SOLID WASTE MANAGEMENT
(Program Elective - 1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Course on Environmental Studies

COURSE DESCRIPTION: Sources and types of municipal solid wastes; Onsite handling; Storage and processing; Collection and transfer; Off sites processing; Disposal.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:
- CO1. Demonstrate the knowledge on sources, characterization, collection, segregation, transportation, storage, off-site processing and disposal of solid waste.
- CO2. Analyze characteristics; collection, transportation, storage, processing and disposal methods of solid waste.
- CO3. Design of solid waste disposal systems.
- CO4. Investigate and interpret data to recommend suitable solutions to solid waste management.
- CO5. Use appropriate techniques for solid waste management.
- CO6. Consider health and safety in solid waste management.
- CO7. Ensure environmental sustainability in solid waste management.
- CO8. Follow environmental acts in solid waste management.
- CO9. Provide economically viable solid waste management solutions.

DETAILED SYLLABUS:

UNIT – I: MUNICIPAL SOLID WASTE (09 Periods)
Sources and types of solid wastes – Quantity, Factors affecting generation of solid wastes, Characteristics, Methods of sampling and characterization, Effects of improper disposal of solid wastes, Public health effects, Social and economic aspects, Public awareness, Role of NGOs, Legislation.

UNIT – II: ON–SITE STORAGE AND PROCESSING (09 Periods)
Principles of solid waste management, On–site segregation and storage methods, Materials used for containers, Public health and economic aspects of storage, Options under Indian conditions, Critical evaluation of options.

UNIT – III: COLLECTION AND TRANSFER (09 Periods)
Methods of collection, Types of vehicles, Manpower requirement, Analysis of Collection routes, Transfer stations, Selection of location, Operation and maintenance, Collection options under Indian conditions.

UNIT – IV: OFF–SITE PROCESSING (08 Periods)
Processing techniques and equipment, Resource and energy recovery from solid wastes – Composting, Incineration and pyrolysis.

UNIT – V: DISPOSAL (10 Periods)
Dumping of solid waste, Sanitary landfills – Site selection, Design and operation of sanitary landfills, Leachate collection and treatment; Biomedical waste management – Incineration and pyrolysis.

Total Periods: 45

TEXT BOOKS:

1. T. V. Rama Chandra, *Management of Municipal Solid Waste*, 2011.
2. B. Bilitewski, G. HardHe, K. Marek, A. Weissbach, and H. Boeddicker, *Waste Management*, Springer, 1994.

REFERENCE BOOKS:

1. George Tchobanoglous, Hilary Theisen and Samuel A. Vigil., *Integrated Solid Waste Management: Engineering Principles and Management Issues*, McGraw–Hill Publishers, 2002.
2. *Manual on Municipal Solid Waste Management*, CPHEEO, Ministry of Urban Development, Government of India, 2000.
3. Bhide, A. D. and Sundaresan, B. B., *Solid Waste Management in Developing Countries*, INSDOC, 2010.

4. G. Burke, B. R. Singh and L. Theodore, *Handbook of Environmental Management and Technology*, John Wiley & Sons, 2nd Edition, 2000.

III B.Tech. – II Semester

(16BT60111) STRUCTURAL HEALTH MONITORING

(Program Elective –1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Basic Electrical and Electronics Engineering, Concrete Technology.

COURSE DESCRIPTION: Structural health monitoring; Non destructive testing of concrete structures; Sensors for health monitoring systems; SHM Techniques and systems; Information technology for health monitoring; SHM Applications in civil engineering.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Acquire the fundamental knowledge on structural health monitoring and its applications.
CO2. Analyze smart materials, civil engineering structures and techniques for health monitoring.
CO3. Recommend suitable solutions for structural health monitoring.
CO4. Implement the modern tools and techniques in structural health monitoring.
CO5. Ensure health and safety of the structures through structural health monitoring systems.
CO6. Understand the impacts of the structural heath monitoring on environment and sustainability.
CO7. Follow ethics in choosing and implementing structural heath monitoring systems and techniques.

DETAILED SYLLABUS:

UNIT - I: STRUCTURAL HEALTH MONITORING (08 Periods)

Need for SHM, SHM - A way for smart materials and structures, SHM and bio mimetic - analog between the nervous system of a man and a structure with SHM, SHM as a part of system management, Passive and active SHM, NDE, SHM and NDECS, Basic components of SHM, Materials for sensor design.

UNIT - II: NON DESTRUCTIVE TESTING OF CONCRETE STRUCTURES (10 Periods)

Situations and contexts, Need, Classification of NDT procedures, Visual inspection, Half-Cell electrical potential methods, Schmidt rebound hammer test, Resistivity measurement, Electromagnetic methods, Radiographic testing, Ultrasonic testing, Infrared thermography, Ground penetrating radar, Radio isotope gauges, Other methods.

UNIT - III: SENSORS FOR HEALTH MONITORING SYSTEMS (09 Periods)

Acoustic emission sensors, Ultrasonic sensors, Piezoceramic sensors and actuators, Fibre optic sensors and Laser shearography techniques, Imaging techniques.

UNIT - IV: SHM TECHNIQUES AND SYSTEMS (09 Periods)

Diagnostic Techniques: Vibration signature analysis, Modal analysis, Neural network-based classification techniques.

Integrated Health Monitoring Systems: Intelligent health monitoring techniques, Neural network classification techniques, Extraction of features from measurements, Training and simulation techniques, Connectionist algorithms for anomaly detection, Multiple damage detection and case studies.

UNIT - V: IT FOR SHM AND SHM APPLICATIONS IN CIVIL ENGINEERING (09 Periods)

Information Technology for Health Monitoring: Information gathering, Signal analysis, Information storage, Archival, Retrieval, Security, Wireless communication, Telemetry, Real time remote monitoring, Network protocols, Data analysis and interpretation.

SHM Applications in Civil Engineering: Capacitive methods, Capacitive probe for cover concrete, SHM of a bridge, Applications for external post tensioned cables, Monitoring historical buildings.

Total Periods: 45

REFERENCE BOOKS:

1. Daniel Balageas, Claus-Peter Fritzen and Alfredo Guemes, *Structural Health Monitoring*, Published by ISTE Ltd., U.K. 2006.
2. Vistasp M. Karbhari and Farhad Ansari, *Structural Health Monitoring of Civil Infrastructure System*, Wood Head Publishing Limited, Cambridge, 2009.
3. M. L. Wang, J. P Lynch and H. Sohn, *Sensors Technologies for Civil Infrastructure*, Vol.1 & 2, Wood Head Publishing Limited, Cambridge, 2009.
4. Philip, W., *Industrial Sensors and Applications for Condition Monitoring*, MEP, 1994.
5. Armer, G. S. T (Editor), *Monitoring and Assessment of Structures*, Spon, London, 2001.
6. J. Prasad and C. G. K. Nair, *Non-destructive Test and Evaluation Materials*, McGraw-Hill, 2nd Edition, 2011.

7. Poonam I. Modi and Chirag N. Patel, *Repair and Rehabilitation of Concrete Structures,* Prentice-Hall of India Pvt. Ltd., New Delhi, 2016.

III B.Tech. – II Semester
(16BT6HS01) BANKING AND INSURANCE
(Open Elective)
(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITES: -

COURSE DESCRIPTION: Origin of Banking; Functions of Banking; Role & Functions of RBI; Bank-Customer Relationship; Deposit and Loan Services of Banks; Banking Procedures; Electronic Payment Mechanisms; Business Models; Concepts of Risk and Uncertainty; Fundamentals of Insurance; Principles of Insurance; Essentials of Insurance Contracts; Insurance players in India.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate Knowledge in
- a) Tools and concepts of Banking and Insurance.
- b) Basic Principles and concepts of Insurance and Banking.
- c) e-fund transfers, e-payments and e-business models.

CO2. Develop skills in providing solutions for
- a) Online banking and e – payments.
- b) Risk Management through insurance benefits the society at large.
- c) Money management by leveraging on technology, banking and insurance services.

CO3. Exhibit conceptual soundness about banking and insurance, this would contribute to more employment opportunities.

CO4. Provide life skills for effective utilization of Banking and Insurance facilities.

DETAILED SYLLABUS:

UNIT – I: INTRODUCTION TO BANKING (09 Periods)
Origin and growth of banking, Meaning and functions of banking, Importance of banking, Reserve Bank of India; Functions, Monetary policy, Open market operations.

UNIT – II: BANK-CUSTOMER RELATIONSHIP (09 Periods)
Debtor-creditor relationship, anti money laundering, deposit products or services, payment and collection of cheques, Accounts – Types of accounts, procedure for opening and closing an account, Loans and Advances- principles of lending, types of loans.

UNIT – III: BUSINESS MODELS & ELECTRONIC PAYMENT SYSTEM (09 Periods)
Features, types of e-payment system, e-cash, NEFT, RTGS, Credit cards, Electronic purses and Debit cards. Business models- B2B, B2C, C2C, and B2G.

UNIT – IV: INTRODUCTION TO RISK AND INSURANCE (09 Periods)
Concept of risk, risk *Vs* uncertainty, Insurance definition, Insurance as risk mitigation mechanism, Elements of insurance.

UNIT – V: INSURANCE OVERVIEW (09 Periods)
Principles of insurance, insurance types, LIC & GIC insurance contract- nature, elements, functions, IRDA, Insurance Players in India.

Total Periods: 45

TEXT BOOKS:
1. A.V. Ranganadha Chary, R.R.Paul, *Banking and Financial system*, Kalyani Publisher, New Delhi, 2nd Edition.
2. P.K.Gupta, *Insurance and Risk Management*, Himalaya Publishing House, New Delhi.

REFERENCE BOOKS:
1. Diwan, Praq and Sunil Sharma, *Electronic Commerce- A Manager's Guide to E-Business*, Vanity Books International, Delhi, 2002.
2. Kalakota Ravi and Whinston Andrew B, *Frontiers of Electronic Commerce*, Pearson Education India, New Delhi, 1996.

3. Schneider, Grey P, *Electronic Commerce, Course Technology'*, Cengage Learning, 2008, 8th Edition, New Delhi.

III B. Tech. – II Semester

(16BT6HS02) BUSINESS COMMUNICATION AND CAREER SKILLS

(Open Elective)

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Technical English or English at Diploma level

COURSE DESCRIPTION: Nature and Scope of Communication; Corporate Communication; Writing Business Documents; Careers and Resumes; Interviews.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate knowledge in
  a) Corporate Communication
  b) Main Stages of Writing Messages
  c) Career Building

CO2. Analyze the possibilities and limitations of language in
  a) Communication Networks
  b) Crisis Management/Communication

CO3. Design and develop the functional skills for professional practice in
  a) Business Presentations & Speeches

CO4. Apply written and oral communication techniques in preparing and presenting various documents in technical writing.

CO5. Function effectively as an individual and as a member in diverse teams.

CO6. Communicate effectively with the engineering community and society in formal and informal situations.

DETAILED SYLLABUS:

UNIT–I: NATURE AND SCOPE OF COMMUNICATION (09 Periods)

Introduction: Functions of Communication – Roles of a Manager – Communication Basics – Communication Networks – Informal Communication – Interpersonal Communication –Communication Barriers

UNIT – II: CORPORATE COMMUNICATION (09 Periods)

Introduction: What is Corporate Communication? – Corporate Citizenship and Social Responsibility – Corporate Communication Strategy – Crisis Management /Communication – Cross-Cultural Communication.

UNIT – III: WRITING BUSINESS DOCUMENTS (09 Periods)

Introduction: Importance of Written Business Communication, Types of Business Messages – Five Main Stages of Writing Business Messages – Business Letter Writing – Effective Business Correspondence – Common Components of Business Letters – Strategies for Writing the Body of a Letter

UNIT – IV: CAREERS AND RESUMES (09 Periods)

Introduction – Career Building – Business Presentations and Speeches – Resume Formats – Traditional, Electronic and Video Resumes – Sending Resumes – Follow-up Letters – Online Recruitment Process

UNIT V – INTERVIEWS (09 Periods)

Introduction – Fundamental Principles of Interviewing – General Preparation for an Interview – Success in an Interview – Types of Interviewing Questions – Important Non-verbal Aspects – Types of Interviews – Styles of Interviewing

Total Periods: *45*

TEXT BOOKS:

1. Meenakshi Raman and Prakash Singh *Business Communication*, Oxford University Press, New Delhi, Second Edition, 2012.

REFERENCE BOOKS:

1. Neera Jain and Sharma Mukherji, *Effective Business Communication*, Tata McGraw-Hill Education, Pvt. Ltd., New Delhi, 2012.
2. Courtland L.Bovee et al., *Business Communication Today*, Pearson, New Delhi, 2011.
3. Krizan, *Effective Business Communication*, Cengage Learning, New Delhi, 2010.

4. R.K. Madhukar, *Business Communication*, Vikas Publishing House Pvt. Ltd., New Delhi, 2005.

III B.Tech. – II Semester

(16BT6HS03) COST ACCOUNTING AND FINANCIAL MANAGEMENT

(Open Elective)

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITES: -

COURSE DESCRIPTION: Scope, Objectives and Elements of Cost Accounting; Cost Sheet and Tender Quotations; Variance Analysis: Material variances, Labor variances; Meaning and Scope, Liquidity, Profitability Ratios: Concept of Risk and Return on Investment.

Course outcomes: On successful completion of this course, the students will be able to:

CO1. Acquire Knowledge in
- a) Elements of Costing.
- b) Basic concepts of Financial Management.
- c) Risk and Return
- d) Significance of Cost Accountancy
- e) Behavioral Finance

CO2. Develop skills in
- a) Material, Labor, Overheads control.
- b) Excellence and ability to minimize the cost of the organization

CO3. Develop effective Communication in Cost control and Financial Management.

CO4. Provide solutions for effective investment decisions.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO COST & COST ACCOUNTING (09 Periods)

Cost and Cost Accounting, Scope, Objectives, Advantages and disadvantages – Cost Accounting *Vs* Management Accounting – Elements of Costing – Installation of costing system – Material Control, Labour Control, Overhead Control.

UNIT - II: COST SHEET & PREPARATION OF COST SHEET (09 Periods)

Analysis of Cost – Preparation of cost sheet, estimate, tender and quotation (Simple problems) – Importance of Costing while pricing the products.

UNIT - III: STANDARD COSTING & VARIANCE ANALYSIS (09 Periods)

Introduction to Standard Costing & Variances – Variance Analysis: Material variances, Labour variances (Simple Problems).

UNIT - IV: INTRODUCTION TO FINANCIAL MANAGEMENT & RATIO ANALYSIS (09 Periods)

Financial Management-Meaning and Scope, Liquidity, Profitability, Financial Statement Analysis through ratios (Simple Problems).

UNIT - V: INTRODUCTION TO INVESTMENT & BEHAVIORAL FINANCE (09 Periods)

Investment-Meaning and Definition- concept of risk and returns-Investment Alternatives- Introduction to Behavioral Finance – Anomalies –Key Concepts –Anchoring – Mental Anchoring-Confirmation and Hindsight Bias-Gambler's Fallacy-Herd Behavior-Over Confidence-Overreaction and Availability Bias-Prospect Theory.

Total Periods: *45*

TEXT BOOKS:

1. S.P. Jain and K.L. Narang, *Cost Accounting*, Kalyani Publishers, Ludhiana, 6th Edition, 2002.
2. James C Van Horne, *Financial Management and Policy*, Prentice-Hall of India/Pearson, 12th Edition, 2001.

REFERENCE BOOKS:

1. The Institute of Company Secretaries of India, *Cost and Management Study Material*, New Delhi.

2. I.M. Pandey, *Financial Management*, Vikas Publishing House Pvt. Ltd., 10th Edition, 2010.

III B.Tech. – II Semester
(16BT6HS04) ENTREPRENEURSHIP FOR MICRO, SMALL AND MEDIUM ENTERPRISES

(Open Elective)

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITE: -

COURSE DESCRIPTION: Introduction to Entrepreneur Development; Idea generation and formation of Business Plan; Micro and Small Enterprises; Institutional Finance and Support to Entrepreneur; Woman Entrepreneurship.

Course outcomes: On successful completion of this course, the students will be able to:

CO1. Acquire Knowledge in
- a) Schemes and institutions encouraging entrepreneurship
- b) Basic Principles and concepts of Accountancy
- c) Significance of entrepreneurship

CO2. Develop skills in providing solutions for
- a) Personal excellence through financial and professional freedom
- b) Women entrepreneurship serving as contrivance in societal development

CO3. Develop Critical thinking and evaluation ability.

CO4. Widens knowledge and build up attitude towards trouble shooting.

CO5. Demonstrate business acumen.

DETAILED SYLLABUS:

UNIT – I: INTRODUCTION TO ENTREPRENEURSHIP DEVELOPMENT (09 Periods)

Concept of Entrepreneurship – Growth of Entrepreneurship in India **-** Factors affecting entrepreneurship growth - Characteristics of an Entrepreneur – Functions of Entrepreneur – Need for an Entrepreneur – Entrepreneurial Decision Process – Types of Entrepreneurs – Distinction between an Entrepreneur and a manager.

UNIT – II: IDEA GENERATION AND FORMULATION OF BUSINESS PLANS (09 Periods)

Sources of Ideas – Methods of idea generation – Steps in Setting up of a Small Business Enterprise – Formulation of Business Plan – Contents of Business Plan – Significance – Common Errors in Business Plan Formulation, The role of incubation centers for promoting Entrepreneurship, Start-up – New Guidelines.

UNIT – III: MICRO AND SMALL ENTERPRISES (09 Periods)

Meaning and Definition – Micro and Macro units – Essentials – Features – Characteristics – Scope of Micro and Small Enterprises – Objectives of Micro Enterprises – relationship between Micro and Macro Enterprises - Problems of Micro and Small Enterprises

UNIT – IV: INSTITUTIONAL FINANCE (09 Periods)

Institutional Finance **–** Need-Scope-Services - Various Institutions offering Institutional support: – Small Industries Development of Bank of India (SIDBI), State Industrial Development Corporations (SIDCs)– Small Industries Development Organisation (SIDO) – Small Industries Service Institutes (SISIs) – District Industries Centres (DICs) – National Institute of Entrepreneurship and Small Business Development (NIESBUD) – Technical Consultancy Organizations (TCOS). Micro Units Development and Refinance Agency Bank (MUDRA).

UNIT – V: WOMEN & RURAL ENTREPRENEURSHIP (09 Periods)

Concept of Women entrepreneur - Functions of Women entrepreneurs - Growth of women entrepreneurship in India - Challenges of Women entrepreneurs- Programmes supporting women entrepreneurship – Rural Entrepreneurship – Meaning, Need for Rural entrepreneurship, Problems of rural entrepreneurship, Role of NGOs, Role of Bharatiya Mahila Bank for encouraging Women Entrepreneurs.

Total Periods: 45

TEXT BOOKS:

1. Dr.S.S.Khanka, *Entrepreneurial Development*, S. Chand and Company Ltd, Revised Edition, 2012.
2. Madhurima Lall and Shikha Sahai, *Entrepreneurship*, Excel Books India, 2nd Edition 2008.

REFERENCE BOOKS:

1. Nandan, H., *Fundamentals of Entrepreneurship*, PHI Learning Pvt. Ltd., 2013, New Delhi, 3rd Edition 2013.

2. Vasanth Desai, *The Dynamics of Entrepreneurial Development and Management*, Himalaya Publishing House, 4th Edition 2009.
3. Bholanath Dutta, *Entrepreneurship Management – Text and Cases*, Excel Books, 1st Edition 2009.

III B.Tech. – II Semester

(16BT6HS05) FRENCH LANGUAGE (La Langue Francais)

(Open Elective)

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Oral communications; Basic grmmar; Advanced grammar; Basic writing; Business French (La Francais Commercial).

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate knowledge in
- a) Process of communication
- b) Modes of listening
- c) Paralinguistic features
- d) Skimming and Scanning
- e) Elements of style in writing

CO2. Analyze the possibilities and limitations of language, understanding
- a) Barriers to Communication
- b) Barriers to Effective Listening
- c) Barriers to Speaking
- d) Formal and metaphorical language

CO3. Design and develop language skills for professional practice**.**

CO4. Apply basic writing skills in writing Emails and understanding wide range of technical terminologies.

CO5. Understand French culture and civilization.

CO6. Communicate effectively with the native French in day to day situation

DETAILED SYLLABUS:

UNIT - I: ORAL COMMUNICATION (09 Periods)

Introduction - Language as a Tool of Communication, French alphabets, Phonetics and pronunciation, making contacts, giving information, Arranging things, Expression of feelings.

UNIT - II: BASIC GRAMMAR (09 Periods)

Introduction –Articles, -Er ending Verbs, Nouns, Numbers, Gender, Pronouns, Sentence structure – Case study.

UNIT - III: ADVANCED GRAMMAR (09 Periods)

Introduction -Adjectives, Prepositions, Introduction to tenses – Present tense, past tense and future tense, Active and Passive voice.

UNIT – IV: BASIC WRITING (09 Periods)

Introduction -Introduction to written communication, Pre-writing, Creating context for writing and Data collection, fill in forms, Write greeting cards, Invitations and Short personal announcements, Short text to describe photos and pictures.

UNIT - V: BUSINESS FRENCH (La Francais Commercial) (09 Periods)

Introduction - E-mail writing, Letter writing, Learning technical vocabulary and its application.

Case study of influential French companies, Learning computer/desktop/new age- media vocabulary, Introduction to how to present a topic, Fixing an Appointment

Total Periods: 45

TEXT BOOKS:

1. Annie Berther, *Alter Ego*, Hachette Publications, 2012.

REFERENCE BOOKS:

1 RegineMerieux, Yves Loiseau, *Connexions*, Goyall Publishers, 2011.
2. DelphineRipaud, *Saison*, French and Euroean Inc., 2015.

III B.Tech. – II Semester
(16BT6HS06) GERMAN LANGUAGE
(Deutsch alsFremdsprache)

(Open Elective)

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Oral communication; Basic grammar; Advanced grammar; Basic writing; Berufsdeutcsch (Business German)

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate knowledge in
  a) Process of communication
  b) Modes of listening
  c) Paralinguistic features
  d) Skimming and Scanning
  e) Elements of style in writing

CO2. Analyze the possibilities and limitations of language, understanding
  a) Barriers to Communication
  b) Barriers to Effective Listening
  c) Barriers to Speaking
  d) Formal and metaphorical language

CO3. Design and develop language skills for professional practice**.**

CO4. Apply basic writing skills in writing Emails and understanding wide range of technical terminologies.

CO5. UnderstandGerman culture and civilization.

CO6. Communicate effectively with the native German in day to day situation**.**

DETAILED SYLLABUS:

UNIT - I: ORAL COMMUNICATION **(09 Periods)**

Introduction - Language as a Tool of Communication, German alphabets, Phonetics and pronunciation, making contacts, giving information, Arranging things, Expression of feelings.

UNIT - II: BASIC GRAMMAR **(09 Periods)**

Introduction – Articles, Verbs, Nouns, Numbers, Gender, Pronouns, Sentence structure – Case study.

UNIT - III: **ADVANCED GRAMMAR** **(09 Periods)**

Introduction -Adjectives, Prepositions, Introduction to tenses – Present tense, past tense and future tense, Active and Passive voice, Introduction to Case- Akkusativ, Nominativ, Dativ&Genetiv Case.

UNIT - IV: **BASIC WRITING** **(09 Periods)**

Introduction -Introduction to written communication, Pre-writing, Creating context for writing and Data collection, fill in forms, Write greeting cards, Invitations and Short personal announcements, Short text to describe photos and pictures.

UNIT - V: **BERUFSDEUTCSCH (BUSINESS GERMAN)** **(09 Periods)**

Introduction - E-mail writing, Letter writing, Learning technical vocabulary and its application.
Case studies of influential German companies, Learning computer/desktop/new age- media vocabulary, Introduction to how to present a topic, Fixing an Appointment.

Total Periods: 45

TEXT BOOKS:

1. Heuber, *Tangram Aktuelleins*, HeuberVerlagPublications, 2011.

REFERENCE BOOKS:

1. Anta Kursisa, Gerhard Newner, Sara vicenta, *Fir fuer Deutsch 1 und Deutsch 2,* HeuberVerlag Publications, 2005.
2. Herman Funk, *Studio D A1*, Cornelsen GOYAL SAAB Publication, 2011.

III B.Tech. – II Semester

(16BT6HS07) **INDIAN CONSTITUTION**

(Open Elective)

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Elements, functions and functionaries according to Indian Constitution, Understanding for better professional practice and good citizenry.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Gain knowledge in

a) parliamentary proceedings, laws, legislature, administration and its philosophy
b) federal system and judiciary of India
c) socials problems and public services like central civil services and state civil services
d) Indian and international political aspects and dynamics

CO2. Develop etiquette and professional behavior in line with the constitution of India for becoming a responsible citizen.

DETAILED SYLLABUS:

UNIT - I: PREAMBLE AND ITS PHILOSOPHY **(08 Periods)**

Introduction and Evolution of Indian Constitution, preamble and its Philosophy.

UNIT - II: UNION GOVERNMENT **(08 Periods)**

Powers, Functions and Position of President, Vice-President and Council of Ministers, Composition of parliament, Constitution Amendment Procedure, Financial Legislation in Parliament.

UNIT - III: FEDERAL SYSTEM **(14 Periods)**

Centre-State relations, Directive Principles of State Policy, Fundamental Rights and Duties, Centre-State Relations, Features of Federal System, Administrative Relationship between Union and States, Powers, Functions and Position of Governors, Function of Chief Ministers, Council of Ministers, Composition and powers of the State Legislature.

UNIT - IV: JUDICIARY AND PUBLIC SERVICES **(10 Periods)**

The Union Judiciary - Supreme Court and High Court, All India Services, Central Civil Services, State Services, Local Services and Training of Civil Services.

UNIT - V: INTERNATIONAL POLITICS **(05 Periods)**

Foreign Policy of India, International Institutions like UNO, WTO, SAARC and Environmentalism.

Total Periods: 45

TEXT BOOK:

1. Briji Kishore Sharma, *Introduction to the Constitution of India*, Prentice Hall of India, 2005.

REFERENCE BOOKS:

1. Mahendra Pal Singh, V. N. Shukla’s Constitution *of India*, Eastern Book Company, 2011.
2. Pandey J. N., *Constitutional Law of India* - Central Law Agency, 1998.

III B.Tech. – II Semester
(16BT6HS08) INDIAN ECONOMY
(Open Elective)
(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Introduction; Time Value of Money; Elementary Economic Analysis; Value analysis, Value Engineering; Economic Planning.

COURSE OUTCOMES: On successful completion of this course, the students will be able to
CO1. Acquire the knowledge in
- a) Micro and Macro Economics.
- b) Traditional and Modern methods of Capital Budgeting.
- c) Five year plans and NITI Aayog.

CO2. Analyze
- a) Capital Budgeting.
- b) Value Analysis and Value Engineering.
- c) Economic analysis
- d) Law of supply and demand

CO3. Understand the nuances of project management and finance.

DETAILED SYLLABUS:
UNIT – I: INTRODUCTION (09 Periods)
Economics- Flow in an Economy, Law of Supply and Demand; Micro and Macro Economics; Relationship between Science, Engineering, Technology, and Economic Development;Concept of Engineering Economics-Types of Efficiency, Definition and Scope of Engineering Economics.
UNIT – II: TIME VALUE OF MONEY (12 Periods)
Concepts and Application; Capital Budgeting-Traditional and Modern Methods; Simple and Compound Interest, Cash Flow Diagram, Principle of Economic Equivalence; Evaluation of Engineering Projects – Present Worth Method, Future Worth Method, Annual Worth Method, Internal Rate of Return Method, Cost-benefit Analysis in Public Projects; Depreciation Policy-Depreciation of Capital Assets, Causes of Depreciation, Straight Line Method and Declining Balance Method.
UNIT – III: ELEMENTARY ECONOMIC ANALYSIS (09 Periods)
Economic Analysis – Meaning, Significance, Simple Economic Analysis; Material Selection for a Product, Substitution of Raw Material; Design Selection for a Product; Material Selection-Process Planning, Process Modification.
UNIT - IV: VALUE ENGINEERING (06 Periods)
Introduction- Value Analysis, Value Engineering, Functions, Aims; Value Analysis vs. Value Engineering; Value Engineering Procedure- Advantages, Application Areas.
UNIT - V: ECONOMIC PLANNING (09 Periods)
Introduction - Need For Planningin India,Five year plans(1951-2012), NITI Aayog(from 2014 onwards); Inclusive Growth-Meaning, Significance, Need for inclusive growth in India, Strategy for more inclusive growth, Challenges and Prospects; Employment and Inclusive Growth in India, Role of engineers in sustaining inclusive growth.

Total Periods: 45

TEXT BOOKS:

1. Panneerselvam R., *Engineering Economics*, PHI Learning Private Limited, Delhi, 2/e, 2013.
2. Jain T.R., V. K.Ohri, O. P. Khanna, *Economics for Engineers,* VK Publication, 1/e, 2015.

REFERENCE BOOKS:

1. Dutt Ruddar and Sundhram K. P. M., *Indian Economy*, S. Chand, New Delhi, 62nd Revised Edition, 2010.

2. Misra, S.K. and V. K. Puri, *Indian Economy*: *Its Development Experience*, Himalaya Publishing House, Mumbai 32/e, 2010.

III B.Tech. - II Semester
(16BT6HS09) **INDIAN HERITAGE AND CULTURE**

(Open Elective)

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Basic traits of Indian Culture; Humanistic Reforms under Jainism and Buddhism; Culture in the medieval period; Socio Religious reforms in Indian Culture; Reform movements for harmonious relations.

COURSE OUTCOMES: On successful completion of this course, the students will be able to

CO1. Acquaint knowledge in
- a) human aspirations and values in Vedic culture.
- b) cultural aspects of Buddhism and Jainism
- c) unification of our country under Mourya's and Gupta's administrations
- d) socio Religious aspects of Indian culture
- e) reform movements and harmonious relations.

CO2. Apply ethical principles and reforms as models for the upliftment of the societal status in the present cultural contexts.

DETAILED SYLLABUS:

UNIT – I: BASIC TRAITS OF INDIAN CULTURE (09 Periods)

Meaning and definition and various interpretations of culture, Culture and its features, The Vedic and Upanishadic culture and society, Human aspirations and values in these societies, Chaturvidha purushardhas, Chaturashrma and Chaturvarna theory.

UNIT - II: HUMANISTIC REFORMS UNDER JAINISM AND BUDDHISM (09 Periods)

Salient features of Jainism - contributions of Jainism to Indian culture, Contributions of Aachaarya and Mahaapragya, Buddhism as a humanistic culture, The four noble truths of Buddhism, Contributions of Buddhism to Indian culture.

Unit - III: CULTURE IN THE MEDIEVAL PERIOD (09 Periods)

Unifications of India under Mouryas and Guptas and their cultural achievements, Cultural conditions under satavahanas, Contributions to pallavas and cholas to art and cultural achievements of vijayanagara rulers.

Unit - IV: SOCIO RELIGIOUS REFORMS IN INDIAN CULTURE (09 Periods)

Western impact on India, Introductin of western education, social and cultural awakening and social reform movements of Rajaramohan Roy - Dayanandha Saraswathi- Anne Besant. (Theosophical society)

Unit - V: REFORM MOVEMENTS FOR HARMONIOUS RELATIONS (09 Periods)

Vivekananda, Eswarchandra vidyasagar and Veeresalingam- emancipation of women and struggle against caste, Rise of Indian nationalism, Mahatma Gandhi- Non violence and satyagraha and eradication of untouchability.

Total Periods: 45

TEXT BOOKS:

1. Valluru Prabhakaraiah, *Indian Heritage and Culture*, Neelkamal Publications Pvt. Ltd. Delhi, 2015.

REFERENCE BOOKS:

1. L. P. Sharma, *History of Ancient India*, Konark Publishers, Pvt. Ltd. New Delhi, 2010.
2. L. P. Sharma, *History of Medieval India*, Konark Publishers, Pvt. Ltd. New Delhi, 2010.
3. L. P. Sharma, *History of Modern India*, Konark Publishers, Pvt. Ltd. New Delhi, 2010.
4. The Cultural Heritage of India Vol-I, II, III, IV, V, The Ramakrishna Mission Institute of Culture, Calcutta.

III B.Tech. – II Semester

(16BT6HS10) **INDIAN HISTORY**

(Open Elective)

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Introduction; Ancient India; Classical and Medieval era; Modern India; India after independence.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Gain knowledge on evolution and history of India as a nation.

CO2. Analyze social and political situations of past and current periods.

CO3. Practice in career or at other social institutions morally and ethically.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION (08 Periods)

Elements of Indian History; History Sources: Archaeology, Numismatics, Epigraphy & Archival research; Methods used in History; History & historiography; sociological concepts-structure, system, organization, social institutions, Culture and social stratification (caste, class, gender, power), State & Civil Society.

UNIT - II: ANCIENT INDIA (09 Periods)

Mohenjo-Daro civilization; Harappa civilization; Mauryan Empire.

UNIT - III: CLASSICAL & MEDIEVAL ERA (12 Periods)

Classic Era (200 BC - 1200 AD); Hindu - Islamic Era (1200 - 1800 AD).

UNIT - IV: MODERN INDIA (06 Periods)

Age of Colonialism (17th - 19th centuries); First war of Indian Independence;
Freedom Struggle (1857-1947).

UNIT - V: INDIA AFTER INDEPENDENCE (1947-) (10 Periods)

The Evolution of the Constitution and Main Provisions; Consolidation of India as a Nation; Politics in the States; Indian economy; Modernization and globalization, Secularism and communalism, Nature of development, Processes of social exclusion and inclusion, ChangingNature of work and organization.

Total Periods: 45

TEXT BOOK:

1. K. Krishna Reddy, *Indian History*, Tata McGraw-Hill, 21st Reprint, 2017.

REFERENCE BOOKS:

1. Guha, Ramachandra, *India after Gandhi*, Pan Macmillan, 2007.

2. Thapar, Romila, *Early India*, Penguin, 2002.

III B.Tech. – II Semester

(16BT6HS11) PERSONALITY DEVELOPMENT

(Open Elective)

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Soft Skills Lab

COURSE DESCRIPTION: Self-esteem & Self-improvement; Developing Positive Attitudes; Self-Motivation & Self-Management; Getting Along with the Supervisor; Workplace Success.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate knowledge in
- a) Self-Management
- b) Planning Career

CO2. Analyze the situations based on
- a) Attitudes
- b) Thinking strategies

CO3. Design and develop the functional skills for professional practice in

CO4. Function effectively as an individual and as a member in diverse teams.

CO5. Communicate effectively in public speaking in formal and informal situations.

DETAILED SYLLABUS:

UNIT – I: SELF-ESTEEM & SELF-IMPROVEMENT (09 Periods)

Know Yourself – Accept Yourself; Self-Improvement: Plan to Improve - Actively Working to Improve Yourself.

Case study: 1

UNIT – II: DEVELOPING POSITIVE ATTITUDES (09 Periods)

How Attitudes Develop – Attitudes are Catching – Improve Your Attitudes.

Case study: 2

UNIT – III: SELF-MOTIVATION & SELF-MANAGEMENT (09 Periods)

Show Initiative – Be Responsible Self-Management; Efficient Work Habits – Stress Management – Employers Want People Who can Think – Thinking Strategies.

Case study: 3

UNIT – IV: GETTING ALONG WITH THE SUPERVISOR (09 Periods)

Know your Supervisor – Communicating with Your Supervisor – Special Communications With Your Supervisor – What Should You Expect of Your Supervisor? – What Your Supervisor Expects of You - Moving Ahead Getting Along with Your Supervisor.

Case study: 4

UNIT - V: WORKPLACE SUCCESS (09 Periods)

First Day on the Job – Keeping Your Job – Planning Your Career – Moving ahead.

Case study: 5

Total Periods: 45

TEXT BOOK:

1. Harold R. Wallace and L. Ann Masters, *Personality Development*, Cengage Learning, Delhi, Sixth Indian Reprint 2011.

REFERENCE BOOKS:

1. Barun K. Mitra, *Personality Development and Soft Skills,* Oxford University Press, New Delhi, 2011.
2. Stephen R. Covey, *The 7 Habits of Highly Effective People*, Free Press, New York, 1989
3. K. Alex, *Soft Skills*, S. Chand & Company Ltd, New Delhi, Second Revised Edition 2011.

4. Stephen P. Robbins and Timothy A. Judge*, Organizational Behaviour*, Prentice Hall, Delhi, 16th Edition 2014.

III B.Tech. – II Semester

(16BT6HS12) PHILOSOPHY OF EDUCATION

(Open Elective)

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Introduction to Philosophy and Engineering Education; Philosophical methods and their implications in engineering; Philosophical education in India; Values and Engineering education; Outcome based education.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Acquire knowledge in
- a) Philosophy of engineering education.
- b) Philosophical methods.
- c) Knowledge acquiring methods.
- d) Engineering education and responsibilities.

CO2. Understand the impact of Outcome Based Education for effective educational Outcomes.

CO3. Apply reasoning to assess societal issues with the contextual knowledge of engineering education and responsibilities.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO PHILOSOPHY AND ENGINNERING EDUCATION (09 Periods)
Concept, Significance, and Scope of Philosophy in Engineering – Aims of Engineering Education – Relationship between philosophy and engineering education – Speculative, normative and critical approaches of philosophy in engineering.

UNIT-II:PHILOSOPHICAL METHODS AND THEIR IMPLICATIONS IN ENGINEERING (09 Periods)
Introduction to Philosophical approaches: Idealism, Naturalism, Pragmatism, Realism and Existentialism; Significance and Scope in Engineering Education.

UNIT - III: PHILOSOPHICAL EDUCATION IN INDIA (09 Periods)
Different branches of philosophy- meaning, Epistemology: nature and scope; Knowledge acquiring methods; Kinds and instruments of knowledge; Re-shaping of educational thoughts by Indian thinkers: Rabindranath Tagore, Sri Aurobindo Gosh, Mahatma Gandhi, Jiddu Krishnamurthy and Swamy Vivekananda.

UNIT - IV: VALUES AND ENGINEERING EDUCATION (09 Periods)
Introduction; Engineering educationand responsibilities: health, social, moral, ethics aesthetic; Value: crisis and strategies forinculcation;
Case study: Engineering Solutions given by Mokshagundam Visvesvaraya

UNIT - V: OUTCOME-BASED EDUCATION (09 Periods)
Institutional visioning; Educational objectives; Programme outcomes, Curriculum, Stakeholders, Infrastructure and learning resources; Governance and management, Quality in education.

Total Periods: 45

TEXT BOOKS:
1. Ganta Ramesh, *Philosophical Foundations of Education*, Neelkamal Publications, 1/e, 2013
2. CarlMicham, *Thinking Through Technology (The Paths between Engineering and Philosophy)*, University of Chicago Press, 1/e, 1994.
3. Louis L Bucciarelli, *EngineeringPhilosophy,* Delft University Press, 1/e, 2003.
4. NBA/ABET Manuals.

REFERENCE BOOKS:

1. Louis L Bucciarelli, *Philosophy of Technology and Engineering Sciences*, North Holland, 1/e, 2009 (e-book).
2. Samuel Florman, *Existential pleasures of education*. Martins's Griffin S.T. publication, 1/e, 1992.

III B.Tech. – II Semester

(16BT6HS13) PUBLIC ADMINISTRATION

(Open Elective)

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Introduction; Public Policy; Good Governance; E-Governance; Development Administration.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Acquire knowledge in
  a) Public Policy.
  b) Good Governance.
  c) E-governance.
  d) Development Administration.

CO2. Analyze the possibilities and limitations ofexisting policies through Good Governance perspective.

CO3. Design and develop solutions in e-governance modelsto find and provide opportunities in e-governance.

CO4. Adopt principles of e-governance in addressing the existing issues and challenges in e-governance sector.

CO5. Understand the significance of Administrative Development in finding professional engineering solutions by probing
  a) Bureaucracy.
  b) Role of civil society.

DETAILED SYLLABUS:

UNIT – I: INTRODUCTION **(09 Periods)**

Public and Private Administration- Differences and Similarities, Meaning, Scope; Importance of Public Administration in Modern Era; Public Administration and its implications in the field of Engineering.

Case Study: **Unique Identification Authority of India (UIDAI): Aadhaar Project: Challenges Ahead**

UNIT – II: PUBLIC POLICY **(09 Periods)**

Meaning and Scope; Policy Formulation in India; Policy making process; Policy Implementation **E**ngineering and Public Policy,Social, ethical, Monetary and fiscal policies; policy implications of engineering;The engineer's role in Public Policy.

Case Study: NITI Aayog: Demonetization and Aftermath of Demonetization – Cashless transactions.

UNIT – III: GOOD GOVERNANCE **(09 Periods)**

Significance; Objectives;Concepts;Reforms;Organization and its basic problemsAdministrative and Governance reforms in India; Sustainable and Inclusive growth in India;Engineering and Sustainable Environment-Role of Engineers; Right to information Act

Case Study: Strategies in Good Governance: A Case Study of Karnataka, Kerala and Orissa.

UNIT – IV: E-GOVERNANCE **(09 Periods)**

Meaning, Significance, Issues in E-governance; E-governance Models, Problems and Opportunities; Application of DataWarehousing and Data Mining in Governance; Engineers role in re-engineering E-governance.

Case Study: e-Housing System for Bhavana Nirman Dhanasahayam Online disbursement of housing assistance in Kerala.

UNIT - V: DEVELOPMENT ADMINISTRATION **(09 Periods)**

Introduction; Development Administration-Administrative Development- Sustainable Development - Significance- Objectives; Bureaucracy - Personnel administration and human resources development; Role of civil society-Citizens and administration;Development and Engineering: Issues Challenges and Opportunities.

Case Study: Neeru-Chettu (Water-Tree) of Andhra Pradesh.

Case Study: TPDDL of Delhi and Odisha. **Total Periods: 45**

TEXT BOOKS:

1. M.P. Sharma, B.L. Sadana, HarpreetKaur. *Public Administration in Theory and Practice.*KitabMahal, Mumbai, 1/e, 2014.
2. CSR Prabhu, *E. Governance – concepts and case studies*.PHI, New Delhi, 2/e 2012.

REFERENCE BOOKS:

1. SurendraMunshi, Bijupaul Abraham*Good Governance, Democratic societies and Globalization*, Sage publications, New Delhi, 1/e, 2004.
2. R.K.Sapru, *Public Policy,* Sterling Publishers Pvt Ltd., New Delhi, 1/e, 2001.

III B.Tech. – II Semester

(16BT60112) BUILDING MAINTENANCE AND REPAIR

(Open Elective)

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Durability of buildings, Failure and repair of buildings, MaterialTechniques for repair, Maintenance of buildings, Conservation and recycling.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Acquire basic knowledge on durability and serviceability, failures, repair and rehabilitation of buildings.
CO2. Analyze failures, repair and rehabilitation techniques.
CO3. Solve complex building maintenance problems through proper investigations and interpretation.
CO4. Use modern tools and techniques for various repairs and rehabilitation of structures.
CO5. Provide solutions for building maintenance and repair problems considering health and safety.
CO6. Consider environmental sustainability in building maintenance and repair.
CO7. Maintain ethical standards for quality in repairs and rehabilitation of structures.
CO8. Evaluate specifications and perform cost analysis of building components while repair and rehabilitation.

DETAILED SYLLABUS:

UNIT – I: DURABILITY AND SERVICEABILITY OF BUILDINGS (10 Periods)

Life expectancy of different types of buildings; Effect of environmental elements such as heat, dampness, frost and precipitation on buildings; Effect of chemical agents on building materials, Effect of pollution on buildings, Effect of fire on building; Damage by biological agents like plants, trees, algae, fungus, moss, insects, etc.; Preventive measures on various aspects, Inspection, Assessment procedure for evaluating for damaged structures, Causes of deterioration, Testing techniques.

UNIT – II*:* FAILURE AND REPAIR OF BUILDINGS (10 Periods)

Building failure – Types, Methodology for investigation; Diagnostic testing methods and equipment, Repair of cracks in concrete and masonry, Materials for Repair, Methods of repair, Repair and strengthening of concrete buildings, Foundation repair and strengthening, Underpinning, Leakage of roofs and repair methods.

UNIT – III: TECHNIQUES FOR REPAIR (08 Periods)

Rust eliminators and polymers coating for rebars during repair, Foamed concrete, Mortar and dry pack, Vacuum concrete, Gunite and shotcrete, Epoxy injection, Mortar repairs for cracks, Shoring and underpinning.

UNIT – IV: MAINTENANCE OF BUILDINGS (09 Periods)

Reliability principles and its applications in selection of systems for building, Routine maintenance of building, Maintenance cost, Specifications for maintenance works, Dampness - Damp proof courses, Construction details for prevention of dampness; Termite proofing, Fire protection, Corrosion protection.

UNIT – V: CONSERVATION AND RECYCLING (08 Periods)

Performance of construction materials and components in service, Rehabilitation of constructed facilities, Conservation movement, Materials and methods for conservation work, Recycling of old buildings and its advantages, Examples. **Total Periods: *45***

TEXT BOOKS:

1. Dennison Campbell, Allen and Harold Roper, *Concrete Structures – Materials, Maintenance and Repair*, Longman Scientific and Technical, UK, 1991.
2. Allen, R. T. L., Edwards, S. C. and J. D. N. Shaw, *The Repair of Concrete Structures*, Blackie Academic & Professional, UK, 1993.

REFERENCE BOOKS:

1. Peter H. Emmons, *Concrete Repair and Maintenance*, John Wiley and Sons Publications, 2002.
2. Building Construction under Seismic Conditions in the Balkan Region, UNDP/UNIDO Project Rer/79/015, Volume 5, *Repair and Strengthening of Reinforced concrete, Stone and Brick Masonry Buildings*, United Nations Industrial Development Organisation, Vienna.
3. Shetty, M. S., *Concrete Technology*, S. Chand and Company.
4. Smith, P. and Julian, W., *Building Services*, Applied Science Publications, London, 1976.
5. SP: 25, BIS; *Causes and Prevention of Cracks in Buildings*.

6. Champion, S., *Failure and Repair of Concrete Structures*, John Wiley and Sons Publications, 1961.
7. Perkins, P. H., Repair, Protection and Water Proofing of Concrete Structures, E& FN Spon, UK, 3rd Edition, 1997.

III B.Tech. – II Semester
(16BT60113) CONTRACT LAWS AND REGULATIONS

(Open Elective)

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Construction contracts; Tenders; Arbitration; Legal requirements; Labour regulations.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate basic Knowledge on construction contracts, tenders, arbitration, legal requirements and labour regulations.
CO2. Analyze contracts and tenders.
CO3. Address the legal issues in contracts and tenders.
CO4. Follow laws and regulations in the preparation of contracts and tenders.
CO5. Prepare contract and tender documents as per the standards.
CO6. Consider project schedule, cost, quality and risk in the preparation of contracts and tenders.

DETAILED SYLLABUS:

UNIT – I: CONSTRUCTION CONTRACTS (09 Periods)

Indian contracts act, Elements of contracts, Types of contracts, Features, Suitability, Design of contract documents, International contract document and laws, Standard contract document, Law of torts.

UNIT – II: TENDERS (09 Periods)

Prequalification, Bidding, Accepting; Evaluation of tender from technical, contractual and financial points of view; Two cover system, Preparation of the documentation, Contract formation and interpretation, Potential contractual problems, Price variation clause, Comparison of actions and laws, Subject matter, Violations.

UNIT–III: ARBITRATION (09 Periods)

Arbitration, Comparison of actions and laws, Agreements, Appointment of arbitrators, Conditions of arbitration, Powers and duties of arbitrator, Rules of evidence, Enforcement of award, Arbitration disputes, Dispute review board.

UNIT – IV: LEGAL REQUIREMENTS (09 Periods)

Legal requirements for planning, Property law, Agency law, Tax laws – Income tax, Sales tax, Excise and custom duties, Local government approval, Statutory regulations, Insurance and bonding, Laws governing purchase and sale, Use of urban and rural land, Land revenue codes, EMD, Security deposits, Liquidated damages.

UNIT – V: LABOUR REGULATIONS (09 Periods)

Social security, Welfare legislation; Laws relating to wages, bonus and industrial disputes; Labour administration, Insurance and safety regulations, Workmen’s compensation act, Maternity benefit act, Child labour act, Other labour laws.

Total Periods: 45

TEXT BOOKS:

1. Subba Rao, G. C. V., *Law of Contracts I & II*, S. Gogia & Co., 11th Edition, 2011.
2. Jimmie Hinze, *Construction Contracts,* McGraw-Hill, 3nd Edition, 2011.

REFERENCE BOOKS:

1. Kishore Gajaria, *GT Gajaria’s Law Relating to Building and Engineering Contracts in India*, Lexis Nexis Butterworths India, 4th Edition, 2000.
2. Patil, B. S., *Civil Engineering Contracts and Estimates*, University Press (India) Private Ltd., 4th Edition, 2015.
3. Joseph T. Bockrath, *Contracts and the Legal Environment for Engineers and Architects*, McGraw-Hill Education, 7th Edition, 2010.
4. Akhileshwar Pathak, *Contract Law*, Oxford University Press, 2011.

III B.Tech. - II Semester
(16BT60114) DISASTER MITIGATION AND MANAGEMENT

(Open Elective)

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:

COURSE DESCRIPTION: Disasters; Earthquakes; Floods; Cyclones; Droughts; Landslides; Disaster management.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate knowledge on disasters, their vulnerability and mitigation measures.
CO2. Analyze disasters and their vulnerability.
CO3. Design strategies for effective disaster mitigation.
CO4. Address pre and post disaster issues for better preparedness and mitigation measures, through proper analysis and interpretation.
CO5. Use appropriate methods in disaster mitigation and management.
CO6. Use historical data of disasters to inform the people over preparedness and mitigation measures.
CO7. Solve disaster related issues considering environment.
CO8. Consider economical issues in disaster management.

DETAILED SYLLABUS:

UNIT - I: DISASTERS **(09 Periods)**

Types of disasters - Natural disasters; Impact of disasters on environment, infrastructure and development; Concepts of hazards and vulnerability analysis, Hazard Assessment, Guidelines for hazard assessment and vulnerability analysis, Basic principles and elements of disaster mitigation.

UNIT - II: EARTHQUAKES **(09 Periods)**

Introduction to earthquake, Intensity scale (MSK–64), Seismic activity in India, Seismic zones of India, Earthquakes in A.P., Action plan for earthquake disaster preparedness, Elements at risk, Recovery and rehabilitation after earthquake, Earthquake resistant design and construction of buildings; Tsunami – Onset, Types and causes, Warning, Elements at risk, Typical effects, Specific preparedness and mitigation strategies.

UNIT - III: FLOODS, CYCLONES AND DROUGHTS **(11 Periods)**

Floods and Cyclones: Onset, Types, Warnings; Elements at risk, Typical effects, Indian floods and cyclones, Hazard zones, Potential for reducing hazards, Mitigation strategies and community based mitigation.

Droughts: Onset, Types and warning; Causes, Impact, Early warning and response mechanisms, Mitigation strategies, Droughts in India.

UNIT - IV: LANDSLIDES **(08 Periods)**

Onset, Types and warning; Causes, Elements at risk, Indian landslides, Hazards zones, Typical effects, Mitigation strategies and community based mitigation.

UNIT - V: DISASTER MANAGEMENT **(08 Periods)**

Disaster management organization and methodology, Disaster management cycle, Disaster management in India – Typical cases; Cost–benefit analysis with respect to various disaster management programs implemented by NGOs and Government of India. **Total Periods: 45**

TEXT BOOKS:

1. V. K. Sharma, *Disaster Management, Medtech Publishing, 2nd Edition, 2013*.
2. Anand S. Arya, Anup Karanth, and Ankush Agarwal, *Hazards, Disasters and Your Community: A Primer for Parliamentarians*, GOI–UNDP Disaster Risk Management Programme, Government of India, National Disaster Management Division, Ministry of Home Affairs, New Delhi, Version 1.0, 2005.

REFERENCE BOOKS:

1. Donald Hyndman and David Hyndman, *Natural Hazards and Disasters*, Cengage Learning, 3rd Edition, 2011.
2. *Disaster Management in India,* A Status Report, Ministry of Home Affairs, Govt. of India, May 2011.
3. Rajendra Kumar Bhandari, *Disaster Education and Management: A Joyride for Students, Teachers, and Disaster Managers*, Springer India, 2014.

4. R. B. Singh, *Natural Hazards and Disaster Management*, Rawat Publications, 2009.

III B.Tech - II Semester
(16BT60115) ENVIRONMENTAL POLLUTION AND CONTROL
(Open Elective)
(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Fundamentals of air pollution; Dispersion of pollutants; Effects and control of air pollution; Water pollution; Soil pollution and control; Municipal solid waste management.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge on air, water, soil pollution and their control and solid waste management.
CO2. Analyze causes and effects of air, water and soil pollution and their remedial measures.
CO3. Recommend suitable solutions to complex environmental pollution problems.
CO4. Use appropriate remedial technique to solve environmental pollution problems.
CO5. Understand the effects of environmental pollutionon human health and vegetation.
CO6. Encourage sustainable development through implementation of pollution control measures.
CO7. Maintain IS Codes for environmental quality control.

DETAILED SYLLABUS:

UNIT – I: AIR AND NOISE POLLUTION (08 Periods)
Air Pollution: Scope, Significance, Classification, Sources – Line, Area, Stationary, Mobile; Effects of air pollutants on man, material and vegetation; Global effects of air pollution; Air pollution meteorology - Lapse rate, Inversion, Plume pattern; Dispersion of air pollutants - Dispersion models and applications; Ambient air quality standards. **Noise Pollution:** Sound pressure, Power and intensity, Impacts of noise, permissible limits of noise pollution, measurement of noise.

UNIT – II: AIR AND NOISE POLLUTION CONTROL (10 Periods)
Self cleansing properties of the environment, Dilution method, Control at source, Process changes and equipment modifications, Control of particulates – Types of equipment, Design and operation - Settling chambers, Centrifugal separators, Bag house filters, Wet scrubbers, Electrostatic precipitators; Control of gaseous pollutants – Adsorption, Absorption, Condensation, Combustion; Control of air pollution from automobiles, Control of noise pollution.

UNIT – III: WATER POLLUTION AND CONTROL (10 Periods)
Water pollution – Sources, Causes, Effects; Surface and groundwater quality – Physical, Chemical, Biological; Drinking water quality standards, Water purification – Processes, Engineered systems – Aeration, Solids separation, Settling operations, Coagulation, Softening, Filtration, Disinfection; Wastewater – Sources, Causes, Effects, Treatment and disposal – Primary, Secondary, Tertiary; Case studies.

UNIT – IV: SOIL POLLUTION AND CONTROL (08 Periods)
Soil pollutants, Sources of soil pollution, Causes, Effects and control of soil pollution, Diseases caused by soil pollution, Methods to minimize soil pollution, Effective measures to control soil pollution, Case studies.

UNIT – V: MUNICIPAL SOLID WASTE MANAGEMENT (09 Periods)
Types of solid waste, Composition of solid waste, Collection and transportation of solid waste, Methods of disposal – Open dumping, Sanitary landfill, Composting, Incineration, Utilization - Recovery and recycling, Energy Recovery.

Total Periods: 45

TEXT BOOKS:

1. Peavy, H. S, Rowe, D. R., and Tchobanoglous, G., *Environmental Engineering*, McGraw-Hill Inc., 1985.
2. C. S. Rao, *Environmental Pollution Control Engineering*, New Age International Pvt. Ltd., 2nd Edition, 2007.
3. Ibrahim A. Mirsa, *Soil Pollution: Origin, Monitoring & Remediation*, Springer, UK, 2nd Edition, 2008.

REFERENCE BOOKS:

1. M. N. Rao and H. V. N. Rao, *Air Pollution,* Tata McGraw–Hill Education Pvt. Ltd., 19th Edition, 2010.
2. Daniel Vallero, *Fundamentals of Air Pollution,* Academic Press (Elsevier), 5th Edition, 2014.
3. S. M. Khopkar, *Environmental Pollution Monitoring and Control,* New Age International Pvt. Ltd., 2nd Edition, 2007.
4. V. M. Domkundwar, Environmental Engineering, Dhanpat Rai & Co. Pvt. Ltd., New Delhi, 2014.

III B.Tech - II Semester

(16BT60116) PLANNING FOR SUSTAINABLE DEVELOPMENT

(Open Elective)

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:-

COURSE DESCRIPTION: Sustainable development; Environmental impact; Sustainable Policies; Governance; Theories and strategies; Media and education for sustainability.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

- CO1. Demonstrate the knowledge on sustainable development, environmental impact, sustainable policies, governance, systems and strategies, media and education for sustainability.
- CO2. Analyze theories, environmental impact, policies, systems and strategies for sustainable development.
- CO3. Develop suitable methods and systems for sustainable development.
- CO4. Use appropriate techniques in solving issues related to sustainable development.
- CO5. Provide solutions to problems associated with sustainable development considering society.
- CO6. Consider environment while planning sustainable development.
- CO7. Communicate effectively on sustainable development issues through media and education.
- CO8. Consider economical issues while planning for sustainable development.

DETAILED SYLLABUS:

UNIT – I: SUSTAINABLE DEVELOPMENT (09 Periods)

Definition and concepts of sustainable development, Capitalization of sustainability - National and global context; Millennium development goals, Emergence and evolution of sustainability and sustainable development, Theories of sustainability, Case studies.

UNIT – II: ENVIRONMENTAL IMPACT (09 Periods)

Climate change – Science, Knowledge and sustainability; Unforeseen environmental impacts on development, Challenges of sustainable development, Centrality of resources in sustainable development, Case studies.

UNIT – III: SUSTAINABLE POLICIES AND GOVERNANCE (09 Periods)

Governance - Democracy and Eco–welfare; Global civil society and world civil politics, Civic environmentalism, Policy responses to sustainable development, Economics of sustainability, Social responsibility in sustainability, National action, ISO 14001: Environmental management system.

UNIT – IV: SUSTAINABLE SYSTEMS AND STRATAGIES (09 Periods)

Need for system innovation, Transition and co–evolution, Theories and methods for sustainable development, Strategies for eco–innovation, Ecological foot print analysis, Socio ecological indicators – Eco labels; Policy programmes for system innovation, Case studies.

UNIT – V: MEDIA AND EDUCATION FOR SUSTAINABILITY (09 Periods)

Role of emerging media, Remarkable design and communication art, Activism and the public interest, Education for sustainability, Participation in decision making, Critical thinking and reflection, Case studies.

Total Periods: 45

TEXT BOOKS:

1. John Blewitt, *Understanding Sustainable Development*, Earth Scan Publications Ltd., 2nd Edition, 2008.
2. Jennifer A. Elliot, *An Introduction to Sustainable Development*, Earth Scan Publications Ltd., 4th Edition, 2006.

REFERENCE BOOKS::

1. Peter Rogers, Kazi F Jalal and John A Boyd, *An Introduction to Sustainable Development*, Earth Scan Publications Ltd., 2006.
2. Simon Dresner, *The Principles of Sustainability*, Earth Scan Publications Ltd., 2nd Edition, 2008.
3. Peter Bartelmus, *Environment Growth and Development: The Concepts and Strategies of Sustainability*, Routledge, 3rd Edition, 2003.

4. Gabriel Moser, Enric Pol, Yvonne Bernard, Mirilia Bonnes, Jose Antonio Corraliza and Maria Vittoria Giuliani, *People Places and Sustainability*, Hogrefe & Huber Publishers, 2nd Edition, 2003.

III B.Tech. – II Semester

(16BT60117) PROFESSIONAL ETHICS

(Open Elective)

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Engineering ethics; Professional ideals and virtues; Engineering as social experimentation; Responsibilities and rights; Global issues.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate the principles of ethics, importance of professional values and social responsibility.

CO2. Analyze the problems in the implementation of moral autonomy and use ethical theories in resolving moral dilemmas.

CO3. Develop suitable strategies to resolve problems arise in practicing professional ethics.

CO4. Provide solutions to complex problems associated with professional ethics by proper analysis and interpretation.

CO5. Use appropriate theories in resolving issues pertain to professional ethics.

CO6. Understand the impact of professional ethics on society and address the limitations of codes of ethics.

CO7. Practice engineering with professionalism, accountability and ethics.

CO8. Function as a member, consultant, manager, advisor and leader in multi-disciplinary teams.

CO9. Write reports without bias and give instructions to follow ethics.

DETAILED SYLLABUS:

UNIT - I: ENGINEERING ETHICS (09 Periods)

Scope and aim of engineering ethics, Senses of engineering ethics, Variety of moral issues, Types of inquiry, Moral dilemmas, Moral autonomy-Kohlberg's theory, Gilligan's theory, Consensus and controversy.

UNIT - II: PROFESSIONAL IDEALS AND VIRTUES (08 Periods)

Theories about virtues, Professions, Professionalism, Characteristics, Expectations, Professional responsibility, Integrity, Self-respect, Sense of responsibility, Self-interest, Customs and religion, Self-interest and ethical egoism, Customs and ethical relativism, Religion and divine command ethics, Use of ethical theories, Resolving moral dilemmas and moral leadership.

UNIT - III: ENGINEERING AS SOCIAL EXPERIMENTATION (10 Periods)

Engineering as experimentation, Similarities to standard experiments, Learning from the past and knowledge gained, Engineers as responsible experimenters, Conscientiousness, Moral autonomy and accountability, The challenger case, Codes of ethics and limitations, Industrial standards, Problems with the law of engineering.

UNIT - IV: RESPONSIBILITIES AND RIGHTS (09 Periods)

Collegiality and loyalty, Respect for authority, Collective bargaining, Confidentiality, Conflict of interests, Occupational crime, Rights of engineers, Professional rights, Whistle-blowing, The BART case, Employee rights and discrimination.

UNIT - V: GLOBAL ISSUES (09 Periods)

Multinational corporations, Professional ethics, Environmental ethics, Computer ethics, Engineers as consultants, Witnesses, Advisors and Leaders, Engineers as Managers, Managerial ethics applied to Engineering Profession, moral leadership.

Total Periods: 45

TEXT BOOKS:

1. Mike W. Martin and Roland Schinzinger, *Ethics in Engineering*, Tata McGraw-Hill, 3rd Edition, 2007.
2. Govindarajan, M., Nata Govindarajan, M., Natarajan, S. and Senthilkumar, V. S., *Engineering Ethics*, Prentice Hall of India, 2004.

REFERENCE BOOKS:

1. S. Kannan and K. Srilakshmi, *Human Values and Professional Ethics*, Taxmann Allied Services Pvt Ltd., 2009.
2. Edmund G. Seebauer and Robert L. Barry, *Fundamental of Ethics for Scientists and Engineers*, Oxford University Press, 2001.
3. Charles F. Fledderman, *Engineering Ethics*, Pearson Education, 2nd Edition, 2004.

4. R. Subramanaian, *Professional Ethics*, Oxford Higher Education, 2013.

III B.Tech. - II Semester

(16BT60118) RURAL TECHNOLOGY

(Open Elective)

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: -

COURSE DESCRIPTION: Rural technology; Non conventional energy; Technologies for rural development; Community development; IT in rural development.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate the knowledge on technologies for rural development.

CO2. Analyze various technologies available which are appropriate for rural development.

CO3. Carryout feasibility study on the public and private partnership for rural development.

CO4. Develop and use latest technologies for rural development.

CO5. Address health and safety issues while choosing technologies for rural development.

CO6. Educate the rural populace on the positive impacts of biofertilisers and usage of agromachinery in agriculture.

DETAILED SYLLABUS

UNIT – I: RURAL TECHNOLOGY (09 Periods)

India - Technology and rural development, Pre and post independence period, Rural India Life, Indian farmer, Role of science and technology in rural development, Rural technology and poverty eradication, Rural business hubs, Technology in improving rural infrastructure, Various organizations related to innovation, Issues of technology transfer - CAPART, NABARD, CSIR, NIF.

UNIT – II: NON CONVENTIONAL ENERGY (09 Periods)

Definition of energy, Types of alternative sources of energy, Sources of non conventional energy – Solar energy: Solar cooker, Solar heater; Biogas, Recycling and management, Wastes conservation, Assessment and production of biomass products and their utilization.

UNIT–III: TECHNOLOGIES FOR RURAL DEVELOPMENT (09 Periods)

Food and agro based technologies, Tissue culture, Nursery, Building and construction technologies, Cultivation and processing of economic plants, Cottage and social industries.

UNIT – IV: COMMUNITY DEVELOPMENT (09 Periods)

Water conservation, Rain water Harvesting, Drinking water, Environment and Sanitation, Bio fertilizers, Medical and aromatic plants, Employment generating technologies – Apiculture, Pisciculture, Aquaculture.

UNIT – V: IT IN RURAL DEVELOPMENT (09 Periods)

Role of information technology (IT) in rural areas, Impact of IT in rural development, Need and necessity of technology, Corporate social responsibilities, Private sector participation (Activities in different spheres: Employment, Education, Health, Agriculture and service sectors) and Saansad Adarsh Gram Yojana (SAGY), Village adoption schemes.

TEXT BOOKS:

1. M. S. Virdi, *Sustainable Rural Technologies*, Daya Publishing House, 2009.
2. S. V. Prabhath and P. Ch. Sita Devi, *Technology and Rural India*, Serials Publications, 2012.

REFERENCE BOOKS:

1. R. Chakravarthy and P. R. S. Murthy, *Information Technology and Rural Development,* Pacific Book International, 2012.
2. Shivakanth Singh, *Rural Development Policies and Programmes,* Northern Book Centre, 2002.
3. L. M. Prasad, *Principles and Practice of Management*, S. Chand & Sons, 8th Edition, 2014.

4. Venkata Reddy, K., *Agriculture and Rural Development - Gandhian Perspective*, Himalaya Publishing House, 2001.

III B.Tech - II Semester

(16BT60308) GLOBAL STRATEGY AND TECHNOLOGY

(Open Elective)

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: -

COURSE DESCRIPTION: Introduction to strategic management; Strategic management process; Principles of good strategy; Globalization strategies; Research and Development strategies; Technology Management and Transfer; Elements of Transfer Process; Corporate Governance in the Indian scenario.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate the knowledge on Strategic management, Research & Development strategies, Technology management and transfer, Globalization and Corporate governance.

CO2. Indentify and analyze crucial problems in strategic management to improve performance of the organizations.

CO3. Develop the products and production process by using research and development strategies.

CO4. Conduct investigations on the impact of globalization in current scenario in the context of corporate governance.

CO5. Appraise the resources and capabilities of the firm in terms of their ability to confer sustainable development.

CO6. Apply ethics in strategic decision making.

DETAILED SYLLABUS

UNIT - I: STRATEGIC MANAGEMENT **(09 Periods)**

Introduction, Classes of decisions, Levels of strategy, Core competence, Strategic intent and stretch, Approaches to strategy making, Roles of different strategists, Strategic management- Process, Benefits, Limitations; Ethics in strategic decision making, Principles of good strategy, Strategic Management in India.

UNIT - II: RESEARCH & DEVELOPMENT STRATEGIES **(09Periods)**

Concept, Evolution of R&D Management, R&D as a business, R&D as competitive advantage, Elements of R & D strategies, Integration of R & D, Selection and implementation of R & D strategies, R & D trends.

UNIT - III: TECHNOLOGY MANAGEMENT AND TRANSFER **(09 Periods)**

Technology Management: Introduction, Technology - Definition, Components, Classification Features; Technology Management- Concept, Nature; Drivers of Management of Technology-Significance, Scope, Responding to technology challenges.

Technology Transfer: Introduction, Definition, Classification, Significance, Elements of process, Types of Technology Transfer, Package, Modes of Transfer, Routes, Channels and Effectiveness of Technology Transfer.

UNIT - IV: GLOBALISATION **(09 Periods)**

Definition, Stages, Essential conditions for globalization, Globalization strategies, Competitive advantage of Nations, Factors affecting Globalization, Globalization of Indian business.

UNIT – V: CORPORATE GOVERNANCE: THE INDIAN SCENARIO **(09 Periods)**

Emergence of corporate governance in India- Landmarks, Models, Codes and status in India, Role and Responsibilities of Regulators, The Board of Directors; Corporate Governance- Specific issues in India, Family owned Business, Corporate Governance and the Indian ethos.

Total Periods: 45

TEXT BOOKS:

1. Francis Cherunilam, *Strategic Management*, Himalaya Publishing House, 3rd Edition, 2002.
2. C.S.G.Krishnamacharyulu and Lalitha Ramakrishnan, *Management of Technology*, Himalaya Publishing House, Second Edition, 2012.

REFERENCE BOOKS:

1. White and Bruton, *The Management of Technology and Innovation: A Strategic Approach*, Cengage Learning, 1st Edition, 2007.

2. S.K.Mandak, *Ethics in Business and Corporate Governance*, TMH, 2nd Edition, 2012.

III B.Tech - II Semester

(16BT60309) INTELLECTUAL PROPERTY RIGHTS AND MANAGEMENT

(Open Elective)

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION:

Protection of ideas; innovation and artistic endeavors; Acts and procedure related to patents, trademarks, copy right, design registration, trade secrets and cyber laws; Infringement; Commercialization of intellectual property rights; Case studies in each.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate knowledge on intellectual property rights, patents, trademarks, copyrights, trade secrets and commercialization of intellectual property.

CO2. Analyse the commercial significance of discoveries and developments and to assist in bringing these into public use.

CO3. Investigate and ensure smooth transition from concept to final product by following National & International Laws of Intellectual Property.

CO4. Utilize the various policies and procedures related to patents, trademarks and copyrights relating to IPR.

CO5. Safeguard, review and manage the intellectual property so that it may receive adequate and appropriate legal protection against unauthorized use.

CO6. Follow ethical standards in capacity building and work as a platform for development, promotion, protection, compliance, and enforcement of intellectual property and knowledge.

CO7. Prepare documents and fill applications needed for filing a patent, design, copyright and trade mark.

DETAILED SYLLABUS:

UNIT – I: OVERVIEW OF INTELLECTUAL PROPERTY RIGHTS (09 Periods)

Introduction, Intellectual Property vs Conventional Property, and importance of intellectual property rights (IPRs), types of intellectual property, International Treaties for protection of IPR-Paris Convention, World Intellectual Property Organization (WIPO), World Trade Organization (WTO), Trade Related Aspects of Intellectual Property Rights (TRIP) Agreement, General Agreement on Tariffs and Trade(GATT).

UNIT – II: TRADEMARKS (09 Periods)

Introduction, Functions and kinds of trademarks, Trade Mark Registration Process, Post registration procedures, Trade Mark maintenance, Transfer of rights, Inter Mark claims, International Trade Mark Law.

UNIT – III: PATENTS (09 Periods)

Introduction, Rights under Patent Law, Patent Application Process, Terms and Maintenance of Patents Requirements, Patent Ownership and Transfer, Licensing of Patent Rights, Sole and Joint Inventors, Disputes over Inventorship, Patent Infringement, International Patent Law, Patent Cooperation Treaty (PCT), Patent Law Treaty (PLT), Substantive Patent Law Treaty (SPLT).

UNIT - IV: COPY RIGHTS, TRADE SECRETS, CYBER LAWS (09 Periods)

Copy Rights: Introduction, nature and scope, subject matter, Rights afforded by copyright law, Copyrights ownership, transfers and duration, Copyright registration process.

Trade Secrets: Introduction, Determination of Trade Secret Status, Emploer-Employee Relationships, Protection of submissions.

Cyber laws: E-commerce and cyber laws, cyber crime and legislation- need, objective and scope; IT Act 2000, Information Technology and Information Security.

UNIT - V: INDUSTRIAL DESIGN AND COMMERCIALIZATION OF INTELLECTUAL PROPERTY RIGHTS (09 Periods)

Industrial Design: Intoduction, Indian Law related to registration of Industrial Designs, Essential requirements for registration of a design in India, International Agreements – Hague System; Conflicts related to registration of design.

Commercialization of Intellectual Property Rights: Competition and Confidentiality Issues, Antitrust Laws, Assignment of Intellectual Property Rights, Technology, Transfer Agreements, Intellectual Property Issues in the Sale of Business, Legal Auditing of Intellectual Property, Due Diligence of Intellectual Property Rights in a Corporate Transaction. **Total Periods: 45**

TEXT BOOKS:

1. Deborah E. Bouchoux, *Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets*, Cengage Learning, 4th Edition, 2016.
2. Kompal Bansal and Parikshit Bansal, *Fundamentals of Intellectual Property for Engineers*, BS Publications, 1st Edition, 2013.

REFERENCE BOOKS:

1. Prabuddha Ganguli, *Intellectual Property Rights-Unleashing the Knowledge Economy*, McGraw-Hill Education, 6th Reprint, 2015.
2. P. Narayanan, *Intellectual Property Law*, Eastern Book Company, 3rd Edition, 2013.

3. R. Radha Krishnan, S. Balasubramanian, *Intellectual Property Rights: Text and Cases*, Excel Books, 1st Edition, 2008.

III B.Tech – II Semester

(16BT60310) MANAGING INNOVATION AND ENTREPRENEURSHIP

(Open Elective)

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Evolution of entrepreneurship from economic theory Managerial and entrepreneurial competencies; Concepts of Shifting Composition of the Economy Purposeful Innovation & Sources of Innovative Opportunity; The Innovation Process; Innovative Strategies; Entrepreneurial Motivation; Entrepreneurs versus inventors; Ethics and International Entrepreneurship; Strategic Issues in International Entrepreneurship; Problem solving Innovation and Diversification.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1: Demonstrate the principles of business innovation and entrepreneurship for establishing industrial ventures.

CO2: Analyze business plans for potential investors and stakeholders and effectively answer probabilistic questions on the substance of plan.

CO3: Develop a comprehensive and well planned business structure for a new venture.

CO4: Conduct investigation on complex problems, towards the development of Project.

CO5: Apply modern statistical and mathematical tools to design projects and subsequent work procedures.

CO6: Apply ethics in constructive innovation framework.

CO7: Exhibit professionalism by employing modern project management and financial tools.

DETAILED SYLLABUS:

UNIT - I: CREATIVITY AND INNOVATION (07 Periods)

Introduction, Levels of innovation, Purposeful innovation and the sources of innovative opportunity, The innovation process, Innovative strategies, Strategies that aim at introducing and innovation, Dynamics of ideation and creativity – Inbound, Outbound; Context and process of new product development, Theories of outsourcing.

UNIT - II: PARADIGMS OF INNOVATION (11 Periods)

Systems approach to innovation, Innovation in the context of developed economies and Emerging economies, Examining reverse innovation and its application, Performance gap, Infrastructure gap, Sustainability gap, Regulatory gap, Preference gap, organizational factors effecting innovation at firm level.

UNIT - III: SOURCES OF FINANCE AND VENTURE CAPITAL (07 Periods)

Importance of finance, Comparison of venture capital with conventional development capital, Strategies of venture funding, Investment phases, Investment process, Advantages and disadvantages of venture capital, Venture capital developments in India.

UNIT - IV: INTELLECTUAL PROPERTY INNOVATION AND ENTREPRENEURSHIP (11 Periods)

Introduction to Entrepreneurship, Evolution of entrepreneurship from economic theory, Managerial and entrepreneurial competencies, Entrepreneurial growth and development, Concepts, Ethics and Nature of International Entrepreneurship, Intellectual property – forms of IP, Patents, Trademarks, Design registration, Copy rights, Geographical indications, Patent process in India.

UNIT - V: OPEN INNOVATION FRAMEWORK & PROBLEM SOLVING (09 Periods)

Concept of open innovation approach, Difference between open innovations and Cloud innovation approaches, Limitations and Opportunities of open innovation framework, Global context of strategic alliance, Role of strategic alliance, Problem Identification and Problem Solving, Innovation and Diversification.

Total Periods: 45

TEXT BOOKS:

1. Vinnie Jauhari, Sudhanshu Bhushan, *Innovation Management*, Oxford University Press, 1st Edition, 2014.
2. Drucker, P. F., *Innovation and Entrepreneurship*, Taylor & Francis, 2nd Edition, 2007.

REFERENCE BOOKS:

1. Robert D Hisrich, Claudine Kearney, *Managing Innovation and Entrepreneurship,* Sage Publications, 1st Edition, 2014.

2. V.K.Narayanan, *Managing Technology and Innovation for Competitive Advantage*, Pearson India, 1st Edition, 2002.

III B. Tech – II Semester
(16BT60311) MATERIALS SCIENCE

(Open Elective)

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Structure and Bonding in metals; Steels, Cast Irons and Non Ferrous alloys; Material Selection for conductors, Insulators and semi conductors; Strengthening mechanisms of metals; Plastics and Ceramics as Insulators; AC and DC properties of Insulators; Semiconductors and Magnetic materials; Composite materials in Electrical and Electronics engineering; Material Selection and manufacturing of Optical fibers.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate the knowledge on concepts of fundamental science and Engineering principles relevant to materials.

CO2. Analyze the structures of various types of Ferrous, Non ferrous alloys influencing various engineering applications.

CO3. Conduct investigations to select suitable materials with desired properties for engineering applications.

CO4. Use phase diagrams to interpret the data regarding microstructure of materials.

CO5. Consider health and safety issues while providing materials to real time applications.

CO6. Use composite materials that reduce material waste in design and manufacturing for sustainability.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO MATERIALS SCIENCE (07 Periods)

Structure of metals: Bonds in Solids, Crystallization of metals, Grain and grain boundaries, Effect of grain boundaries on the properties of metals / alloys, Determination of grain size measurement.

Constitution of alloys: Necessity of alloying, Types of solid solutions, Hume rothery rules, Intermediate alloy phases.

UNIT - II: CAST IRONS, STEELS & NON-FERROUS METALS (12 Periods)

Structure and properties of Grey cast iron, Spheroidal cast iron, White Cast iron, Malleable Cast iron, Alloy cast irons, Classification of steels, structure and properties of plain carbon steels, Structure and properties of Copper and its alloys, Aluminum and its alloys.

UNIT - III: ELECTRIC CONDUCTORS & INSULATORS (12 Periods)

Type of materials selected for conductors, Insulators and semi conductors, Introduction to ceramics - Bonding and microstructure, DC properties of ceramic materials, AC properties of ceramic materials, mechanical properties, Ceramics as Conductors, Insulators and capacitors; Introduction to Plastics - DC properties, AC properties, Mechanical properties.

UNIT - IV: SEMICONDUCTORS AND MAGNETIC MATERIALS (09 Periods)

Fabrication of Semiconductors, Producing a silicon wafer-Lithography and Deposition packaging of semiconductors materials; Types of magnetic materials, Measuring magnetic properties, Application of soft magnetic materials in Electromagnets and relays, AC transformers, Generators and motors.

UNIT - V: ADVANCED MATERIALS AND APPLICATIONS (05 Periods)

Composites - Fiber reinforced metal matrix, Ceramic matrix, Polymer matrix, Properties and applications of composites; Ceramics - Alumina, Zirconia, Silicon Carbide, SiAlONs, Reaction Bonded Silicon Nitride (RBSN); Glasses- properties and applications, manufacturing of optical fibers. **Total Periods: 45**

TEXT BOOKS:

1. Kodgire V D, *Material Science and Metallurgy*, Everest Publishing House, Pune, 31st Edition, 2011.
2. Ian. P.Jones, *Material Science for Electrical and Electronic Engineers*, Oxford University Press, 1st Edition, 2000

REFERENCE BOOKS:

1. V. Raghavan, *Physical Metallurgy: Principles and Practices*, PHI, New Delhi, 2nd Edition, 2006.

2. William. D. Callister, *Materials Science & Engineering-An Introduction*, John Wiley and Sons, New Delhi, 6th Edition, 2002.

III B.Tech - II Semester

(16BT70412) GREEN TECHNOLOGIES

(Open Elective)

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Principles of green engineering; Green communications; Green energy; Green computing; Green construction; Green manufacturing.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Deploy conceptual knowledge in green technologies pertaining to engineering practice.
CO2. Analyze various green technologies for engineering practice.
CO3. Provide green solutions to engineering problems.
CO4. Apply various green techniques in the engineering practice.
CO5. Consider health and safety issues while providing green solutions to the society.
CO6. Understand issues related to environment sustainability.
CO7. Apply ethical standards for environmental sustainability in the engineering practice.

DETAILED SYLLABUS:

UNIT - I: PRINCIPLES OF GREEN ENGINEERING AND GREEN COMMUNICATIONS (11 Periods)

Principles of Green Engineering: Introduction, Definition of green engineering, Principles of green engineering.

Green Communications: Introduction, Origin of Green Communications, Energy Efficiency in Telecommunication systems, Telecommunication system model and energy Efficiency, Energy saving concepts, Quantifying energy efficiency in ICT, Energy efficiency metrics of green wireless networks, Embodied energy of communication devices- Introduction, The extended energy model, Embodied/Operating Energy of a BS in Cellular network- A Case study; Energy efficient standards for wireline communications.

UNIT - II: GREEN ENERGY (09 Periods)

Introduction, adverse impacts of carbon emission, control of carbon emission– methods, greenhouse gas reduction – methods, Energy sources and their availability, Green energy for sustainable development. Green energy sources – Solar energy, Wind energy, Fuel cells, Biofuels, Wave and Geothermal energy (Principle of generation only).

UNIT - III: GREEN IT (09 Periods)

The importance of Green Information technologies, Strategizing Green Initiatives, Implementation of Green IT, Information Assurance, Communication and Social Media, Regulating Green IT- Laws, Standards and Protocols; RoHS, REACh, WEEE, Legislating for GHG Emissions and Energy Use of IT Equipment, Non-regulatory Government Initiatives, Industry Associations and Standard Bodies, Green Building Standards, Green Data Centres, Social Movements and Greenpeace, Conclusions.

UNIT - IV: GREEN CONSTRUCTION (09 Periods)

Green Building: Definition, Typical features, Benefits, Requisites for green building construction, Sustainability, Concept of REDUCE, REUSE, RECYCLE, RETHINK, REPLENISH AND REFUSE (6 R's), Sustainable construction focus point – Site selection, Planning, Water, Energy, Material, Indoor air quality, Construction procedures.

Indian Green Building Council: Introduction to IGBC green homes, Benefits of IGBC, IGBC green home rating system, Introduction to USGBC, LEED rating system, Procedure to get IGBC certification, GRIHA Rating.

UNIT - V: GREEN MANUFACTURING (09 Periods)

Introduction, background, definition, motivation and barriers to green manufacturing, Impact of manufacturing in environmental ecology, Need for green manufacturing, Advantages and Limitations, green manufacturing strategies, Green manufacturing and sustainability, Sustainability tools; Waste stream mapping and application, Green manufacturing through clean energy supply, green lean manufacturing, green packaging and supply chain. **Total Periods: 47**

TEXT BOOKS:

1. Konstantinos Samdanis, Peter Rost, Andreas Maeder, Michela Meo, Christos Verikoukis, *Green Communications: Principles, Concepts and Practice, John Wiley & Sons, 2015.*
2. Soli J. Arceivala, *Green Technologies for a better future,* McGraw-Hill Education (India) Pvt Ltd, 2014.
3. San Murugesan, G.R. Gangadharan, *Harnessing Green IT – Principles and Practices,* John Wiley & Sons Ltd., 2008.
4. Tom Woolley, Sam Kimmins, Paul Harrison and Rob Harrison, *Green Building Handbook*, *Volume 1*, E & FN Spon, an imprint of Thomson Science & Professional. 5.*IGBC Green Homes Rating System Version 1.0* – A bridged reference guide.
6. J Paulo Davim, Green Manufacturing: Processes and Systems, Springer, 2012.
7. David A Dornfeld, Green Manufacturing: Fundamentals and Applications, Springer, 2013

REFERENCE BOOKS:

1. Athanasios V Alavanidis, Thomais Vlachogianni, *Green Chemistry and Green Engineering*, Synchrona Themata, 2012.

2. G.D. Rai, *Non-conventional Energy Sources*, Khanna Publishers, Delhi, 5th Edition, 2011.
3. Marty Poniatowski, *Foundation of Green Information Technology, Prentice Hall, 2009.*
4. R. K. Gautham, *Green Homes*, BS Publications, 2009.

III B.Tech. - II Semester

(16BT70413) INTRODUCTION TO NANOSCIENCE AND NANOTECHNOLOGY

(Open Elective) (Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Introduction to the concept of nano; Description of nanomaterial; Nanostructure characterization tools; Classification of nanomaterials; Fabrication of nanomaterial; Different applications of nanostructures and nanomaterials.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate knowledge in
- a) Nanoscale technology.
- b) Difference between micro and nanotechnology
- c) Classification of Nanostructure and Nanomaterial
- d) Fabrication of various nanomaterials and nanostructures.

CO2. Analyze numerical and analytical problems in
- a) Nanomaterial size by using Scanning Electron Microscope and X-Ray diffraction

CO3. Design and fabricate devices based on nanostructures like
- a) Nano solar cell
- b) Nano cantilever
- c) Nano bio-sensor

CO4. Synthesize nano particle of different materials to solve the problems related to fabrication of nanostructures.

CO5. Select appropriate technique for fabrication of nanostructures and nanocomposites.

CO6. Apply ethical standards and legal issues while using chemical substances in fabrication of new nanostructures.

DETAILED SYLLABUS:

UNIT - I: FUNDAMENTALS OF NANOTECHNOLOGY (08 Periods)

Introduction – Scientific revolutions, Time and length scale in structures, Definition of a nanosystem; Dimensionality and size dependent phenomena - Surface to volume ratio Fraction of surface atoms, Surface energy and surface stress, surface defects, Properties at nanoscale (optical, mechanical, electronic, and magnetic).

UNIT - II: IDENTIFICATION AND CHARACTERIZATION TOOLS FOR NANOMATERIALS AND NANOSTRUCTURE (10 Periods)

Field Emission Scanning Electron Microscopy (FESEM), Environmental Scanning Electron Microscopy (ESEM) High Resolution, Transmission Electron Microscope (HRTEM), Scanning Tunneling Microscope(STM), Surface enhanced Raman spectroscopy (SERS), Secondary Ion Mass Spectroscopy, Focused Ion Beam Photoelectron Spectroscopy, X-ray Photoelectron Spectroscopy (XPS), Auger electron spectroscopy (AES), Rutherford backscattering spectroscopy (RBS), X-Ray Diffraction, Intensities in X-Ray Scattering Particle Size Effect.

UNIT - III: CLASSIFICATION OF NANOMATERIALS (10 Periods)

Classification based on dimensionality, Quantum Dots, Wells and Wires-III-V Nanoparticles, Electronic Structure of Nanosemiconductor, Carbon based nanomaterials (buckyballs, nanotubes, graphene), Metal based nano materials (nanogold, nanosilver and metal oxides), Nanocomposites, Nanopolymers, Nanoglasses, Nano ceramics, Biological nanomaterials, Fulrene-discovery and early years,.

UNIT - IV: SOME FABRICATION TECHNIQUES OF NANOMATERIALS AND NANOSTRUCTURES (09 Periods)

Chemical Methods: Metal Nanocrystals by Reduction, Solvothermal Synthesis, Photochemical Synthesis, Sonochemical Routes, Chemical Vapor Deposition (CVD), Metal Oxide Chemical Vapor Deposition (MOCVD), Plasma Enhanced Chemical Vapour Deposition Technique (PECVD), Hydrothermal Method, Sol-Gel.

Physical Methods: Ball Milling, Electrodeposition, Spray Pyrolysis, Flame Pyrolysis, DC/RF Magnetron Sputtering, Molecular Beam Epitaxy (MBE) Thermal Evaporation Method.

UNIT - V: APPLICATIONS (08 Periods)

Solar energy harvesting, Catalysis, Molecular electronics and printed electronics Nanoelectronics, Polymers with a special architecture, Liquid crystalline systems, Linear and nonlinear optical and electro-optical properties, Applications in displays and other devices, Nanomaterials for data storage, Photonics, Plasmonics, Chemical and biosensors, Nanomedicine and Nanobiotechnology, MESFET.

Total Period s: 45

TEXT BOOKS:

1. Pradeep T., *A Textbook of Nanoscience and Nanotechnology*, Tata McGraw-Hill Education Pvt. Ltd., 2012.
2. Hari Singh Nalwa, *Nanostructured Materials and Nanotechnology*, Academic Press, 2002.

REFERENCE BOOKS::

1. Nabok A., *Organic and Inorganic Nanostructures*, Artech House, 2005.

2. Dupas C., Houdy P., Lahmani M., *Nanoscience: Nanotechnologies and Nanophysics*, Springer - Verlag Berlin Heidelberg, 2007.
3. S.M. Sze, Physics of Semiconductor Devices, Second Edition 2001.

III B.Tech. – II Semester

(16BT60505) ENGINEERING SYSTEM ANALYSIS AND DESIGN

(Open Elective)

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION:
Systems Process; Technologies for Systems; System Development Life Cycle; System Analysis and Modeling; Levels of Management; Project Management; Systems Implementation and Importance of UML Prototyping; Maintaining and Managing the Systems Output Process.

COURSE OUTCOMES: On successful completion of this course, the student will be able to:

CO1. Demonstrate knowledge in
  a) Systems Process and System Design
  b) Systems Analysis and Modeling
  c) System Development Life Cycle
  d) Design Management and Maintenance Tools.

CO2. Analyze System Process and estimate the given models by using case tools.

CO3. Design and Develop a model to the organizational systems.

CO4. Solve complex problems related to engineering systems and produce accurate results.

CO5. Apply object oriented techniques for modeling dynamic systems.

CO6. Contribute towards societal issues and responsibilities in designing, modeling and developing of organizational systems.

DETAILED SYLLABUS:

UNIT – I: INTRODUCTION (09 Periods)
Systems, Types of systems, Integrating technologies for systems, Need for system analysis and design, Role of the systems analyst, System development life cycle, CASE tools for analysis and design.

UNIT – II: ANALYSIS AND MODELING ORGANIZATIONAL SYSTEM (09 Periods)
Organization as system, System analysis, Depicting systems graphically, Use case modeling, Levels of management, Organizational culture.

UNIT – III: PROJECT MANAGEMENT (10 Periods)
Project initiation, Problem in organization, Determining feasibilities, Ascertaining hardware and software needs, Identifying, Forecasting, Comparing costs and benefits, Activity planning and control, Managing the project.

UNIT - IV: OBJECT ORIENTED ANALYSIS AND DESIGN USING UML (08 Periods)
Introduction, Object modeling, Dynamic modeling, functional modeling, packages and other UML artifacts, the importance of using UML for modeling.

UNIT - V: DESIGNING EFFECTIVE OUTPUT (09 Periods)
Output design objectives, Relating output content to output method, Realizing how output bias affects users, Designing output for display, Case studies-Designing a web site management, Online exam management, Online portal design. **Total Periods: 45**

TEXT BOOK:
1. Kenneth E. Kendall and Julie E. Kendall, "System Analysis and Design," Pearson Education, Ninth Edition, 2011.

REFERENCE BOOKS:
1. Dennis, Wixom and Roth, "Systems Analysis and Design," John Wiley, Fifth Edition, 2012.
2. Shelly and Rosenblatt, "Systems Analysis and Design," Cengage Learning, Ninth Edition, 2012.

III B.Tech. – II Semester

(16BT71011) MICRO-ELECTRO-MECHANICAL SYSTEMS

(Open Elective)

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Overview of Micro Electro Mechanical Systems (MEMS); scaling laws; working principles of microsensors and microactuators; materials; microfabrication processes; packaging of Microsystems.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate knowledge on MEMS devices, scaling laws, microsensors and microactuators.

CO2. Analyze the properties of materials and identify its suitability for MEMS devices.

CO3. Design MEMS devices that meet desired specifications and requirements.

CO4. Analyze and synthesize the information to provide effective solution to engineering problems with MEMS devices.

CO5. Use modern techniques in micro manufacturing process.

CO6. Develop efficient and cost effective MEMS based products for society.

DETAILED SYLLABUS:

UNIT - I: OVERVIEW OF MEMS AND SCALING LAWS (09 periods)

MEMS and Microsystems, Microsystems and microelectronics, miniaturization, applications of MEMS in the automotive industry and in other industries.

Scaling Laws of Miniaturization: Introduction to scaling, scaling in: geometry, rigid- body dynamics, electrostatic forces, electromagnetic forces, Electricity, Fluid mechanics, Heat transfer.

UNIT - II: WORKING PRINCIPLES OF MICROSYSTEMS (09 periods)

Microsensors, acoustic wave sensors, biomedical and biosensors, chemical sensors, pressure sensors, thermal sensors. Microactuation: actuation using thermal forces, shape-memory alloys, piezoelectric crystals, electrostatic forces. MEMS with microactuators, microgrippers, micromotors, microvalves, micropumps. Microaccelerometers, microfludics.

UNIT - III: MATERIALS FOR MEMS AND MICROSYSTEMS (09 periods)

Substrate and wafers, silicon as a substrate material, silicon compounds, silicon piezoresistors, gallium arsenide, quartz, piezoelectric crystals, polymers, carbon nano tube (CNT), development of CNTs, application of CNTs.

UNIT - IV: MEMS FABRICATION PROCESS AND MICRO MANUFACTURING (09 periods)

Photolithography, ion implantation, diffusion, oxidation, chemical vapor deposition, physical vapor deposition, deposition by epitaxy, etching, bulk micromanufacturing, surface micromanufacturing, LIGA process.

UNIT - V: MEMS PACKAGING (09 periods)

Introduction to microsystem packaging, objectives and general considerations in packaging design, three levels of microsystem packaging, interfaces in microsystem packaging, packaging technologies, three-dimensional packaging, selection of packaging materials, signal mapping and transduction, Design case: Pressure sensor packaging.

Total Periods: 45

TEXT BOOK:

1. Tai-Ran Hsu, *MEMS & Microsystems, Design and Manufacture*, McGraw-Hill Education (India) Pvt. Ltd., 2002.

REFERENCE BOOKS:

1. G.K.Ananthasuresh, K.J.Vinoy, Micro *and Smart Systems*, Wiley India, 2010.
2. Nitaigour Premchand Mahalik, *MEMS*, McGraw-Hill Education (India) Pvt. Ltd., 2007.

III B.Tech. – II Semester

(16BT61205) CYBER SECURITY AND LAWS

(Open Elective)

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Cyber Crimes and Indian IT Act; Cyber Offenses; Tools and Methods used in Cyber Crime; Phishing ad Identity Theft; Indian and Global Perspective on Cyber Crimes and Cyber Security; Organizational Implications on Cyber Security; IPR Issues; Cyber Crime and Terrorism; Cyber Crime Illustrations.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate knowledge in Cyber security, Cyber crimes and its related laws in Indian and Global Act.

CO2. Analyze the legal perspectives and laws related to cyber crimes in Indian context.

CO3. Apply security and privacy methods in development of modern applications and in organizations to protect people and to prevent cyber crimes.

CO4. Solve Cyber security issues using privacy policies.

CO5. Use antivirus tools to minimize the impact of cyber threats.

CO6. Follow security standards for the implementation of Cyber Security and laws

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO CYBER CRIMES AND OFFENSES (09 Periods)

Cyber Crimes: Introduction, Definition, Origin, Cyber crime and information security, Cyber criminals, Classifications of cyber crimes, The legal perspectives and Indian perspective, Cyber crime and Indian ITA 2000, Global perspective on cyber crimes.

Cyber Offenses: Introduction, Criminals planning on attacks, Social engineering, Cyber stalking, Cyber cafe and crimes, Botnets.

UNIT-II: TOOLS AND METHODS USED IN CYBER CRIME & PHISHING AND IDENTITY THEFT (09 Periods)

Introduction, Proxy servers and Anonymizers, Phishing, Password cracking, Key loggers and Spywares, Virus, Worms and Ransomware, Trojan horses and Backdoors, Steganography, DoS and DDoS attacks.

Phishing and Identity Theft: Introduction, Phishing, Identity Theft (ID Theft).

UNIT - III: CYBER CRIMES AND CYBER SECURITY-LEGAL PERSPECTIVES (08 Periods)

Introduction, Cyber laws in Indian context, The Indian IT act, Challenges to Indian law and Cyber crime scenario in India, Consequences of not addressing the weakness in IT act, Digital signatures and the Indian IT Act, Cyber Crime and Punishment, Cyberlaw, Technology and Students in India scenario.

UNIT - IV: CYBER SECURITY-ORGANIZATIONAL IMPLICATIONS (10 Periods)

Introduction, Web threats for organizations – evils and perils, Security and privacy implications from cloud computing, Social Media Marketing-Security risks and Perils for organizations, Social computing and associated challenges for organizations, Protecting people's privacy in organization, Organizational guidelines for internet usage, Safe computing and Usage policy, Incident handling and Best practices.

UNIT - V: CYBER CRIME & TERRORISM AND ILLUSTRATIONS (09 Periods)

Cyber Crime & Terrorism: Introduction, Intellectual property in the cyber space, The ethical dimension of cyber crimes, The psychology, Mindset and skills of hackers and cyber criminals, Sociology of cyber criminals, Information warfare.

Cyber Crime Illustrations: Indian banks lose millions of rupees, Justice vs. Justice, Parliament attack, The Indian case of online gambling, Bank and credit card related frauds, Purchasing goods and services scam, Nigerian 419 scam.

Total Periods: 45

TEXT BOOK:

1. Nina Gobole and Sunit Belapure, *Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives*, Wiley India, 2011.

REFERENCE BOOK:

1. Prashant Mali, *Cyber Law and Cyber Crimes*, Snow White Publications Pvt. Ltd., 2013.

III B.Tech. – II Semester
(16BT61505) BIOINFORMATICS
(Open Elective)
(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: -

COURSE DESCRIPTION: Introduction to Bioinformatics; Biology and Information; Sequence alignment and dynamic programming; Biological Database; Homology Modeling; Structure Prediction; Molecular Dynamics

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1. Demonstrate knowledge on concepts of biological databases, Genome and proteome.
CO2. Analyze biological sequences for Homology Modeling.
CO3. Apply clustering methods for Phylogenetic trees.
CO4. Solve bio sequencing problems using dynamic programming.
CO5. Select and apply appropriate techniques and tools to structure Prediction

DETAILED SYLLABUS:

UNIT - I: NUCLEIC ACIDS, PROTEINS, AND AMINO ACIDS (08 periods)

Bioinformatics-Definition, Nucleic acid structure, Protein structure, the central dogma, Physico-chemical properties of the amino acids and their importance in protein folding, Polymerase chain reaction (PCR)

UNIT - II: INFORMATION RESOURCES FOR GENES AND PROTEINS (10 periods)

Database file formats, Nucleic acid sequence databases, Protein sequence databases

Sequence Alignment Algorithm: Pair wise sequence alignment – The problem, Pair wise sequence alignment – Dynamic programming methods, The effect of scoring parameters on the alignment, Multiple sequence alignment.

UNIT - III: PREDICTION OF THE THREE-DIMENSIONAL STRUCTURE OF A PROTEIN AND HOMOLOGY MODELING (09 Periods)

Secondary Structure Prediction, Basic Principles, The Steps of Comparative Modeling, Accuracy of Homology Models, Manual versus Automatic Models, SNPs, Motifs**.**

UNIT - IV: PHYLOGENETIC METHODS (10 periods)

Phylogenetic trees, choosing sequences, Distance matrices and clustering methods, Calculation of distances in the neighbor-joining method, Bootstrapping, Tree optimization criteria and tree search methods, The maximum-likelihood criterion, Calculating the likelihood of the data on a given tree, The parsimony criterion.

UNIT - V: NEW FOLD MODELING (08 periods)

Estimating the Energy of a Protein Conformation, Energy Minimization, Molecular Dynamics, The "Omics" Universe**-**Transcriptomics, Proteomics, Interactomics, Structural Genomics, Pharmacogenomics**.**

TEXTBOOKS:

1. Paul G. Higgs and Teresa K. Attwood, *Bioinformatics and Molecular Evolution* Blackwell Publishing, 2005.
2. Anna Tramontano, *Introduction to Bioinformatics* Chapman and Hall/CRC 2006

REFERENCE BOOKS::

1. Hooman H. Rashidi and Lukas K. Buehler, *Bioinformatics Basics, Applications in Biological Science and Medicine*, CRC Press, Taylor & Francis Group, 2nd Edition, 2005.
2. Rastogi S. C., NamitaMendiratta and Parag Rastogi, *Bioinformatics: Methodsand Applications: enomics, Proteomics and Drug Discovery*, PHI Learning Pvt. Ltd., 3rd Edition, 2011.

III B.Tech. – II Semester

(16BT60131) COMPUTER AIDED DESIGN AND DETAILING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Courses on Reinforced Cement Concrete Structures, Design of Steel Structures.

COURSE DESCRIPTION: Exercises on Analysis and design of Simple beams; 2–D and 3–D RCC Frames; Trusses; Solid slabs; Retaining walls; Water tanks; Plate Girder Bridges.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Explain the knowledge on computer aided design of RCC and steel structures using software tools.
CO2. Analyze RCC and steel structures using software tools.
CO3. Design RCC and steel structures using software tools.
CO4. Solve complex RCC and steel structural design problems using software tools and suggest suitable solutions.
CO5. Use appropriate techniques in modeling, analysis and design of RCC and steel structures using software tools.
CO6. Apply contextual knowledge to assess the safety and serviceability of the structures designed.
CO7. Follow relevant IS Codes for the design of RCC and steel structures using software tools.
CO8. Function effectively as an Individual and as a team member in the design of RCC and steel structures using software tools.
CO9. Communicate effectively on the design of RCC and steel structures using software tools in written, oral and graphical forms.

DETAILED SYLLABUS:

SOFTWARE: STAAD.Pro or any other industry popular structural analysis and design softwares.

LIST OF EXERCISES

1. Analysis and design of simply beams
   a) Simply supported beam
   b) Cantilever beam
   c) Continuous beam
   d) Fixed beam
2. 2–D RCC Frame analysis and design
3. 3–D RCC Frame analysis and design
4. Analysis and design of Steel Truss
   a) Howe roof truss
   b) Howe bridge truss
   c) Warren truss
   d) Pratt truss
5. Simple tower analysis and design
6. Analysis and design of solid slab
7. Retaining wall analysis and design
8. Design of RCC Tee beam bridges for IRC loading
9. Analysis and design of INTZ type water tank
   a) Circular water tanks
   b) Rectangular water tanks
10. Analysis and design of plate girder bridge

TEXT BOOKS:

1. V. L. Shah and S. R. Karve, *Illustrated Design of Reinforced Concrete Building*, Structures Publication, Pune, 7th Edition, 2014.
2. Krishnamurthy. D., *Structural Design and Drawing,* Vol-II and Vol-III, CBS Publishers and Distributors, Delhi, 1992.

REFERENCE BOOKS:

1. IS 456 – 2000
2. IS 800 – 2007
3. IS 875 Part – I, II & III – 2000
4. Relevant IRC Code.
5. SP-16 – 1980: *Design Aids for Reinforced Concrete*, Bureau of Indian Standards, New Delhi.

5. SP-34 – 1987: *Hand Book on Concrete Reinforcement* and Detailing, Bureau of Indian Standards, New Delhi.

III B.Tech. II Semester

(16BT60132) HIGHWAY ENGINEERING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Course on Highway and Traffic Engineering.

COURSE DESCRIPTION: Highway material testing – Aggregates, Bituminous materials, Bituminous mixes; Pavement evaluation; Traffic studies.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate practical knowledge on highway material testing, pavement evaluation and traffic studies.

CO2. Characterize highway materials, pavements and traffic.

CO3. Design bituminous mix for pavements.

CO4. Solve complex engineering problems associated with highway materials, pavements and traffic through suitable investigations.

CO5. Use modern tools and techniques appropriate in highway material testing, pavement evaluation and traffic studies.

CO6. Ensure health and safety in highway material testing, pavement evaluation and traffic studies.

CO7. Encourage sustainable and environmental friendly highway materials, pavement evaluation methods and traffic studies.

CO8. Maintain ethical standards for quality in highway material testing, pavement evaluation and traffic studies following relevant IS codes.

CO9. Function effectively as an individual, and as a member or leader in teams to solve highway and traffic engineering problems.

CO10. Communicate effectively on highway material testing, pavement evaluation and traffic studies in written, oral and graphical forms.

CO11. Promote cost effective highway materials.

LIST OF EXPERIMENTS:

(A) AGGREGATES

1. Sieve analysis of aggregates
2. Shape test and angularity number test for coarse aggregate
3. Aggregate crushing value test and 10% fines value
4. Aggregate impact test
5. Attrition test for coarse aggregate
6. Abrasion test for coarse aggregate
7. Specific gravity and water absorption test

(B) BITUMINOUS MATERIALS

8. Penetration test
9. Ductility test
10. Softening point test
11. Flash and fire point test
12. Viscosity test
13. Specific gravity test

(C) BITUMINOUS MIXES

14. Marshall stability test on Marshall bituminous mix design
15. Stripping value test of coated bituminous mix
16. Theoretical maximum specific gravity (Gmm) of bituminous mix test
17. Bitumen extraction and determination of bitumen content and gradation of aggregates

(D) PAVEMENT EVALUATION

18. Field CBR test for subgrade strength
19. Benkelman beam deflection studies on flexible pavement and analysis
20. Measurement of unevenness/roughness by Bump Integrator

(E) TRAFFIC STUDIES

21. Spot speed studies
22. Traffic volume studies at mid-block section and at typical intersections

TEXT BOOKS:

1. Khanna, S.K., Justo, C. E. G. and Veeraragavan, A., *Highway Materials and Pavement Testing*, Nem Chand & Bros, Roorkee, Revised 5th Edition, 2009.
   Khanna, S. K., Justo, C. E. G. and Veeraragavan, A.,

2. *Highway Engineering, Nem* Chand & Bros, Roorkee, Revised 10th Edition, 2014.

Note: A minimum of fourteen experiments are to be performed covering all sections.

III B.Tech. – II Semester

(16BT60133) SEMINAR

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
	100	100	-	-	-	2

PREREQUISITES: All the courses of the program up to III B. Tech. – I Semester.

COURSE DESCRIPTION: Identification of topic for the seminar; Literature survey; Performing critical study and analysis of the topic identified; Preparation of report and presentation.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Knowledge on the seminar topic.

CO2. Analytical ability exercised during the seminar work.

CO3. Ability to investigate and solve complex engineering problems faced during the seminar work.

CO4. Ability to apply techniques to complex engineering activities with an understanding of limitations as applied in the seminar work.

CO5. Ability to function effectively as an individual as experienced during the seminar work.

CO6. Ability to present views cogently and precisely on the seminar topic.

CO7. Ability to engage in life-long leaning as experience during the seminar work.

IV B.Tech. – I Semester

(16BT70101) **ESTIMATION AND QUANTITY SURVEYING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Building Materials and Construction Technology, Surveying, Computer Aided Building Planning and Drawing.

COURSE DESCRIPTION: Estimation of residential buildings; Estimation of different structures; Specifications and rate analysis; Contracts and Tenders; Valuation.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate the basic knowledge on estimation of civil engineering structures, specifications, rate analysis, contracts, tenders and valuation.
CO2. Analyze estimates for different structures, rates, specifications, contracts, tenders and valuation.
CO3. Provide solutions to problems associated with valuation, contracts and tenders by proper interpretation.
CO4. Use appropriate techniques for estimation and valuation of civil engineering structures.
CO5. Consider societal and legal issues in contracts and tenders.
CO6. Maintain ethical standards in estimation, valuation, contracts and tenders.
CO7. Prepare contracts, tenders and valuation reports for various civil engineering projects.
CO8. Prepare contacts and tenders considering financial issues.

DETAILED SYLLABUS:

UNIT - I: ESTIMATION OF RESIDENTIAL BUILDINGS (10 Periods)

Types of estimation, Methods of estimation, Load bearing and framed structures – Calculation of quantities of earth work excavation, Brick work, RCC, PCC, Plastering, White washing, Colour washing and painting/varnishing for shops, rooms; Residential building with flat and pitched roof, Various types of arches, Calculation of brick work and RCC works in arches, Estimate of joineries for panelled and glazed doors, windows, ventilators etc.

UNIT - II: ESTIMATION OF DIFFERENT STRUCTURES (10 Periods)

Estimating different structures - Septic tank, Soak pit, Sanitary and water supply installations, Water supply pipe line, Sewer line, Tube well, Open well, Roads, Retaining walls, Culverts.

UNIT - III: SPECIFICATIONS AND RATE ANALYSIS (09 Periods)

Purpose and method of writing specifications, General and detailed specification for different items of building construction, Lead statement, Data, Schedule of rates, Rate analysis - Concrete, Brick work, Plastering, Flooring and Painting.

UNIT - IV: CONTRACTS AND TENDERS (08 Periods)

Purpose of contract, Types of contract, Agreement, Tenders, Tender notice and form, Arbitration, Legal requirements.

UNIT - V: VALUATION (08 Periods)

Necessity, Basics of value engineering, Capitalized value, Depreciation, Escalation, Value of building, Calculation of standard rent, Mortgage, Lease.

Total Periods: 45

TEXT BOOKS:

1. Dutta. B. N., *Estimating and Costing in Civil Engineering*, UBS Publishers &Distributors Pvt. Ltd., 27th Edition, 2003.
2. Kohli, D. D and Kohli, R. C., *A Text Book of Estimating and Costing (Civil)*, S. Chand & Company Ltd., 12th Edition, 2004.

REFERENCE BOOKS:

1. M. Chakraborthi, *Estimating Costing Specification and Valuation in Civil Engineering*, Laxmi Publications, New Delhi, 23rd Edition, 2010.
2. Standard Schedule of Rates and Standard Data Book, Public Works Department.
3. IS 1200 (Parts I to XXV – 1974/ *Method of Measurement of Building and Civil Engineering Works* – B.I.S).

4. National Building Code of India, BIS, Government of India, New Delhi, 2005.

IV B. Tech. – I Semester

(16BT70102) GEOSPATIAL TECHNOLOGIES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Surveying.

COURSE DESCRIPTION: Photogrammetry; Remote sensing; Geographic information system; GIS Spatial analysis; Remote sensing and GIS applications.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate the basic knowledge on photogrammetry, remote sensing and geographic information system and their applications.
CO2. Analyze the spatial data and non spatial data.
CO3. Develop thematic maps using RS and GIS data for engineering applications.
CO4. Conduct investigations to provide valid conclusions in geospatial applications.
CO5. Apply suitable techniques to predict and model the damages due to natural disasters.
CO6. Provide geospatial solutions ensuring societal safety.
CO7. Consider the environmental sustainability issues in geospatial applications.

DETAILED SYLLABUS:

UNIT – I: PHOTOGRAMMETRY (09 Periods)

Principle of photogrammetry, Types of aerial photographs, Planning and execution of photographic flights, Geometry of aerial photographs, Scale of aerial photographs and its determination, Stereoscopy, Ground control, Mosaics, Parallax measurements for height determinations.

UNIT – II: REMOTE SENSING (10 Periods)

Elements of remote sensing, Electromagnetic spectrum, Energy resources, Physics of radiant energy, Energy interactions with earth surface features and atmosphere, Spectral reflectance curves, Resolution; Spectral properties of water bodies, soil and vegetation; Sensors and platforms, Visual interpretation techniques.

UNIT – III: GEOGRAPHIC INFORMATION SYSTEM (10 Periods)

GIS categories, Components of GIS, Fundamental operations of GIS, Spatial and non spatial data, Raster data and vector data, File management, Layer based GIS, Feature based GIS, Map projections.

UNIT – IV: GIS SPATIAL ANALYSIS (07 Periods)

Database models, Data storage, Vector data storage, Attribute data storage, Overview of the data manipulation and analysis, Integrated analysis of the spatial and attribute data, Basics of global positioning system.

UNIT – V: REMOTE SENSING AND GIS APPLICATIONS (09 Periods)

Land use/Land cover classification, Rainfall-runoff studies, Flood and drought impact assessment and monitoring, Drainage morphometry, Watershed management for sustainable development, Inland water quality survey and management, Regional and urban planning and management, GIS based highway alignment, GIS based traffic congestion analysis, Soil mapping.

Total Periods: 45

TEXT BOOKS:

1. B. Bhatta, *Remote Sensing and GIS*, Oxford University Press, 2nd Edition, 2011.
2. M. Anji Reddi, *A Text Book of Remote Sensing and Geographical Information Systems*, B. S. Publications, 2nd Edition, 2012.

REFERENCE BOOKS:

1. Lillesand, T. M., Kiefer, R. W. and J. W. Chipman, *Remote Sensing and Image Interpretation*, John Willey and Sons (Asia) Pvt. Ltd. 7th Edition, 2014.
2. Chandra, A. M. and Ghosh, S. K., *Remote Sensing and Geogrphic Information System*, Narosa Publishing House, 2nd Edition, 2015.
3. Narayana Panigrahi, *Geographical Information Science*, University Press, 2nd Edition, 2013.
4. Peter A. Burragh and Rachael Mc Donnell, *Principles of Geographical Information Systems*, Oxford University Press, 2nd Edition, 2014.

IV B.Tech. – I Semester

(16BT70103) RAILWAY, AIRPORT AND HARBOUR ENGINEERING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Highway and Traffic Engineering.

COURSE DESCRIPTION: Railway Engineering; Construction and maintenance of railway tracks; Airport planning; Airport design; Harbour engineering.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate the basic knowledge on railway, airport and harbour engineering.
CO2. Analyze railway, airport and harbour engineering problems.
CO3. Design elements of railways and airports.
CO4. Solve problems associated with railway, airport and harbour engineering through proper investigations, analysis and interpretation.
CO5. Use appropriate techniques in solving railway, airport and harbour engineering problems.
CO6. Provide solutions to railway, airport and harbour engineering problems considering health and safety in the context of society.
CO7. Consider the environmental issues while solving railway, airport and harbour engineering problems.
CO8. Follow standards for planning and design of Railways, Airports and Harbours.

DETAILED SYLLABUS:

UNIT - I: RAILWAY ENGINEERING (10 Periods)

Development of railways in India, Advantages of railways, Classification of Indian railways, Permanent way – Cross section, Components, Functions; Rail joints, Welding of rails, Concept of gauges, Coning of wheels, Creep of rails, Adzing of sleepers, Route alignment surveys - Conventional and modern methods; Soil suitability analysis, Track geometric design, Points and crossings, Signals, Interlocking.

UNIT - II: CONSTRUCTION AND MAINTAINANCE OF RAILWAY TRACKS (08 Periods)

Earthwork, Stabilization of track on poor soil, Drainage, Calculation of materials required for track laying, Construction and maintenance of tracks, Modern methods of construction and maintenance, Railway stations and yards and passenger amenities, Urban rail, Infrastructure for metro, mono and underground railways.

UNIT - III: AIRPORT PLANNING (10 Periods)

Air transport characteristics, Aircraft characteristics, Airport classification, Air port planning - Objectives, Components, Layout characteristics; Airport site selection - Site surveys and drawings; Terminal area - Functions, Site location; Noise control, Aprons, Gate positions and parking system, Airport markings, Airport lighting, Typical layouts.

UNIT - IV: AIRPORT DESIGN (09 Periods)

Runway design – Orientation, Wind rose diagram, Length, Geometric design, Configuration and pavement design principles, Lighting system; Airport grading, Elements of taxiway design, Airport zones, Passenger facilities and services, Runway and taxiway markings and lighting, Characteristics and requirements of airport drainage.

UNIT - V: HARBOUR ENGINEERING (08 Periods)

Significance, Advantages and limitations of water transport, Harbour - Classification and site selection, Port – Layout, Components, Functions, Classification, Site selection; Docks – Types, Functions; Inland water transport, Natural phenomenon – Tides, Winds, Waves, Currents, Drift; Navigational aids.

Total Periods: 45

TEXT BOOKS:

1. S. P. Saxena and S. P. Arora, *Railway Engineering – A Text Book of Transportation Engineering*, S. Chand and Co. Ltd., 7th Edition, 2010.
2. Khanna. S. K., Arora. M. G., and Jain, S. S. *Airport planning and Design*, Nem Chand and Bros, 6th Edition, 2012.
3. S. C. Rangwala, *Harbor Engineering*, Charotar Publishing House, 7th Edtion, 2013.

REFERENCE BOOKS:

1. Chandra S. and M. M. Agarwal, *Railway Engineering*, Oxford University Press, 2nd Edition, 2007.
2. S. K. Khanna and Arora, *Airport Planning and Design*, Nemchand and Brothers, 6th Edition, 2012.
3. Seetharaman, S., *Dock and Harbour Engineering*, Umesh Publications, 1999.

IV B.Tech. - I Semester

(16BT70104) **ADVANCED FOUNDATION ENGINEERING**

(Program Elective – 2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Soil Mechanics, Foundation Engineering.

COURSE DESCRIPTION: Shallow foundations- Advanced bearing capacity theories, Design principles of shallow foundations; Pile foundations; Sheet pile walls; Foundations in problematic soils - Underreamed pile foundations; Marine substructures.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate knowledge on advanced theories of bearing capacity and settlement of shallow and pile foundations; sheet pile walls, foundations on expansive soils and marine sub structures.

CO2. Analyze footings for bearing capacity and settlements, sheet piles for stability and marine substructures.

CO3. Proportion and design all types of foundations, sheet piles and break waters.

CO4. Provide solutions to complex foundation engineering problems.

CO5. Use appropriate techniques for the analysis and design of foundations, sheet piles and marine substructures.

CO6. Ensure stability and safety in the design of foundations, sheet piles and marine substructures.

CO7. Follow IS Codes to design foundations, sheet piles and break waters.

CO8. Communicate effectively on advanced foundation engineering problems in written and graphical forms.

DETAILED SYLLABUS:

UNIT - I: SHALLOW FOUNDATIONS **(09 Periods)**

Theories of bearing capacity–Hansen, Vesic; Effect of tilt, eccentricity, compressibility, non–homogeneity and anisotropy of soil on bearing capacity; Bearing capacity of footings resting on stratified soils, on slope and on top of the slopes, Settlement of foundation – 3D consolidation settlement; Bearing pressure using SPT, CPT, Dilatometer and Pressure meter, Design principles - Isolated, Combined footing and mat foundation (conventional rigid method only).

UNIT – II: PILE FOUNDATIONS **(10 Periods)**

Bearing capacity of vertically loaded piles - Static capacity-á, â and ë Methods, IS Code; Dynamic pile capacity – Simplex and Janbu methods; Point bearing resistance with SPT and CPT results; Bearing resistance of piles on rock, Uplift resistance, Laterally loaded piles, Ultimate lateral resistance, Batter piles, Under reamed piles, Mini and micro piles; Ultimate capacity of pile groups in compression, Pullout and lateral load, Efficiency; Settlements of pile groups, Design of simple R.C.C piles.

UNIT – III: SHEET PILE WALLS **(09 Periods)**

Sheet pile structures, Cantilever sheet pile walls in granular soils and cohesive soils, Anchored bulk head – Free earth supported method, Fixed earth support method; Lateral earth pressure on braced sheet pile walls.

UNIT – IV: FOUNDATIONS ON EXPANSIVE SOILS **(08 Periods)**

Foundations in black cotton soils – Basic foundation problems associated with black cotton soils, Lime column techniques, Use of Cohesive Non Swelling (CNS) layer below shallow foundations; Underreamed piles – Principle of functioning of underreamed pile, Analysis and design of underreamed pile.

UNIT – V: MARINE SUBSTRUCTURES **(09 Periods)**

Introduction, Types of marine structures – Breakwaters, Wharves, Piers, Sea walls, Docks, Quay walls; Design loads, Wave action, Wave pressure on vertical wall, Ship impact on piled wharf structure, Design of rubble mount break water and wall type break water. **Total Periods: 45**

TEXT BOOKS:

1. Donald P. Coduto, *Foundation Design Principles and Practices*, PHI, 3rd Edition, 2008.
2. Swami Saran, *Analysis and Design of Substructures – Limit State Design,* Oxford & IBH Publishing Company Pvt. Ltd., 2nd Edition 2010.

REFERENCE BOOKS:

1. V. N. S. Murthy, *Text Book of Soil Mechanics and Foundation Engineering,* CBS Publishers & Distributors Pvt. Ltd., 3rd Edition, 2010.
2. Braja M. Das, Principles *of Foundation Engineering,* Cengage Learning India, 7th Edition, 2010.
3. Bowles J.E., *Foundation Analysis and Design,* McGraw–Hill Publishing Company, 5th Edition, 2001.

4. Shamsher Prakash, Gopal Ranjan and Swami Saran, *Analysis and Design of Foundations and Retaining Structures,* Sarita Publishers, 2nd Edition, 1987.

IV B.Tech. I Semester

(16BT70105) ARCHITECTURE AND TOWN PLANNING

(Program Elective – 2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Construction Planning and Project Management

COURSE DESCRIPTION: Architectural design and site planning; Building architecture and services; Town planning and structure; Land use planning; Regional planning and standards.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate knowledge on architecture and town planning.

CO2. Identify the regional and urban related problems by analyzing the principles of architecture design and town planning practices in India.

CO3. Design and develop a town plan by using various models of urban structure.

CO4. Use information system approach and appropriate techniques for better land use planning.

CO5. Ensure safety and performance standards in integration of building architecture and services.

CO6. Use environmentally sustainable approach in architecture and town planning.

CO7. Maintain ethics in architecture and town planning by following building rules and regulations.

CO8. Communicate effectively in the form of layouts pertain to architecture and town planning.

DETAILED SYLLABUS:

UNIT – I: ARCHITECTURAL DESIGN AND SITE PLANNING (09 Periods)

Architectural design, Analysis, Integration of function and aesthetics, Introduction to basic elements and principles of design, Surveys, Site analysis, Development control, Layout regulations, Layout design concepts.

UNIT – II: BUILDING ARCHITECTURE AND SERVICES (09 Periods)

Residential, Institutional, Commercial and industrial, Application of anthropometry and space standards, Inter relationships of functions, Safety standards, Building rules and regulations, National building code, Integration of building services, Interior design, Man and environment interaction, Factors that determine climate, Characteristics of climate types, Design for various climate types, Passive and active energy controls, Green building concept.

UNIT – III: TOWN PLANNING AND STRUCTURE (09 Periods)

Planning concepts and processes, Objectives, Levels of planning in India and their interrelationship, Planning administration, Models of planning processes, Components of Settlement structures, Models of urban structure, Demand and supply of land for urban use, Means and mechanism, Impact on urban structure, Goals of land policy.

UNIT – IV: LAND USE PLANNING (09 Periods)

Concept of land use, Locational attributes of land use, Land use planning information system, Activity system and choice of space qualities, System approach and physical planning, Approach to land use planning, Introduction to spatial planning at regional level, Choice theory and advocacy planning and their application action plan and its relevance, Development plan types, Scope and objectives, Principles of landscape design.

UNIT – V: REGIONAL PLANNING AND STANDARDS (09 Periods)

Planning practices in India, Method of identifying urban and regional problem, Setting of goals objectives and priorities, Performance standards, Spatial standards and standard for utilities, Classification of regions, Regionalization and delineation techniques for various types of regions, Cluster and factor analysis method.

Total Periods: *45*

TEXT BOOKS:

1. Biswas Hiranmay, *Principles of Town Planning and Architecture*, Vayu Education of India, 2012.
2. Satish Chandra Agarwala, *Architecture and Town Planning*, Dhanpat Rai and Company, 2008.

REFERENCE BOOKS:

1. Rangwala, K. S., *Town Planning*, Charotar Publishing House, 2014.
2. Hiraqskar, G. K., *Fundamentals of Town Planning*, Dhanpat Rai & Sons, 2001.
3. Bandopadhyay, A., *Text Book of Town Planning*, Books and Allied, 2000.
4. Faludi, Andreas, *Planning Theory*, Pergamon Press, 1973.
5. Muthu Shoba Mohan, G., *Principles of Architecture*, Oxford University Press, New Delhi, 2006.

IV B.Tech. I Semester

(16BT70106) ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT

(Program Elective – 2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Environmental Studies, Water Supply Engineering, Wastewater Technology.

COURSE DESCRIPTION: Environmental impact assessment (EIA); EIA methodologies; Environmental impact on soils, ground water and surface water; Environmental impact assessment on air, vegetation and wild life; Environmental audit and acts.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Gain basic knowledge on EIA, EIA methodologies, environmental audits and acts and preparation of EIA reports for various projects.
CO2. Analyze factors, elements, methodologies and reports of EIA; environmental audits and acts.
CO3. Interpret EIA and audit reports to provide solutions for environmental problems.
CO4. Use appropriate methods to prepare EIA and audit reports.
CO5. Consider health and safety in EIA.
CO6. Give suitable recommendations based on EIA study for sustainable development.
CO7. Follow environmental acts in EIA.
CO8. Prepare EIA and audit reports.

DETAILED SYLLABUS:

UNIT – I: ENVIRONMENTAL IMPACT ASSESSMENT (09 Periods)

Basic concept of EIA, Introduction to life cycle analysis, Initial environmental examination, Elements of EIA, Factors affecting EIA, Impact evaluation and analysis, Preparation of environmental base map and classification of environmental parameters.

UNIT – II: EIA METHODOLOGIES (08 Periods)

Criteria for the selection of EIA Methodology, EIA Methods – Adhoc method, Matrix method, Network method, Environmental medium quality index method, Overlay method and Cost/benefit analysis.

UNIT – III: EIA ON SOIL, GROUND WATER AND SURFACE WATER (10 Periods)

Prediction and assessment, Soil quality, Methodology for the assessment of soil and groundwater – Delineation of study area, Identification of activities, Impact prediction, Assessment of impact significance, Identification and incorporation of mitigation measures; EIA on surface water - Methodology for the assessment of impacts on surface water environment, Watershed management schemes.

UNIT–IV: EIA ON AIR, VEGETATION AND WILDLIFE (08 Periods)

Air pollution sources, Generalized approach for assessment of air pollution impact on various anthropogenic activities, Assessment of impact of developmental activities on vegetation and wildlife, Environmental impact of deforestation – Causes and effects of deforestation.

UNIT – V: ENVIRONMENTAL AUDIT, ACTS AND MANAGEMENT (10 Periods)

Environmental audit and environmental legislation, Objectives of environmental audit, Types of environmental audit, Audit protocol, Stages of environmental audit, Onsite activities, Evaluation of audit data and preparation of audit report, Post audit activities, Environmental Acts - Environmental protection act, The water act, The air act, Wild life act; Case studies - Preparation of EMP report and EIA statement for various projects; Environmental management systems.

Total Periods: 45

TEXT BOOKS:

1. Y. Anjaneyulu, *Environmental Impact Assessment Methodologies,* B.S. Publications, 2nd Edition, 2007.
2. J. Glynn and Gary W. Heinke, *Environmental Science and Engineering,* Prentice Hall, 2nd Edition, 1996.

REFERENCE BOOKS:

1. Suresh K. Dhameja, *Environmental Engineering and Management,* S.K. Kataria and Sons, 2010.
2. H. S. Bhatia, *A Text Book of Environmental Pollution and Control,* Galgotia Publications (P) Ltd., 2003.
3. Charless H. Eccleston, *Environmental Impact Assessment*, CRC Press, Taylor and Francis Group, 2011.

4. Balakrishna Moorthy, *Environmental Management*, PHI Publications, 2nd Edition, 2008.

IV B. Tech. – I Semester

(16BT70107) GLOBAL POSITIONING SYSTEM

(Program Elective – 2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Physics.

COURSE DESCRIPTION: Geodesy; Overview of Global Positioning System (GPS); GPS signal structure; GPS Errors and accuracy; GPS surveying and applications.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate the knowledge on geodesy, GPS signal structure, GPS errors and accuracy, GPS surveying and applications for civil engineering structures.
CO2. Analyze problems associated with GPS and GPS surveying.
CO3. Conduct investigations and give recommendations for boundary and locations, specific land surveying issues.
CO4. Use modern methods and apply suitable techniques in collecting waypoints, recording tracks, navigating to a position.
CO5. Consider societal issues in practicing GPS survey.
CO6. Follow ethics in GPS survey practice.
CO7. Understand and manage projects on global positioning satellite data interface and relation in multidisciplinary environments.

DETAILED SYLLABUS:

UNIT – I: GEODESY (09 Periods)

Fundamentals of geodesy, Earth geoid and ellipsoid, Reference surface, geodetic systems, Indian geodetic system, Coordinate systems and transformations.

UNIT – II: OVERVIEW OF GLOBAL POSITIONING SYSTEM (08 Periods)

NAVSTAR GPS, GLONASS, Indian regional navigational Satellite system, Segments of GPS, Blocks of GPS - Block I, II/IIA; Advantages and current limitations of GPS.

UNIT – III: GPS SIGNAL STRUCTURE (09 Periods)

Carriers, GPS codes - C/A, P, Navigational message; GPS receiver - Types and structure of receivers; Principles of GPS position fixing, Pseudo ranging.

UNIT – IV: GPS ERRORS AND ACCURACY (09 Periods)

Satellite dependent - Ephemeris errors, Satellite clock bias, Selective availability; Receiver dependent - Receiver clock bias, Cycle slip, Selective availability; Observation medium dependent: Ionospheric errors, Tropospheric errors; Station dependent - Multipath, Station coordinates; Satellite geometry based measures - Geometry dependent (Dilution of Precision: DOP), User equivalent range error.

UNIT – V: GPS SURVEYING AND APPLICATIONS (10 Periods)

Static surveying and kinematics surveying, DGPS survey, Preparation of GPS surveys - Setting up an observation plan, Observation strategies, Network design; GPS applications - Cadastral surveys, Remote sensing and GIS, Military applications and vehicle tracking, Infrastructure development, Natural disasters.

Total Periods: 45

TEXT BOOKS:

1. Sateesh Gopi, *Global Positioning Systems –Principles and Applications*, McGraw-Hill Education (India) Pvt. Ltd., 2014.
2. Akash Deep Sharma, *Global Positioning System*, MD Publication Pvt. Ltd., New Delhi (India), 2008.

REFERENCE BOOKS:

1. Gunter Seeber, *Satellite Geodesy,* Walter de Gruyter, Berlin (Germany), 2003.
2. Pratap Misra and Per Enge, *Global Positioning System,* Ganga Jamuna Press, 2006.

3. Bradford, W. Parkinson and James J. Spiker Jr., *Global Positioning System: Theory and Applications*, Vol I and II, American Institute of Aeronautics and Astronautics: Washington (USA), 1996.
4. Hofmann Wellenhof, B., Lichtenegger, H. and Collins, J., *Global Positioning System: Theory and Practice*", Springer, Berlin (Germany), 1994.

IV B.Tech. – I Semester

(16BT70108) STRUCTURAL DYNAMICS

(Program Elective - 2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Engineering Mechanics, Mechanics of Solids, Structural Analysis - I, Structural Analysis - II.

COURSE DESCRIPTION: Principle of vibration analysis; Single degree of freedom, Two degree of freedom and multi–degree of freedom systems; Vibration analysis; Dynamic analysis of continuous systems.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Elucidate the knowledge on theory of vibrations.
CO2. Analyze engineering systems for different modes of vibrations.
CO3. Formulate the complex equation of motions for free vibrations and continuous systems.
CO4. Solve complex engineering problems associated with vibrations by proper modeling and analysis.
CO5. Use appropriate methods to analyze engineering systems for vibrations.
CO6. Ensure sustainability while analyzing engineering systems for vibrations.

DETAILED SYLLABUS:

UNIT – I: SINGLE DEGREE OF FREEDOM (SDOF) SYSTEM (09 Periods)
Single degree of freedom, Alembert's principle, Theory of vibrations, Lumped mass and continuous mass systems, Single degree of freedom (SDOF) systems, Formulation of equations of motion, Undamped and damped free vibration, Damping - Critical damping, Logarithmic decrement.

UNIT – II: TWO DEGREE OF FREEDOM SYSTEMS (09 Periods)
Equations of motion in two degree of freedom systems, Normal mode of vibrations, Applications.

UNIT – III: MULTI–DEGREE OF FREEDOM (MDOF) SYSTEMS (09 Periods)
Formulation of equations of motion, Free vibration, Determination of natural frequencies of vibration and mode shapes, Orthogonal properties of normal modes, Mode superposition method of obtaining response.

UNIT – IV: VIBRATION ANALYSIS (09 Periods)
Vibration analysis, Rayleigh's method, Approximate methods, Improved Rayleigh method**.**

UNIT – V: DYNAMIC ANALYSIS OF CONTINUOUS SYSTEMS (09 Periods)
Differential equation of motion, Transverse vibration of linearly elastic beams, Analysis of undamped free vibration of simply supported and cantilever beams.

Total Periods: 45

TEXT BOOKS:
1. Anil K. Chopra, *Dynamics of Structures*, Pearson Education, 3rd Edition, 2007.
2. Mario Paz, *Structural Dynamics: Theory and Computation*, Kluwer Academic Publication, 2004.

REFERENCE BOOKS:
1. Clough and Penzien, *Dynamics of Structures*, McGraw–Hill International Edition, 3rd Edition, 2008.
2. R. Ayothiraman and Hemanth Hazarika, *Earthquake Hazard Mitigation*, I.K. International Publishing House Pvt. Ltd., 2010.
3. Pankaj Agarwal and Manish Shrikhande, *Earthquake Resistant Design of Structures*, Prentice Hall of India, 2006.

4. S. K. Duggal, *Earthquake Resistant Design of Structures,* Oxford University Press, 2010.

IV B.Tech. - I Semester

(16BT70109) TRANSPORTATION PLANNING AND MANAGEMENT

(Program Elective – 2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Course on Highway and Traffic Engineering.

COURSE DESCRIPTION: Transportation planning; Transport demand analysis; Traffic assignment; Landuse transport models and theory of traffic flow; Transport economics; Public transportation–mass transit systems; Scheduling; Planning; Softwares.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate the knowledge on transportation planning and management.
CO2. Analyze problems associated with transportation planning and management.
CO3. Develop transportation plans and management systems.
CO4. Solve complex problems in transportation planning and management through proper investigations, analysis and interpretation.
CO5. Use appropriate tools and techniques in transportation planning and management.
CO6. Consider societal issues in transportation planning and management.
CO7. Provide solutions to transportation planning and management problems considering environment.
CO8. Maintain ethics in transportation planning and management practice.
CO9. Consider economical issues in transportation planning and management.

DETAILED SYLLABUS:

UNIT - I: TRANSPORTATION PLANNING (08 Periods)

Transportation planning process, System approach to transportation planning, Stages in transportation planning and difficulties in transportation planning process - Transportation survey, Study area, Zoning; Types of surveys - Inventory of transportation facilities; Land use and economic activities.

UNIT - II: TRANSPORT DEMAND ANALYSIS (09 Periods)

Trip purpose - Factors governing trip generation and attraction, Multiple linear regression analysis; Trip distribution models - Gravity model, Modal spilt models, Probit analysis, Traffic assignment models; Travel demand forecasting, Trip generation analysis, Trip classification – Multiple regression analysis, category analysis, modal split analysis; Trip distribution analysis - Methods of trip distribution, Uniform and average factor method, Fratarmethod, Furness method, Gravity model; Linear programming approach to trip distribution.

UNIT - III: TRAFFIC ASSIGNMENT, LANDUSE TRANSPORT MODELS AND THEORY OF TRAFFIC FLOW (09 Periods)

Traffic Assignment: Purpose, Techniques - All or nothing assignment, Multiple route assignment, Capacity restraint assignment; Diversion curves, Route building algorithms

Landuse Transport Models: Selection of land, Lowry model, Grain-Lowry model, Applications of Lowry model.

Theory of Traffic Flow: Scope, Definitions and basic relationship, Hydrodynamic analogies, Car following theory, Probabilistic description of traffic flow, Queuing theory as applied to traffic flow problems for study state conditions, Simulation studies.

UNIT - IV: TRANSPORT ECONOMICS AND PUBLIC TRANSPORTATION–MASS TRANSIT SYSTEMS (08 Periods)

Transport Economics: Economic evaluation of highway schemes, Necessity, Cost and benefits of transportation projects, Basic principles of economic evaluation - Net present value method, Benefit/Cost ratio method, Internal rate of return method; Vehicle operating costs, Value of travel time saving, Accident costs.

Public Transportation–Mass Transit Systems: Bus and rail transit, characteristic capacities – Introduction to advanced computational techniques for transportation planning.

UNIT-V: SCHEDULING, PLANNING AND SOFTWARES (11 Periods)

Scheduling: Grouping of plant and machinery; Incorporating in project planning; Preparation of plant schedule.

Planning: WBS, Network development, Resource allocation, Planning and controlling of resources.

Softwares: Primavera and MS Project. **Total Periods: 45**

TEXT BOOKS:

1. Kadyali, L. R., *Traffic Engineering and Transportation Planning*, Khanna Publications, 7th Edition, 2012.
2. Chitkara, K. K., *Construction Project Management: Planning, Scheduling and Controlling*, Tata McGraw-Hill Education Pvt. Ltd., 3rd Edition, 2010.

REFERENCE BOOKS:

1. Saxena, S. P. and Arora, S. P. *Railway Engineering – A Text Book of Transportation Engineering,* S. Chand and Co. Ltd., 7th Edition, 2010.
2. Chandola, S. P., *A Text Book of Transportation Engineering*, S. Chand & Co Ltd, 2011.
3. Partha Chakroborthy and Animesh Das, *Principles of Transportation Engineering,* Prentice Hall of India Pvt. Ltd, 2005.

4. Papacostas, C. S. and Prevedouros, P. D., *Transportation Engineering and Planning,* Prentice Hall of India Pvt. Ltd., 2006.

IV B.Tech. – I Semester

(16BT70110) WATER RESOURCES SYSTEMS PLANNING AND MANAGEMENT

(Program Elective – 2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Surveying, Engineering Hydrology, Irrigation Engineering.

COURSE DESCRIPTION: Concepts of water resources system planning and management; Linear programming; Dynamic programming; Non–linear optimization techniques; Simulation; Water resources economics; Water resources management.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate the basic knowledge on optimization techniques in systems, planning and management of water resources.
CO2. Analyze optimization techniques and their application in water resources systems, planning and management.
CO3. Develop water resources management systems.
CO4. Solve complex problems associated with water resources systems planning and management through proper analysis and interpretation of data.
CO5. Use and develop appropriate optimization techniques in water resources planning and management.
CO6. Understand the impact of water resources planning and management on society.
CO7. Provide suitable solutions to water resources planning and management problems considering environment sustainability.
CO8. Consider economical issues for cost effective water resources planning and management.

DETAILED SYALABUS:

UNIT - I: WATER RESOURCE SYSTEMS (09 Periods)

Concepts of systems analysis, Systems approach to water resources planning and management, Role of optimization models, Objective function and constraints, Types of optimization techniques.

UNIT - II: LINEAR PROGRAMMING (09 Periods)

Formulation of linear programming models, Graphical method, Simplex method, Application of linear programming in water resources, Revised simplex method, Duality in linear programming, Sensitivity and post optimality analysis.

UNIT - III: DYNAMIC PROGRAMMING (09 Periods)

Belman's principles of optimality, Forward and backward recursive dynamic programming, Case of dimensionality, Application of dynamic programming for resource allocation.

UNIT - IV: NON–LINEAR OPTIMATIZATION TECHNIQUES AND SIMULATION (08 Periods)

Classical method of optimization, Kun–Tucker, Gradient based techniques for simple unconstrained optimization, Application of simulation techniques in water resources planning.

UNIT - V: WATER RESOURCES ECONOMICS AND MANAGEMENT (10 Periods)

Principles of economic analysis, Benefit cost analysis, Socio–economic institutional and pricing of water resources, Planning of reservoir system, Optimal operation of single reservoir system, Allocation of water resources, Optimal cropping pattern, Conjunctive use of surface and sub–surface water resources.

Total Periods: 45

TEXT BOOKS:

1. S. Vedula and P. P. Mujumdar, *Water Resources Systems*, Tata McGraw–Hill, 5th Edition, 2010.
2. N. Ramanathan, *Operations Research*, TMH Publications, 2005.

REFERENCE BOOKS:

1. P. R. Bhave, *Optimal Design of Water Distribution Networks*, Narosa Publishing House, 2003.
2. P. Sankar Iyer, *Operations Research*, TMH Publications, 2008.
3. Rao, S. S., *Engineering Optimization,* John Wiley and Sons Inc., 4th Edition, 2009.
4. James and Lee, *Water Resources Economics,* Oxford Publishers, 2005.
5. Jain, S. K. and Singh, V. P., *Water Resources Systems Planning and Management*, Elsevier, The Netherlands, 2003.
6. Loucks, D. P. and Beek, E. V., *Water Resources Systems Planning and Management*, UNESCO Publishing, The Netherlands, 2005.

7. Chadurvedi, M. C., *Water Resource Systems Planning and Management*, Tata McGraw-Hill inc., New Delhi, 1997.

IV B.Tech. – I Semester

(16BT70111) ADVANCED STEEL STRUCTURES

(Program Elective - 3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Structural Analysis-I, Structural Analysis-II, Steel Structures.

COURSE DESCRIPTION: Welded plate girders; Gantry girder; Steel water tanks; Composite construction; Grillage foundation.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Gain the knowledge on advanced steel structures: welded plate girders, gantry girder, water tanks, composite construction, grillage foundation and connections.
CO2. Analyze the advanced steel structures and their elements.
CO3. Design advanced steel structures and their elements.
CO4. Provide solutions to complex engineering problems associated with advanced steel construction through proper analysis and design.
CO5. Use appropriate techniques to analyze and design of advanced steel structures and their elements.
CO6. Ensure safety and stability in the design of advanced steel structures and their elements
CO7. Follow IS codes in the design of advanced steel structures and their elements.

DETAILED SYLLABUS:

UNIT - I: WELDED PLATE GIRDERS (10 Periods)
Design of cross section of plate girders, Design of end stiffeners, intermediate stiffeners, bearing stiffeners and horizontal stiffeners.

UNIT - II: GANTRY GIRDER (09 Periods)
Gantry girder impact factors, Longitudinal forces, Design of gantry girders.

UNIT - III: STEEL WATER TANKS (09 Periods)
Specifications, Design of rectangular pressed steel tank.

UNIT - IV: STEEL - CONCRETE COMPOSITE CONSTRUCTION
(08 Periods)
Design principles, Shear connections, Composite beam design.

UNIT - V: GRILLAGE FOUNDATION (09 Periods)
Introduction, Design of grillage foundation, Foundation for a single column, Foundation for a two column.

Total Periods: 45

TEXT BOOKS:

1. S. S. Bhavikatti, *Design of Steel Structures*, I. K. International Publishing House Pvt. Ltd., 3nd Edition, 2010.
2. B. C. Punmia, Ashok Kumar Jain and ArunKumar Jain, *Design of Steel Structures,* Laxmi Publications, 2nd Edition, 2013.

REFERENCE BOOKS:

1. S. Ramachandra, *Design of Steel Structures*, Dhanpat Rai Publishing Company, 2nd Edition, 2007.
2. N. Krishna Raju, *Structural Design and Drawing*, Universities Press, 3rd Edition, 2009.
3. S. K. Duggal, *Limit State Design of Steel Structures*, McGraw-Hill, 2nd Edition, 2014.
4. N. Subramanian, *Design of Steel Structures*, Oxford University Press, 2010.

CODES/TABLES:

1. IS: 800–2007: General Construction in Steel – Code of Practice,

Steel Tables, **are to be permitted into the examination hall.**

IV B.Tech. – I Semester

(16BT70112) **EARTHQUAKE RESISTANT DESIGN OF STRUCTURES**

(Program Elective – 3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Structural Dynamics, Engineering Geology.

COURSE DESCRIPTION: Earthquake engineering; Earthquake analysis; Codal design and detailing provisions; Seismic planning; Shear walls and base isolation techniques.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Acquire the knowledge on seismology and earthquake resistant design of structures.
CO2. Analyze structures for earthquake loading.
CO3. Design earthquake resistant structures.
CO4. Recommend suitable structural elements for earthquake resistant structures.
CO5. Use an appropriate technique for earthquake resistant design of structures.
CO6. Consider stability and safety issues in earthquake resistance design of structures.
CO7. Ensure ethics in earthquake resistant design of structures as per IS Codes.

DETAILED SYLLABUS:

UNIT – I: EARTHQUAKE ENGINEERING (08 Periods)

Engineering seismology, Earthquake phenomenon, Causes and effects of earthquakes, Faults, Structure of earth, Plate tectonics, Elastic rebound theory, Earthquake terminology, Source, Focus, Epicenter, Earthquake size, Magnitude and intensity of earthquakes, Classification of earthquakes, Seismic waves, Seismic zones, Seismic zoning map of India.

UNIT – II: EARTHQUAKE ANALYSIS (09 Periods)

Rigid base excitation, Formulation of equations of motion for SDOF and MDOF Systems, Earthquake response analysis of single and multi-storied buildings, Use of response spectra.

UNIT–III: CODAL DESIGN AND DETAILING PROVISIONS (11 Periods)

Codal Design Provisions: Review of the latest Indian seismic code IS:1893 – 2002 (Part–I): Provisions for buildings, Earthquake design philosophy – Assumptions, Design by seismic coefficient and response spectrum methods, Displacements and drift requirements, Provisions for torsion.

Codal Detailing Provisions: Review of the latest Indian seismic codes IS: 4326, IS: 13920 and SP – 34 provisions for ductile detailing of R.C buildings – Beam, Column and joints, Soft store

UNIT – IV: SEISMIC PLANNING (08 Periods)

Plan configurations, Torsion irregularities, Re-entrant corners, Non-parallel systems, Diaphragm discontinuity, Vertical discontinuities in load path, Irregularity in strength and stiffness, Mass irregularities, Vertical geometric irregularity, Proximity of adjacent buildings.

UNIT – V: SHEAR WALL AND BASE ISOLATION TECHNIQUES (09 Periods)

Shear Wall: Types, Design of shear walls as per IS: 13920 – Detailing of reinforcements.

Base Isolation Techniques: Basic concept of seismic base isolation, Various systems and their importance.

Total Periods: 45

TEXT BOOKS:

1. Pankaj Agarwal and Manish Shrikhande, *Earthquake Resistant Design of Structures*, Prentice Hall of India, 2006.
2. S. K. Duggal, *Earthquake Resistant Design of Structures*, Oxford University Press, 2010.

REFERENCE BOOKS:

1. Anil K. Chopra, *Dynamics of Structures*, Pearson Education, 3rd Edition, 2007.
2. Clough and Penzien*, Dynamics of Structures*, McGraw–Hill International Edition, 3rd Edition, 2008.
3. Mario Paz, *Structural Dynamics: Theory and Computation*, Kluwer Academic Publication, 2004.
4. C. V. R. Murty, *Earthquake Tips*, NICEE (www.nicee.org), IIT, Kanpur.

CODE:

IS: 1893-2002: Indian Standard Criteria for Earthquake Resistant Design of Structures, **is to be permitted into the examination hall.**

IV B.Tech. – I Semester

(16BT70113) **HIGHWAY CONSTRUCTION AND MAINTENANCE**

(Program Elective – 3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Highway and Traffic Engineering

COURSE DESCRIPTION: Highway construction; Stabilized roads; Highway drainage, Hill roads; Highway construction equipment; Highway maintenance; Road side development.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate the knowledge on highway construction and maintenance.
CO2. Analyze the problems associated with highway construction and maintenance.
CO3. Design highway drainage.
CO4. Solve issues related to highway construction and maintenance through proper investigations and interpretation of data.
CO5. Use appropriate techniques and tools in highway construction and maintenance.
CO6. Consider the societal issues in highway construction and maintenance.
CO7. Provide solutions to the problems in highway construction and maintenance considering environment.
CO8. Follow ethics in highway construction and maintenance.

DETAILED SYLLABUS:

UNIT - I: HIGHWAY CONSTRUCTION (08 Periods)

General construction, Earth work, Construction of fill and subgrade, Gravel roads, WBM roads, Bituminous pavements, Cement concrete pavements, Different types of joints in cement concrete pavements - Joint filler and sealer; Interlocking concrete block (ICBP) pavements.

UNIT - II: STABILIZED ROADS (08 Periods)

Introduction, Properties of soil-aggregate mixes, Mechanical soil stabilization, Soil-cement stabilization, Soil-lime stabilization, Stabilization of soil using bituminous materials and special problems in soil stabilization work.

UNIT-III: HIGHWAY DRAINAGE AND HILL ROADS (10 Periods)

Highway Drainage: Importance of highway drainage – Requirements; Surface drainage - Design of surface drainage system; Subsurface drainage, Drainage of slopes and erosion control, Road construction in water logged areas and black cotton soils.

Hill Roads: General considerations, Alignment of hill roads, Geometric design of hill roads, Design and construction; Drainage and maintenance problems in hill roads.

UNIT-IV: HIGHWAY CONSTRUCTION EQUIPMENT (09 Periods)

Excavators - Drilling rock and earth; Aggregate production – Trucks and haulage equipment, Dozers, Scrappers; Finishing equipment, Hot-mix plats for bituminous mixes, Pavers and compacting equipment for hot bituminous mixes, Plants and equipment for cement concrete and paving equipment; Piles and pile driving equipment, Air compressors and pumps.

UNIT-V: HIGHWAY MAINTENANCE AND ROAD SIDE DEVELOPMENT (10 Periods)

Highway Maintenance: Introduction, Pavement failures, Maintenance of highways; Pavement evaluation, Strengthening of existing pavements by overlays.

Road Side Development: Environment factors in planning and development of highways, Road side development and arboriculture, Planning plantation of trees, Species and their selection, Care of trees.

Total Periods: 45

TEXT BOOKS:

1. Khanna, S. K., Justo, C. E. G. and Veeraragavan, A., *Highway Engineering, Nem* Chand & Bros, Roorkee, Revised 10th Edition, 2014.
2. Kadiyali, L. R., *Traffic Engineering and Transport Planning*, Khanna Technical Publications, 7th Edition, 2010.

REFERENCE BOOKS:

1. Subhash C. Saxena, *A Course in Traffic Planning and Design,* Dhanpat Rai Publications, 2nd Edition, 1989.
2. Jotin Khisty, C. and KentLall, B., *Transportation Engineering – An Introduction,* Prentice Hall of India Pvt. Ltd., 3rd Edition, 2006.
3. Partha Chakroborthy and Animesh Das, *Principles of Transportation Engineering,* Prentice Hall of India Pvt. Ltd., 2005.

4. Papacostas, C. S. and Prevedouros, P. D., *Transportation Engineering and Planning,* Prentice Hall of India Pvt. Ltd., 2006.

IV B.Tech - I Semester

(16BT70114) **INDUSTRIAL WASTEWATER TREATMENT**

(Professional Elective – 3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Course on Wastewater Technology.

COURSE DESCRIPTION: Industrial wastewater sources and characteristics; Principles of Primary and biological treatment; Advanced wastewater treatment systems; Typical wastewater treatment systems for different industries; Waste minimization.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CEO1. Demonstrate the knowledge on characteristics of industrial wastewater, treatment systems and waste minimization.

CEO2. Analyze characteristics, treatment systems and waste minimization techniques of industrial wastewater.

CEO3. Design wastewater treatment

DETAILED SYLLABUS:

UNIT – I: CHARACTERISTICS OF INDUSTRIAL WASTEWATER **(08 Periods)**

Industrial sources of wastewater and characterization, Significance in determination of characteristics for different industrial effluents, Pattern of pollution and self-purification of a stream, ISI tolerance limits for disposal of effluent into inland surface water and public sewers.

UNIT – II: PRIMARY AND BIOLOGICAL TREATMENT **(10 Periods)**

Scope, Working principle and functions - Equalization, Neutralization, Screen chamber, Grit chamber, Primary sedimentation tank; Microbiological metabolism - Basic kinetic equations, Biological treatment kinetics, Growth kinetics; Complete mix and plug flow systems, Oxygen requirement in aerobic process, Design of conventional biological treatment facilities.

UNIT – III: ADVANCED TREATMENT SYSTEMS **(08 Periods)**

Pollution characteristics, Toxic chemicals, Treatments – Oxidation and reduction systems, Thermal reduction, Air stripping, Membrane systems; Nitrogen removal by biological nitrification and denitrification, Phosphate removal by activated sludge process and anaerobic filters.

UNIT – IV: TYPICAL INDUSTRIAL WASTEWATER TREATMENT **(10 Periods)**

Origin, Characteristics and treatment of wastewater - Pulp and paper mills, Breweries, Wineries, Distilleries, Tanneries, Textile mills, Sugar mills, Refineries and dairy units.

UNIT – V: WASTE MINIMIZATION **(09 Periods)**

In-plant survey, Flow measurement, Composition of wastewater generated, Analytical methods recommended for characterization, Waste volume and strength reduction, Water conservation, Factors encouraging the waste minimization, Clean-up and cleaner technologies, Remediation, Hierarchy of waste management options.

Total Periods: 45

TEXT BOOKS:

1. M. N. Rao and A. K. Dutta, *Waste Water Treatment,* Oxford and IBH Publishers, 3rd Edition, 2009.
2. Met Calf and Eddy, *Wastewater Engineering, Treatment and ReUse,* Mc.Graw Hill Education Private Limited, 4th Edition, 2010.

REFERENCE BOOKS:

1. Newmerow, *Liquid Waste of Industry,* Pearson Education Publishing Co., 1971.
2. Mark J. Hammer and Mark J. Hammer Jr., *Water and Wastewater Technology,* 6th Edition, 2008.
3. A. D. Patwardhan, *Industrial Wastewater Treatment*, PHI Publisher, 2008.

4. Rakesh Kumar and R. N. Singh, *Municipal Water and Wastewater Treatment*, TERI, 2009.

IV B.Tech. I Semester

(16BT70115) INFRASTRUCTURE DEVELOPMENT AND MANAGEMENT

(Program Elective – 3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Construction Planning and Project Management.

COURSE DESCRIPTION: Infrastructure development; Overview of Indian infrastructure – Tenders, Contracts and specifications; Policies on infrastructure development; Construction and infrastructure; Infrastructure management.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate the knowledge on infrastructure development and management in global economy scenario in India.
CO2. Analyze problems associated with infrastructure development and management.
CO3. Formulate legal framework for regulating private partnerships by adopting government policies.
CO4. Use appropriate tools and techniques for better infrastructure development and management.
CO5. Ensure public health care and education in different sectors of infrastructural development projects.
CO6. Use environmentally sustainable approach in infrastructure development and management.
CO7. Maintain ethics in infrastructure development and management by following policies and regulations as per government norms.
CO8. Futuristic plan, monitor and control the finance in infrastructural development projects.

DETAILED SYLLABUS:

UNIT – I: INFRASTRUCTURE DEVELOPMENT (09 Periods)

Impact of Infrastructure development on economic development, Standard of living and environment, Reasons for rise of public sector and government in infrastructural activities, Changed socio-economic scenario and current problems and related issues.

UNIT – II: OVERVIEW OF INDIAN INFRASTRUCTURE (09 Periods)

Indian Infrastructure: Energy, Power, Water resources, Dams, Bridges, Canals, Rural Infrastructure, Urban Infrastructure, Housing, Roads, Railways, Ports, Airports, Social Infrastructure, Education, Health care, Infrastructure deficiencies.

Tenders, Contracts and Specifications: Public Private Partnership (PPP) contracts, Turnkey contracts, FIDIC clauses.

UNIT – III: POLICIES ON INFRASTRUCTURE DEVELOPMENT (09 Periods)

A historical review of the Government policies on infrastructure, Current public policies on transportations, power and telecom sectors, Plans for infrastructure development, Legal framework for regulating private participation, Roads and highways, Ports & Airports, Power and telecom.

UNIT – IV: CONSTRUCTION AND INFRASTRUCTURE (09 Periods)

Construction component of various infrastructure sectors, Highway, Ports and aviation, Oil and gas, Power, Telecom, Railways, Irrigation, Current scenario, Future needs, Investment needed, Regulatory framework, Government policies and future plans, Technological and methodological demands on construction management in infrastructure development projects.

UNIT – V: INFRASTRUCTURE MANAGEMENT (09 Periods)

Importance, scope and role in different sectors of construction

- **Highway Sector:** Repayment of Funds, Toll Collection Strategy, Shadow tolling, and direct tolls, Maintenance strategy, Review of toll rates & structuring to suit the traffic demand.
- **Irrigation Projects:** Large / Small Dams, Instrumentation, Monitoring of water levels, Catchments area, Rainfall data management, Prediction, Land irrigation planning & policies, Processes Barrages, Canals.
- **Power Projects:** Power scenario in India, Estimated requirement, Generation of power distribution strategies, National grid, Load calculation & factors, Hydropower, Day to day operations, Management structures, Maintenance, Thermal Power, Nuclear Power.
- **Airports:** Requisites of domestic and International airports, Cargo and military airports, Facilities available, Terminal management, ATC.
- **Railways:** Mass Rapid Transport System MRTS, LRT, Multi–modal Transport System.

Total Periods: *45*

TEXT BOOKS:

1. Narindar Jetli, K. and Vishal Sethi, *Infrastructure Development in India Post Liberalization Initiatives and Challenges*, New Century Publications, 2007.
2. Raghuram, G. and Jain, R., *Infrastructure Development and Financing towards a Public–Private Partnership*, Macmillan India Ltd., 2002.

REFERENCE BOOKS:

1. Joshi, R. N., *Public Private Partnership in Infrastructure Perspectives, Principles, Practice*, Vision Books, 2000.
2. Prasanna Chandra, *Projects: Planning, Analysis, Selection, Financing, Implementation and Review*, Mc. Graw Hill Education, 8th Edition, 2014.
3. Murty, G. R. K., *Infrastructure Projects: Current Financing Trends,* ICFAI University Press, 2006.

4. Anup Chatterjee, Narinder Jetli, K. and Vishal Sethi*, Industry and Infrastructure Development in India since 1947*, New Century Publications, 2009.

IV B.Tech. - I Semester

(16BT70116) SOIL DYNAMICS AND MACHINE FOUNDATIONS

(Program Elective – 3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Soil Mechanics, Foundation Engineering.

COURSE DESCRIPTION: Fundamentals of vibration; Frequency of soil systems; Wave propagation; Dynamic soil properties; Vibration analyses; Design of machine foundations; Machine foundations on piles; Vibration isolation.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate knowledge on soil behaviour under dynamic loading, vibration analysis, machine foundations and vibration isolation.
CO2. Analyze dynamic soil properties, vibrations and machine foundations.
CO3. Design machine foundations.
CO4. Investigate the soil properties during wave propagation and suggest suitable foundations.
CO5. Use appropriate techniques for dynamic soil characterization, design of machine foundations and vibration isolation.
CO6. Recommend machine foundations and vibration isolation techniques considering stability and safety.
CO7. Follow IS codes in dynamic soil characterization, design of machine foundations and suggesting vibration isolation techniques.

DETAILED SYLLABUS:

UNIT – I: FUNDAMENTALS OF VIBRATION AND FREQUENCY OF SOIL SYSTEMS (09 Periods)

Fundamentals of Vibration: Definitions, Simple harmonic motion, Free and forced vibrations with and without viscous damping, Frequency dependent excitation, Systems under transient loads, Rayleigh's method of fundamental frequency, Logarithmic decrement.

Frequency of Soil Systems: Determination of viscous damping, Transmissibility, Systems with two and multiple degrees of freedom, Vibration measuring instruments.

UNIT – II: WAVE PROPAGATION AND DYNAMIC SOIL PROPERTIES (09 Periods)

Wave Propagation: Propagation of seismic waves in soil deposits, Attenuation of stress waves, Stress–strain behavior of cyclically loaded soils, Strength of cyclically loaded soils.

Dynamic Soil Properties: Dynamic soil properties, Laboratory and field testing techniques, Elastic constants of soils, Correlations for shear modulus and damping ratio in sands, gravels, clays and lightly cemented sand; Liquefaction of soils.

UNIT - III: VIBRATION ANALYSES (09 Periods)

Types, General requirements, Permissible amplitude, Allowable soil pressure, Modes of vibration of a rigid foundation block, Methods of analysis, Lumped mass models, Elastic half space method, Elastodynamics, Effect of footing shape on vibratory response, Dynamic response of embedded block foundation.

UNIT – IV: DESIGN OF MACHINE FOUNDATIONS (09 Periods)

Analysis and design of block foundations for reciprocating engines, Dynamic analysis and design procedure for a hammer foundation, IS Code of practice, Design procedure for foundations of reciprocating and impact type machines.

UNIT – V: MACHINE FOUNDATIONS ON PILES AND VIBRATION ISOLATION (09 Periods)

Machine Foundations on Piles: Introduction, Analysis of piles under vertical vibrations, Analysis of piles under translation and rocking, Analysis of piles under torsion, Design procedure for a pile supported machine foundation.

Vibration Isolation: Types and methods of isolation, Active isolation and passive isolation, Dynamic properties of isolation materials.

TEXT BOOKS:

1. Das, Braja M. and Ramana, G. V., *Principles of Soil Dynamics,* Cengage Learning Inc., 2nd Edition, 2011.
2. Srinivasulu, P. and Vaidyanathan, C., *Hand Book of Machine Foundations,* Tata McGraw–Hill, 2007.

REFERENCE BOOKS:

1. Arya, S. D, O'Neil, M. and Pincus, G., *Design of Structures and Foundations for Vibrating Machines,* G.Gulf Publishing Co., 1979.
2. Prakash, S., *Soil Dynamics,* McGraw-Hill, 1981.

3. Swami Saran, *Soil Dynamics and Machine Foundations,* Galgotia Publications Pvt. Ltd., 2nd Edition, 2010.
4. Kameswara Rao, N. S. V., *Vibration Analysis and Foundation Dynamics,* Wheeler Publishing, 1998.

IV B.Tech I Semester

(16BT70117) **WATERSHED MANAGEMENT**

(Program Elective – 3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Surveying, Engineering Hydrology.

COURSE DESCRIPTION: Concept of watershed; Need and objectives; Characteristics of watershed; Principles of erosion; Measures to control erosion; Water harvesting; Land and ecosystem management; Planning and administration.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Understand the principles and applications of watershed management.
CO2. Assess water availability, soil erosion, ecosystems and watershed management techniques.
CO3. Design solutions for complex harvesting sites to meet the specific needs.
CO4. Conduct investigations and interpret data for development of watersheds.
CO5. Use of modern tools to enhance the efficiency of harvesting systems.
CO6. Consider societal issues in the development of watershed management.
CO7. Ensure environmental sustainability in the development of watershed.
CO8. Effective management of watersheds.

DETAILED SYLLABUS:

UNIT – I: WATERSHED **(09 Periods)**

Objectives, Need for watershed development in India, Classification, Integrated and multidisciplinary approach for watershed management, Characteristics of watershed – Socio–economic characteristics, Basic data on watersheds.

UNIT – II: PRINCIPLES OF EROSION **(10 Periods)**

Types of erosion, Factors affecting erosion, Effects of erosion on land fertility, Estimation of soil loss due to erosion, Universal soil loss equation, Contour techniques, Ploughing, Furrowing, Trenching, Bunding, Terracing, Gully control, Rockfill dam, Brushwood dam, Gabion.

UNIT – III: WATER HARVESTING AND LAND MANAGEMENT **(09 Periods)**

Rainwater harvesting, Catchment harvesting, Harvesting structures, Soil moisture conservation, Check dams, Artificial recharge - Farm ponds, Percolation tanks, Latest techniques of harvesting; Land use and land capability classification; Management of forest, agricultural, grassland and wild land; Reclamation of saline and alkaline soils.

UNIT – IV: ECOSYSTEM MANAGEMENT **(09 Periods)**

Role of ecosystem, Crop husbandry, Soil enrichment; Inter, mixed and strip cropping; Cropping pattern, Sustainable agriculture, Bio–mass management, Dry land agriculture, Silvi pastures, Horticulture, Social forestry and afforestation.

UNIT – V: PLANNING AND ADMINISTRATION **(08 Periods)**

Planning of watershed management activities, Stake holder's participation, Preparation of action plan, Administrative requirements, Trends in watershed management.

Total Periods: 45

TEXT BOOKS:

1. J. V. S. Murthy, *Watershed Management,* New Age International Publishers, 2nd Edition, 2009.
2. R. A. Wurbs and W.P. James, *Water Resource Engineering*, PHI Publications, 2001.

REFERENCE BOOKS:

1. V. V. N. Murthy, *Land and Water Management,* Kalyani Publications, 4th Edition, 2008.
2. D. K. Majumdar, *Irrigation and Water Management,* PHI, 2010.
3. Vijay P. Singh, Ram Narayan yadava, *Watershed Management*, Allied Publishers, 2003.
4. Timothy O. Randhir, *Watershed Management: Issues and Approaches*, IWA Publishing, 2007.

IV B.Tech. - I Semester
(16BT70118) AIR POLLUTION AND CONTROL
(Program Elective - 4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Environmental Studies

COURSE DESCRIPTION: Fundamentals of air pollution; Effects of air pollution; Sampling and analysis; Control methods and equipment; Air and noise pollution from industrial operations.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate the knowledge on air pollution, effects, sampling, control methods and equipment.
CO2. Identify and analyse air pollution and control measures.
CO3. Design various air pollution controlling systems.
CO4. Provide solutions to complex air pollution problems through proper investigations and interpretation.
CO5. Use appropriate techniques in the analysis, control and management of air pollution.
CO6. Consider the ill effects of air pollution on human health, materials and vegetation in designing controlling systems.
CO7. Understand and demonstrate the need for sustainable development.
CO8. Follow IS codes in analysis and control of air pollution.

DETAILED SYLLABUS:

UNIT – I: AIR POLLUTION (08 Periods)

Scope and significance of air pollution, Episodes in India and other nations – Overview; Sources and classification of air pollutants, Meteorology and air pollution – Plume behaviour, Wind rose; Dispersion theories and model, Stack height.

UNIT – II: EFFECTS OF AIR POLLUTION (09 Periods)

Effects of air pollution on human health, animals and plants; Global effects of air pollution – Green house effect, Heat islands, Acid rains, Ozone holes; Economic effects of air pollution – Material damage; Art treasures in India and other countries.

UNIT – III: SAMPLING AND ANALYSIS (09 Periods)

Classification, Stages and methods of sampling, Difficulties encountered, Instruments of sampling, Duration and location of sampling sites, Sampling - High volume filtration, Stack sampling techniques; Recent trends in sampling of stack effluents.

UNIT – IV: CONTROL METHODS AND EQUIPMENT (10 Periods)

Analytical methods – Chemical, Instrumental and biological methods; Types of collection equipment – Settling chambers, Inertial separators, Cyclones, Filters and electrostatic precipitators, Scrubbers or wet collectors; Choice of equipment and economical aspects, Control of smoke, Gaseous contaminants, Odours and by process changes.

UNIT – V: AIR AND NOISE POLLUTION FROM INDUSTRIAL OPERATIONS (09 Periods)

Air Pollution from Industrial Operations: Air pollution from major industrial operations – Mineral product industries, Cement industry, Petroleum refineries, Ferrous and non-ferrous metallurgical operations, Thermal power plants; Kinds of air quality standards, Emission standards and air pollution indices.

Noise Pollution from Industrial Operations: Noise pollution from industrial operations, Noise standards.

Total Periods: 45

TEXT BOOKS:

1. M. N. Rao and H. V. N. Rao, *Air Pollution*, Tata McGraw-Hill Education Pvt. Ltd., New Delhi, 19th Edition, 2010.
2. Thod Godish, *Air Quality*, Levis Publishers, Taylor and Francis Group, New Delhi, 4th Edition, 2003.
3. K. Wark and C. F. Warner, Harper and Row, *Air Pollution: Its Origin and Control*, Addison–Wesley, New York, 3rd Edition, 1998.

REFERENCE BOOKS:

1. R. K. Trivedy and P. K. Goel, *An introduction to Air Pollution*, B. S. P. Books Pvt. Ltd., Hyderabad, 2nd Edition, 2005.
2. K. V. S. G. Murali Krishna, *Air Pollution and Control*, Kousal and Co. Publications, New Delhi, 3rd Edition, 2008.
3. B. Padmanabha Murthy, *Environmental Meteorology*, I. K. Internationals Pvt. Ltd., New Delhi, 2009.
4. Crawford, M., *Air pollution Control Theory*, Tata McGraw-Hill, New Delhi, 1980.

5. H. C. Perkins, *Air Pollution*, McGraw-Hill Higher Education, Lincoln, United Kingdom, 1974.

IV B.Tech. – I Semester
(16BT70119) **BRIDGE ENGINEERING**
(Program Elective – 4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Reinforced Concrete Structures and Foundation Engineering.
COURSE DESCRIPTION: Bridge loading standards; Box culvert and deck slab bridge; Beam and slab bridge; Bridge bearings; Piers and abutments.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Acquire knowledge on site selection and design of RCC Bridges.
CO2. Analyze various components RCC bridges.
CO3. Design various components of RCC bridges.
CO4. Recommend suitable bridge components.
CO5. Use appropriate techniques in the analysis and design of RCC bridges.
CO6. Consider stability, safety and serviceability requirements in the design components of RCC bridges.
CO7. Ensure environmental sustainability in planning and preparing RCC bridge designs.
CO8. Ensure ethics in RCC bridge design in accordance with IS Codes.

DETAILED SYLLABUS:

UNIT – I: BRIDGE LOADING STANDARDS (08 Periods)
Highway bridge loading standards, Impact factor, Railway bridge loading standards (B.G. ML Bridge), Various loads in bridges, Importance of site investigation in bridge design.

UNIT – II: BOX CULVERT AND DECK SLAB BRIDGE (10 Periods)
Box Culvert: General aspects, Design loads, Design of box culvert subjected to class AA tracked vehicle only.
Deck Slab Bridge: Effective width method of analysis and design of deck slab bridge (simply supported) subjected to Class AA tracked vehicle only.

UNIT – III: BEAM AND SLAB BRIDGE(T–BEAM BRIDGE) (09 Periods)
General features, Design of interior panel of slab, Pigeauds method, Design of a T–beam bridge subjected to Class AA tracked vehicle only.

UNIT – IV: BRIDGE BEARINGS (08 Periods)
General features, Types of bearings, Design principles of steel rocker and roller bearings, Design of a steel rocker bearing, Design of elastomeric pad bearing.

UNIT – V: PIERS AND ABUTMENTS (10 Periods)
General features, Bed block, Materials of piers and abutments, Types of piers, Forces acting on piers, Stability analysis of piers, General features of abutments, Forces acting on abutments, Stability analysis of abutments, Types of wing walls, Approaches, Types of bridge foundations (excluding design).

Total Periods: 45

TEXT BOOKS:
1. N. Krishna Raju, *Design of Bridges,* Oxford and IBH, Publishing Company Pvt. Ltd., 4th Edition, 2010.
2. T. R. Jagadish and M. A. Jayaram, *Design of Bridges Structures,* Prentice Hall of India Pvt. Ltd., 2nd Edition, 2004.

REFERENCE BOOKS:
1. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Design of Steel Structures,* Laxmi Publications, 2nd Edition, 2013.
2. Ramachandra, *Design of Steel Structures,* Scientific Publishers (India), 11th Edition, 2009.
3. Ponnuswamy, S., *Bridge Engineering,* Tata Mcgraw–Hill Company, 2nd Edition, 2010.
4. Swami Saran, *Analysis and Design of Substructures – Limit State Design,* Oxford and IBH Publishing Company Pvt. Ltd., 2nd Edition, 2010.

CODES:
1. IRC: 5-2000: Standard Specifications and Code of Practice for Road Bridges Section I: General Features of Design,
2. IRC: 6-2014: Standard Specifications and Code of Practice for Road Bridges Section II: Loads and Stresses,
3. IRC: 21-2000: Standard Specifications and Code of Practice for Road Bridges Section III: Cement Concrete (Plain and Reinforced),
4. IRC: 83 (Part I)-1999: Standard Specifications and Code of Practice for Road Bridges Part I: Metallic Bearings,
5. IRC: 83 (Part II)-1987: Standard Specifications and Code of Practice for Road Bridges Part II: Elastomeric Bearings,

IRC: 83 (Part III)-2002: Standard Specifications and Code of practice for Road bridges Part III: POT, POT–CUM–PTFE, PIN AND METALLIC GUIDE BEARINGS, **are to be permitted into the examination hall.**

IV B.Tech. – I Semester

(16BT70120) GROUND IMPROVEMENT TECHNIQUES

(Program Elective – 4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Soil Mechanics and Foundation Engineering.

COURSE DESCRIPTION: Scope of ground improvement; Methods of ground improvement; Drainage and dewatering; In–situ densification; Stabilization; Geosynthetics and earth reinforcement.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Explain the concept and techniques of ground improvement.
CO2. Compare different types of ground improvement techniques and select an appropriate one.
CO3. Design ground improvement techniques.
CO4. Solve complex soil problems through suitable ground improvement techniques.
CO5. Use and develop appropriate ground improvement techniques.
CO6. Understand the importance of safety in the design and execution of any ground improvement technique.
CO7. Recommend environmental friendly ground improvement techniques.
CO8. Follow IS Codes in practicing ground improvement techniques.

DETAILED SYLLABUS:

UNIT – I: GROUND IMPROVEMENT (08 Periods)

Role of ground improvement in foundation engineering, Methods of ground improvement, Geotechnical problems in alluvial, laterite and black cotton soils; Selection of suitable ground improvement techniques based on soil condition.

UNIT – II: DRAINAGE AND DEWATERING (09 Periods)

Drainage techniques, Well points, Vacuum and electroosmotic methods, Dewatering after construction, Control of surface water, Well pointing in deep excavation, Drainage on slopes, Electro kinetic dewatering system.

UNIT – III: IN-SITU DENSIFICATION OF GRANULAR SOILS AND COHESIVE SOILS (10 Periods)

Granular Soils: Principles of in-situ densification, In-situ densification methods – Dynamic compaction, Blasting, Vibro compaction, Granular piles, Relative merits and their limitations.

Cohesive Soils: Principles of in-situ densification, In-situ densification methods – Vertical drains, Sand wick, Geodrains, Stone columns, Granular pile anchors, Lime columns and thermal methods, Relative merits and their limitations.

UNIT – IV: SOIL STABILIZATION (09 Periods)

Soil Stabilization – Mechanical, Bitumen, Cement, Lime and Chemical; Stabilization of expansive soils; Soil stabilization by grouting - Types of grouts, Grouting equipment and machinery, Injection methods, Grout monitoring; Shotcreting and guniting technology.

UNIT – V: GEOSYNTHETICS AND EARTH REINFORCEMENT (09 Periods)

Concept of reinforcement, Types of reinforcement material, Components and applications of reinforced earth, Soil nailing, Geosynthetics – Types, Functions, Applications; Design of geosynthetic reinforced earth walls.

Total Periods: 45

TEXT BOOKS:

1. Hausmann, M. R., *Engineering Principles of Ground Modification,* McGraw–Hill Publishers, 1990.
2. Purushotham Raj, P., *Ground Improvement Techniques,* Laxmi Publications Pvt. Ltd., 2005.

REFERENCE BOOKS:

1. Moseley, M. P. and Kirsch. K., *Ground Improvement,* Taylor Francis Ltd., 2nd Revised Edition, 2004.
2. Xanthakos P. P., Abramson, L. W and Bruce, D. A., *Ground Control and Improvement,* John Wiley and Sons, 1994.
3. Koerner, R. M., *Designing with Geosynthetics, Xlibris* Publishers*,* 6th Edition, 2012.
4. Jewell, R. A., *Soil Reinforcement with Geotextiles (Report),* CIRIA Special Publication, 1996.

IV B.Tech. – I Semester

(16BT70121) HYDRO POWER ENGINEERING

(Program Elective – 4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Fluid Mechanics and Hydraulic Machinery.

COURSE DESCRIPTION: Hydro power; Water power estimate; Hydro power plants; Pumped storage power plants; Hydraulic turbines; Water conveyance; Channel surges and intakes; Power house and equipment.

COURSE OUTCOMES: On successful completion of this course, the students will able to:

CO1. Demonstrate knowledge on the basic concepts of hydro power, hydro power plants and its components.

CO2. Analyze hydro power estimates, hydro power plants and its components.

CO3. Design components of hydro power plant.

CO4. Recommend suitable solutions for hydro power issues through proper investigation and interpretation.

CO5. Use appropriate methods in estimation of hydropower potential.

CO6. Consider societal issues while recommending for the construction of hydro power plants.

CO7. Ensure environmental sustainability in planning, construction and operation of hydro power plants.

DETAILED SYLLABUS:

UNIT - I: HYDROPOWER AND ESTIMATE (09 Periods)

Hydropower development, Sources of energy, Estimation of water power potential, Load curve, Load factor, Capacity factor, Utilization factor, Diversity factor, Load duration curve, Firm power, Secondary power, Prediction of load, Collection and analysis of stream flow data, Mass curve, Flow duration curves, Construction and utility of these curves, Effect of storage and pondage, Estimates of available water power.

UNIT - II: HYDROPOWER PLANTS (09 Periods)

Low and high head plants: Classification of hydel plants, Run-off- river plants, General arrangement of run-off-river plants, Valley dam plants, Diversion canal plants, High head diversion plants, Storage and pondage, Basic features, Advantages of pumped storage plants, Types of pumped storage plants, Relative merits of two-unit and three-unit arrangement, Tidal power plants.

UNIT - III: HYDRAULIC MACHINES (10 Periods)

Reciprocating Pumps, Components and working principle of Single acting and double acting reciprocating pumps, Discharge coefficient, Volumetric efficiency and Slip; Work done by reciprocating pumps, Work done and power input, Indicator diagram, Effect of acceleration and friction on indicator diagram.

UNIT - IV: WATER CONVEYANCE (09 Periods)

Classification of penstocks, Design criteria, Economical diameter, Anchor blocks, Conduit valves, Bends and manifolds -Water hammer, Resonance in penstocks, Channel surges, Surge tanks, Intakes, Types, Losses, Air entrainment, Inlet aeration, Canals, Forebay, Tunnels, Selection of turbines.

UNIT - V: POWER HOUSE AND EQUIPMENT (08 Periods)

Location of power house, General arrangement of hydroelectric unit, Number and size of units, Power house sub structure.

Total Periods: 45

TEXT BOOKS:

1. M. M. Dandekar and K.N. Sharma, *Water Power Engineering*, Vikas Publishing House Pvt. Ltd., India, 2007
2. R.K. Sharma and T.K. Sharma, *A Text Book of Water Power Engineering*, S. Chand Company, New Delhi, 2008.

REFERENCE BOOKS:

1. B. C. Punmia, B. B. PandeLal, Ashok Kumar Jain and Arun Kumar Jain, *Irrigation and Water Power Engineering*, Laxmi Publications, New Delhi, 2009.
2. P. N. Modi, *Irrigation Water Resources and Water Power Engineering*, Standard Book House, 7th Edition, 2008.

3. K. R. Arora, Irrigation, *Water Power and Water Resources Engineering*, Standard Publishers Distributors, Delhi, 4th Edition, 2011.
4. Deshmukh M.M, *Water Power Engineering*, DhanpatRai and Sons, New Delhi, 1978.

IV B.Tech. – I Semester

(16BT70122) PAVEMENT ANALYSIS AND DESIGN

(Program Elective – 4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Highway and Traffic Engineering.

COURSE DESCRIPTION: Highway materials and mix design; Design factors for flexible pavements; Analysis and design of flexible pavements; Analysis and design of rigid pavements.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate the knowledge on transportation planning, pavement analysis and design.

CO2. Analyze problems associated with transportation planning, pavement analysis and design.

CO3. Design of pavements and bituminous concrete mix.

CO4. Solve transportation planning, pavement analysis and design problems through proper analysis, interpretation and design.

CO5. Use appropriate methods in transportation planning, pavement analysis and design.

CO6. Consider safety issues in providing solutions to problems in transportation planning and pavement design.

CO7. Provide solutions to the problems in transportation planning, pavement analysis and design, considering environment.

CO8. Follow codes of practice in transportation planning, pavement analysis and design.

DETAILED SYLLABUS:

UNIT - I: HIGHWAY MATERIALS AND MIX DESIGN (09 Periods)

Soil, Aggregate and bitumen, Aggregate properties and their Importance, Bituminous concrete - Mix design, Marshall's method of bituminous mix design.

UNIT - II: DESIGN FACTORS AND ANALYSIS OF FLEXIBLE PAVEMENTS (12 Periods)

Design Factors for Flexible Pavements: Types of pavement, Factors affecting design of flexible pavements - Elastic modulus, Poisson's ratio, Wheel load, Wheel configuration and tyre pressure, ESWL Concept, Contact pressure, Material characteristics, Environmental and other factors.

Analysis of Flexible Pavements: Stresses in flexible pavement, Layered systems concept - One layer system, Boussinesq two-layer system, Burmister two-layer theory for pavement design.

UNIT - III: DESIGN OF FLEXIBLE PAVEMENTS (08 Periods)

Theoretical, Empirical and semi-empirical methods - Burmister, CBR Method, AASHO Method, IRC method.

UNIT - IV: ANALYSIS OF RIGID PAVEMENTS (08 Periods)

Stresses in rigid pavements, Relative stiffness of slab, Modulus of sub grade reaction, Stresses due to warping, Stresses due to loads, Stresses due to friction.

UNIT - IV: DESIGN OF RIGID PAVEMENTS (08 Periods)

General design approach, PCA method, AASHTO, IRC method, Design of different types of joints in CC pavements, Design of tie bars and dowel bars.

Total Periods: 45

TEXT BOOKS:

1. Khanna, S. K., Justo, C. E. G. and Veeraragavan, A., *Highway Engineering, Nem* Chand & Bros, Roorkee, Revised 10th Edition, 2014.
2. Kadiyali, L. R., *Traffic Engineering and Transport Planning,* Khanna Technical Publications, 7th Edition, 2010.

REFERENCE BOOKS:

1. Jotin Khisty, C. and Kent Lall, B., *Transportation Engineering –An Introduction,* Prentice Hall of India Pvt. Ltd., 3rd Edition, 2006.
2. Partha Chakroborthy and Animesh Das, *Principles of Transportation Engineering,* Prentice Hall of India Pvt. Ltd, 2005.
3. Yoder, E. J. and Witczack, M. W., *Principles of Pavement Design,* John Wily & Sons, New York, 2nd Edition, 1975.
4. Papacostas, C. S. and Prevedouros, P. D., *Transportation Engineering and Planning,* Prentice Hall of India Pvt. Ltd., 2006.
5. Mannering, F. L. and Washburn, S. S., *Principles of Highway Engineering and Traffic Analysis*, John Wiley & Sons, Inc., 5th Edition, 2013.

CODES:

1. IRC: 37-2012: *Tentative Guidelines for the Design of Flexible Pavements,* Third Revision, Indian Roads Congress, New Delhi,

2. IRC: 58-2015: *Guidelines for the Design of Plain Jointed Rigid Pavements for Highways*, Fourth Revision, Indian Roads Congress, New Delhi, **are to be permitted into the examination hall.**

IV B.Tech. – I Semester
(16BT70123) **PRESTRESSED CONCRETE**

(Program Elective –4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Structural Analysis, Reinforced Cement Concrete Structures.

COURSE DESCRIPTION: Materials for prestressed concrete; Prestressing systems**;** Analysis of prestress; Design of section for flexure and shear; Analysis of end blocks, Composite construction of prestressed and insitu concrete.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate the knowledge on prestressed concrete structures and composite construction.
CO2. Analyze prestressed concrete members and composite structures.
CO3. Design prestressed concrete structural elements and composite structures.
CO4. Solve problems associated with prestressed concrete structures and composite construction through proper analysis and interpretation.
CO5. Use appropriate techniques for the analysis and design of prestressed concrete structures and composite construction.
CO6. Consider safety issues in the design of prestressed concrete structures and composite construction in the context of society.
CO7. Follow IS Codes of practice in the design of prestressed concrete structures and composite construction.

DETAILED SYLLABUS:

UNIT - I: MATERIALS FOR PRESTRESSED CONCRETE AND PRESTRESSING SYSTEMS (08 Periods)

Principles of prestressing, Types of prestressing, Materials - High strength concrete, High tensile steel; Advantages and limitations of pre-stressed concrete, Tensioning devices, Pre-tensioning and post-tensioning systems, Types - Hoyer system, Magnel Blaton system, Freyssinet system, Gifford-Udall system, Lee McCall system.

UNIT - II: ANALYSIS OF PRESTRESS (10 Periods)

Analysis of sections for flexure – Stress concept, Load balancing concept, Force concept; Kern zone, Pressure line, Cable zone, Losses of prestress in pre-tensioning and post-tensioning system.

UNIT - III: DESIGN OF SECTION FOR FLEXURE AND SHEAR (08 Periods)

Design of section for the limit state of collapse in flexure, Stress range approach, Design of shear reinforcements - IS codal provision.

UNIT - IV: ANALYSIS OF END BLOCKS (10 Periods)

Anchorage zone stresses - Guyon's method, Magnel method; Anchorage zone reinforcement, Transfer of prestress pre–tensioned members.

UNIT - V: COMPOSITE CONSTRUCTION OF PRESTRESSED AND INSITU CONCRETE (09 Periods)

Need of composite construction, Different types – Propped, Unpropped; Stress distribution of composite construction, Differential shrinkage, Design of composite section.

Total Periods: 45

TEXT BOOKS:

1. N. Krishna Raju, *Prestressed Concrete*, Tata McGraw–Hill Publications, 4th Edition, 2011.
2. N. Rajagopalan, *Prestressed Concrete*, Narosa Publications, 2nd Edition, 2014.

REFERENCE BOOKS:

1. Ramamrutham, *Prestressed Concrete*, Dhanpat Rai Publications, 5th Edition, 2003.
2. T. Y. Lin and Ned H. Burns, *Design of Prestressed Concrete Structures*, John Wiley and Sons, 3rd Edition, 2010.
3. Praveen Nagaraju, *Prestressed Concrete Design*, Dorling Kindersley Publication, 2013.
4. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Reinforced Concrete Structures*, Vol.I, LaxmiPublications Pvt. Ltd., New Delhi, 19th Edition, 2010.

CODE:

IS: 1343–2012: Prestressed Concrete – Code of Practice, **is to be permitted into the examination hall.**

IV B.Tech. – I Semester

(16BT70124) REHABILITATION AND RETROFITTING OF STRUCTURES

(Program Elective –4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Building Materials and Construction Technology, Concrete Technology, Reinforced Cement Concrete Structures.

COURSE DESCRIPTION: Maintenance and repair strategies; Serviceability and durability of concrete; Materials and techniques for repair; Repairs, Rehabilitation and Retrofitting of structures; Demolition techniques.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate the knowledge on maintenance, repair and rehabilitation of concrete structures.

CO2. Analyze structural damages and techniques of rehabilitation, retrofitting and demolition.

CO3. Solve the complex problems pertaining to the repairs, rehabilitation, retrofitting and demolition of structures.

CO4. Use appropriate techniques for repairs, rehabilitation, retrofitting and demolition of structures.

CO5. Understanding the impacts of damages and apply contextual knowledge in repair, rehabilitation, retrofitting to ensure safety of the structures in societal context.

CO6. Comprehend the reports effectively on the case studies of demolition of buildings.

DETAILED SYLLABUS:

UNIT - I: MAINTENANCE AND REPAIR STRATEGIES (08 Periods)

Maintenance, Repair and rehabilitation, Facets of Maintenance, Importance of maintenance, Various aspects of inspection, Assessment procedure for evaluating a damaged structure, Causes of deterioration.

UNIT - II: SERVICEABILITY AND DURABILITY OF CONCRETE (09 Periods)

Quality assurance for concrete construction, Concrete properties – Strength, Permeability, Thermal properties; Cracks – Causes and effects due to climate, temperature, chemicals, and corrosion; Design and construction errors – Effects of cover thickness and cracking.

UNIT - III: MATERIALS FOR REPAIR (10 Periods)

Special concretes and mortar, Concrete chemicals, Special elements for accelerated strength gain, Expansive cement, Polymer concrete, Sulphur infiltrated concrete, Ferrocement, Fibre reinforced concrete, Rust eliminators and polymers coating for rebars during repair, Foamed concrete, Mortar and dry pack, Vacuum concrete.

UNIT - IV: TECHNIQUES FOR REPAIR (09 Periods)

Gunite and shotcrete, Epoxy injection, Mortar repair for cracks, Shoring and underpinning, Methods of corrosion protection, Corrosion inhibitors, Corrosion resistant steels, Coating to reinforcement and cathodic protection.

UNIT- V:REPAIRS, REHABILITATION, RETROFITTING AND DEMOLITION OF STRUCTURES (09 Periods)

Repairs, Rehabilitation, Retrofitting of Structures: Repairs to overcome low member strength, Deflection, Cracking, Chemical disruption, Weathering, Corrosion, Wear, Fire, Leakage and marine exposure.

Demolition of Structures: Engineered demolition techniques for dilapidated structures – Case studies.

Total Periods: 45

TEXT BOOKS:

1. Vidivelli, B., *Rehabilitation of Concrete Structures*, Standard Publishers Distributors, 2008.
2. Santhakumar, A. R., *Training Course Notes on Damage Assessment and Repairs in Low Cost Housing*, "RHDC – NBO", Anna University, 1992.

REFERENCE BOOKS:

1. Shetty, M. S., *Concrete Technology – Theory and Practice,* S. Chand and Company, 2005.
2. Zongjinli, *Advanced Concrete technology*, John Wiley and Sons, 2011.
3. M. G. Alexander, H. D. Beushausen, F. Dehn and P. Moyo, *Concrete Repair, Rehabilitation and Retrofitting III*, CRC press/ Balkama, 2012.

4. P. K. Guha, *Maintenance and Repairs of Buildings*, New Central Book Agency (P) Ltd., 2006.

IV B.Tech. – I Semester

(16BT70131) CIVIL ENGINEERING SOFTWARE LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Courses in different domains of Civil Engineering.

COURSE DESCRIPTION: Software tools in modeling; analysis and design of systems in different domains of Civil Engineering - Structural Engineering; Geotechnical Engineering; Transportation Engineering; Environmental Engineering; Water Resources Engineering; Construction Engineering; Surveying.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Acquire knowledge on software tools in analysis and design of civil engineering systems.
CO2. Analyse civil engineering systems by software tools.
CO3. Design civil engineering systems through software tools.
CO4. Address complex civil engineering problems for better solutions with software tools.
CO5. Use the latest software tools for modeling, analysis and design of civil engineering systems.
CO6. Consider safety of built environment through software tools.
CO7. Contemplate environmental sustainability of civil engineering systems through software tools.
CO8. Follow ethics in civil engineering practice through software tools.
CO9. Function effectively as an individual and as a team member in modeling, analysis and design of civil engineering systems using software tools.
CO10. Communicate effectively on civil engineering software applications in written, oral and graphical forms.

DETAILED SYLLABUS:

This laboratory provides training to the students in using popular softwares for various Civil Engineering Applications as mentioned below.

LIST OF EXERCISES:

1. **ROBOT Structure** for Structural Analysis and Design
2. **SAP 2000** for Structural Analysis and Design
3. **ETABS** for Integrated Analysis, Design and Drafting of Building Systems
4. **NISA–CIVIL** for Structural Analysis And Design
5. **PLAXIS 2D/3D** for Geotechnical Modeling Software
6. **GEOSLOPE** for Slope Stability Analysis
7. **FLAC 2D/3D** for Geotechnical Modeling Software
8. **Civil 3D** for Computer Aided Civil Engineering Drafting
9. **MXROAD SUITE** for Pavement Design, Rehabilitation and Renewal.
10. **KENPAVE** for Pavement Design and Rate Analysis of Roads
11. **SYNCHRO** for Traffic Signal Timing and Analysis Software
12. **MIKE-SHE** for Hydrologic and Hydraulic Modeling
13. **HEC-HMS** for Hydrologic Modeling System
14. **SWMM** for Storm Water Management Model
15. **SWAT** for Soil and Water Assessment Tool
16. **EPANET** for Hydraulic and Water Quality Behavior of Water Distribution System
17. **OPEN FOAM** for Fluid Flow Simulation and Analysis
18. **Visual MODFLOW** for Water Resources Engineering
19. **PRIMAVERA** for Project Management
20. **MS PROJECT** for Project Management
21. **Auto Plotter** for Analysis of Surveying Results
22. **Auto CAD Revit Structure Suite** for Analysis and Design of Various Structural Members
23. **Auto CAD Revit Architecture** for Plotting the Graphical Design of Structural Members
24. **Spread Sheets** for Civil Engineering Applications

Suggested References:

- Software manuals

Note: A minimum of twelve exercises are to be performed covering all technical areas of civil engineering

IV B. Tech. – I Semester

(16BT70132) REMOTE SENSING AND GEOGRAPHICAL INFORMATION SYSTEMS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: -

COURSE DESCRIPTION: Creation of geo–database; Digitization of toposheet/map; Drainage analysis; Developing digital elevation model; Preparation of thematic maps; Land use and land cover analysis; Study of feature estimation; Rainfall runoff analysis; Road network analysis; Watershed analysis; Site suitability analysis; Natural hazard zones map.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate the practical knowledge on toposheets, aerial photographs, satellite imagery, remote sensing and GIS applications to civil engineering.

CO2. Identify the spatial objects on the toposheets and imagery.

CO3. Create the thematic maps using geospatial data with emphasis on practical applications in civil engineering.

CO4. Conduct field study and interpret the spatial and non spatial data.

CO5. Select appropriate methods to estimate the feature classes in RS and GIS applications.

CO6. Provide geospatial solutions to civil engineering problems considering societal issues.

CO7. Consider environmental sustainability in engineering and non engineering applications.

CO8. Follow standards in mapping and interpretation of the geospatial data.

CO9. Function effectively as an individual, and as a member or leader in teams to solve Geospatial technology issues.

CO10. Communicate effectively on the geospatial data to the engineering community and society in written, oral and graphical forms.

DETAILED SYLLABUS:

LIST OF EXERCISES:

1. Creation of geo–database
2. Digitization of toposheet/map
3. Drainage analysis
4. Developing digital elevation model
5. Preparation of thematic maps
6. Landuse and landcover analysis
7. Study of feature estimation
8. Rainfall–runoff analysis
9. Road network analysis
10. Watershed analysis
11. Site suitability analysis
12. Natural hazard zones map

IV B.Tech. – I Semester
(16BT70133) COMPREHENSIVE ASSESSMENT

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
	100	100	-	-	-	2

PRE-REQUISITES: All the courses of the program.

COURSE DESCRIPTION: Assessment of student learning outcomes in the courses of the program.

COURSE OUTCOMES: Comprehensive Assessment enables a successful student to demonstrate:

CO1. Knowledge in the courses of the program.

CO2. Analytical ability in the courses of the program.

CO3. Design skills in the courses of the program.

CO4. Ability to investigate and solve complex engineering problems in the courses of the program.

CO5. Ability to apply tools and techniques to complex engineering activities with an understanding of limitations in the courses of the program.

CO6. Ability to provide solutions as per societal needs with consideration to health, safety, legal and cultural issues in the courses of the program.

CO7. Understanding of the impact of the professional engineering solutions in environmental context and need for sustainable development in the courses of the program.

CO8. Ability to apply ethics and norms of the engineering practice in the courses of the program.

CO9. Ability to function effectively as an individual in the courses of the program.

CO10. Ability to present views cogently and precisely in the courses of the program.

CO11. Project management skills in the courses of the program.

CO12. Ability to engage in life-long leaning in the courses of the program.

IV B.Tech. – II Semester
(16BT80131) **PROJECT WORK**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
100	100	200	-	-	-	12

PRE-REQUISITES: All the courses of the program.

COURSE DESCRIPTION: Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Preparation of thesis and presentation.

COURSE OUTCOMES: Completion of the project work enables a successful student to demonstrate:

CO1. Knowledge on the project topic.

CO2. Analytical ability exercised in the project work.

CO3. Design skills applied on the project topic.

CO4. Ability to investigate and solve complex engineering problems faced during the project work.

CO5. Ability to apply tools and techniques to complex engineering activities with an understanding of limitations in the project work.

CO6. Ability to provide solutions as per societal needs with consideration to health, safety, legal and cultural issues in the project work.

CO7. Understanding of the impact of the professional engineering solutions in environmental context and need for sustainable development experienced during the project work.

CO8. Ability to apply ethics and norms of the engineering practice as applied in the project work.

CO9. Ability to function effectively as an individual as experienced during the project work.

CO10. Ability to present views cogently and precisely on the project work.

CO11. Project management skills as applied in the project work.

CO12. Ability to engage in life-long leaning as experience during the project work.

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(Autonomous)

COURSE STRUCTURE

MECHANICAL ENGINEERING

I B.Tech. (I Semester)

Course code	Course Title	Contact Periods/ Week				Credits (C)	Scheme of Examination Max. Marks		
		L	T	P	Total		Internal Marks	External Marks	Total Marks
16BT1HS01	Technical English	3	1	0	4	3	30	70	100
16BT1BS01	Engineering Chemistry	3	1	0	4	3	30	70	100
16BT1BS03	Matrices and Numerical Methods	3	1	0	4	3	30	70	100
16BT1BS04	Multi-Variable Calculus and Differential Equations	3	1	0	4	3	30	70	100
16BT10501	Programming in C	3	1	0	4	3	30	70	100
16BT1HS31	English Language Lab	0	0	3	3	2	50	50	100
16BT1BS31	Engineering Chemistry Lab	0	0	3	3	2	50	50	100
16BT10331	Computer Aided Engineering Drawing	0	1	6	7	3	50	50	100
16BT10531	Programming in C Lab	0	0	3	3	2	50	50	100
Total		**15**	**6**	**15**	**36**	**24**	**350**	**550**	**900**

I B.Tech. (II Semester)

Sl. No.	Course code	Course Title	Contact Periods/ Week				Credits (C)	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
1	16BT1BS02	Engineering Physics	3	1	0	4	3	30	70	100
2	16BT2BS01	Transformation Techniques and Partial Differential Equations	3	1	0	4	3	30	70	100
3	16BT20102	Engineering Mechanics	4	1	0	5	4	30	70	100
4	16BT20241	Basic Electrical and Electronics Engineering	3	1	0	4	3	30	70	100
5	16BT20301	Engineering Materials	3	1	0	4	3	30	70	100
6	16BT1BS32	Engineering Physics Lab	0	0	3	3	2	50	50	100
7	16BT20251	Electrical and Electronics Engineering Lab	0	0	3	3	2	50	50	100
8	16BT20331	Engineering Workshop Practice	0	0	3	3	2	50	50	100
9	16BT20332	Materials Science Lab	0	0	3	3	2	50	50	100
		Total	**16**	**5**	**12**	**33**	**24**	**350**	**550**	**900**

II B.Tech. (I Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits (C)	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
II Year – I Semester										
1	16BT3BS01	Probability Distributions and Statistical Methods	3	1	-	4	3	30	70	100
2	16BT30301	Engineering Metallurgy	3	1	-	4	3	30	70	100
3	16BT30302	Kinematics of Machinery	3	1	-	4	3	30	70	100
4	16BT30303	Manufacturing Technology	3	1	-	4	3	30	70	100
5	16BT30304	Strength of Materials	3	1	-	4	3	30	70	100
6	16BT30305	Thermodynamics	3	1	-	4	3	30	70	100
7	16BT30331	Computer Aided Machine Drawing Lab	-	-	3	3	2	50	50	100
8	16BT30332	Manufacturing Technology Lab	-	-	3	3	2	50	50	100
9	16BT30132	Strength of Materials Lab	-	-	3	3	2	50	50	100
Total			**18**	**6**	**9**	**33**	**24**	**330**	**570**	**900**

II B.Tech. (II Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits (C)	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
II Year – II Semester										
1	16BT3HS01	Environmental Studies	3	-	-	3	3	30	70	100
2	16BT40301	Design of Machine Elements – I	3	1	-	4	3	30	70	100
3	16BT40302	Dynamics of Machinery	3	1	-	4	3	30	70	100
4	16BT40303	Fluid Mechanics	3	1	-	4	3	30	70	100
5	16BT40304	Machine tools and Modern Machining Processes	3	1	-	4	3	30	70	100
6	16BT40305	Thermal Engineering - I	3	1	-	4	3	30	70	100
7	16BT40331	Fluid Mechanics Lab	-	-	3	3	2	50	50	100
8	16BT40332	Machine Tools Lab	-	-	3	3	2	50	50	100
9	16BT4HS31	Soft Skills Lab	-	-	3	3	2	50	50	100
Total			**18**	**5**	**9**	**32**	**24**	**330**	**570**	**900**

III B.Tech. (I Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
III Year – I Semester										
1	16BT50301	Design of Machine Elements –II	3	1	-	4	3	30	70	100
2	16BT50302	Industrial Engineering and Management	3	1	-	4	3	30	70	100
3	16BT50303	Metrology and Measurements	3	1	-	4	3	30	70	100
4	16BT50304	Refrigeration and Air –conditioning	3	1	-	4	3	30	70	100
5	16BT50305	Thermal Engineering - II	3	1	-	4	3	30	70	100
6		Interdisciplinary Elective-1	3	1	-	4	3	30	70	100
	16BT50306	Human Resources Management								
	16BT50307	Instrumentation and Control Systems								
	16BT50308	Mechatronics								
	16BT40502	Database Management System								
7	16BT50331	Dynamics and Vibrations Lab	-	-	3	3	2	50	50	100
8	16BT50332	Internal Combustion Engines Lab	-	-	3	3	2	50	50	100
9	16BT50333	Metrology and Instrumentation Lab	-	-	3	3	2	50	50	100
		Total	**18**	**6**	**9**	**33**	**24**	**330**	**570**	**900**

III B.Tech. (II Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
III Year – II Semester										
1	16BT3HS02	Managerial Economics and Principles of Accountancy	3	1	-	4	3	30	70	100
2	16BT60301	CAD/CAM	3	1	-	4	3	30	70	100
3	16BT60302	Heat Transfer	3	1	-	4	3	30	70	100
4		Interdisciplinary Elective-2	3	1	-	4	3	30	70	100
	16BT60303	Non-Conventional Energy Sources								
	16BT50402	Microprocessors and Microcontrollers								
	16BT41202	Java programming								
	16BT51201	Computer Graphics and Multimedia								
5		Program Elective– 1	3	1	-	4	3	30	70	100
	16BT60304	Gas Turbines and Jet Propulsion								
	16BT60305	Hydraulics and Pneumatics								
	16BT60306	Mechanical Vibrations								
	16BT60307	Supply Chain Management								
6		Open Elective	3	1	-	4	3	30	70	100
7	16BT60331	CAD and Simulation Lab	-	-	3	3	2	50	50	100
8	16BT60332	Heat Transfer Lab	-	-	3	3	2	50	50	100
9	16BT60333	Seminar	-	-	-	-	2	-	100	100
10	16BT6MOOC	MOOC	-	-	-	-	-	-	-	-
		Total	**18**	**6**	**6**	**30**	**24**	**280**	**620**	**900**

S. No.	Course Code	Open Elective Course Title	S. No.	Course Code	Open Elective Course Title
1.	16BT6HS01	Banking and Insurance	16.	16BT60114	Disaster Mitigation and Management
2.	16BT6HS02	Business Communication and Career Skills	17.	16BT60115	Environmental Pollution and Control
3.	16BT6HS03	Cost Accounting and Financial Management	18.	16BT60116	Planning for Sustainable Development
4.	16BT6HS04	Entrepreneurship for Micro, Small and Medium Enterprises	19.	16BT60117	Professional Ethics
5.	16BT6HS05	French Language	20.	16BT60118	Rural Technology
6.	16BT6HS06	German Language	21.	16BT60308	Global Strategy and Technology
7.	16BT6HS07	Indian Constitution	22.	16BT60309	Intellectual Property Rights and Management
8.	16BT6HS08	Indian Economy	23.	16BT60310	Managing Innovation and Entrepreneurship
9.	16BT6HS09	Indian Heritage and Culture	24.	16BT60311	Materials Science
10.	16BT6HS10	Indian History	25.	16BT70412	Green Technologies
11.	16BT6HS11	Personality Development	26.	16BT70413	Introduction to Nanoscience and Technology
12.	16BT6HS12	Philosophy of Education	27.	16BT60505	Engineering System Analysis and Design
13.	16BT6HS13	Public Administration	28.	16BT71011	Micro-Electro-Mechanical Systems
14.	16BT60112	Building Maintenance and Repair	29.	16BT61205	Cyber Security and Laws
15.	16BT60113	Contract Laws and Regulations	30.	16BT61505	Bio-informatics

IV B.Tech. (I Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
IV Year – I Semester										
1	16BT70301	Automobile Engineering	3	1	-	4	3	30	70	100
2	16BT70302	Finite Element Method	3	1	-	4	3	30	70	100
3	16BT70303	Operations Research	3	1	-	4	3	30	70	100
4		Program Elective–2	3	1	-	4	3	30	70	100
	16BT70304	Cryogenics								
	16BT70305	Geometric Modeling								
	16BT70306	Quality Management and Reliability Engineering								
	16BT70307	Tool design								
5		Program Elective–3	3	1	-	4	3	30	70	100
	16BT70308	Computational Fluid Dynamics								
	16BT70309	Industrial Robotics								
	16BT70310	Product Design								
	16BT70311	Production and Operations Management								
6		Program Elective–4	3	1	-	4	3	30	70	100
	16BT70312	Power Plant Engineering								
	16BT70313	Project Management								
	16BT70314	Rapid Prototype Technology								
	16BT70315	Tribology								
7	16BT70331	Computer Aided Manufacturing and Automation Lab	-	-	3	3	2	50	50	100
8	16BT70332	Industrial Engineering Lab	-	-	3	3	2	50	50	100
9	16BT70333	Comprehensive Assessment	-	-	-	-	2	-	100	100
Total			**18**	**6**	**6**	**30**	**24**	**280**	**620**	**900**

IV B.Tech. (II Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
IV Year – II Semester										
1	16BT80331	Project Work*	-	-	-	-	12	100	100	200
	Total		**-**	**-**	**-**	**-**	**12**	**100**	**100**	**200**

*Full-time project work

I B. Tech. - I Semester
(16BT1HS01) **TECHNICAL ENGLISH**
(Common to: CE, CSE, CSSE, IT & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Intermediate English.
COURSE DESCRIPTION: Introduction to Communication; Active Listening; Effective Speaking; Reading; and Writing.
COURSE OUTCOMES:
After successful completion of this course, the student will be able to:
CO1: Demonstrate knowledge in
- Process of communication.
- Modes of listening.
- Paralinguistic features.
- Skimming and Scanning.
- Elements of style in writin.

CO2: Analyze the possibilities and limitations of language for understanding
- Barriers to Communication.
- Barriers to Effective Listening.
- Barriers to Speaking.
- Formal and metaphorical language.

CO3: Design and develop functional skills for professional practice.
CO4: Apply writing skills in preparing and presenting documents.
CO5: Function effectively as an individual and as a member in diverse teams.
CO6: Communicate effectively with the engineering community and society in formal and informal situations**.**

DETAILED SYLLABUS:
UNIT-I : INTRODUCTION TO COMMUNICATION ` (09 Periods)
Introduction –Language as a Tool of Communication – Communicative Skills (Listening, Speaking, Reading and Writing) – Effective Communication – Modes of Communication – Barriers to Communication (classification).
UNIT-II : **ACTIVE LISTENING (09 Periods)**
Introduction – Reasons for poor Listening – Traits of a Good Listener – Listening Modes – Types of Listening – Barriers to Effective Listening – Listening for General Content and Specific Information.
UNIT-III: EFFECTIVE SPEAKING (09 Periods)
Introduction – Achieving Confidence, Clarity and Fluency – Paralinguistic Features – Barriers to Speaking – Types of Speaking – Persuasive Speaking.
UNIT-IV: READING (09 Periods)
Introduction and Reading Rates – Reading and Interpretation – Intensive and Extensive Reading – Critical Reading – Reading for Different Purposes – SQ3R Reading Technique –Study Skills.
UNIT-V: WRITING (09 Periods)
Introduction – Language – Elements of Style – Techniques for Good Technical Writing – Referencing and Styling – Right Words and Phrases – Sentences.

Total Periods: 45

TEXT BOOKS:
1. Meenakshi Raman & Sangeetha Sharma, *Technical Communication*, Oxford University Press, New Delhi, 2012.

REFERENCE BOOKS:

1. Ashraf Rizvi, *Effective Technical Communication*, McGraw-Hill Education (India) Pvt.Ltd., New Delhi, 2015.
2. Sanjay Kumar & Pushp Lata, *Communication Skills*, Oxford University Press, New Delhi, 2013.
3. Teri Kwal Gamble and Michael Gamble, *Communication Works,* Tata Mc Graw-Hill, New Delhi, 2010.

4. Rajendra Pal and J.S. Korlahalli, *Essentials of Business Communication*, Sultan Chand and Sons (P) Ltd, New Delhi, 2010.

I B. Tech. - I Semester

(16BT1BS01) ENGINEERING CHEMISTRY

(Common to: CE, CSE, CSSE, IT & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITE: Intermediate/Senior Secondary Chemistry

COURSE DESCRIPTION: Water technology, Chemistry of Engineering materials, Nanochemistry, Green Chemistry, Electro chemical cells, Sensors, Corrosion and Lubricants.

COURSE OUTCOMES:

After completion of the course, a successful student is able to:

CO1: Acquire basic knowledge in water technology, engineering plastics, conducting polymers, composites, Electro chemical cells, Nano Chemistry, principles of Green Chemistry, corrosion phenomenon and lubricants.

CO2: Develop analytical skills in:
- Determination of hardness of water.
- Determination of viscosity, flame and fire points, cloud and pour points.

CO3: Develop designing skills in:
- Synthesis of engineering plastics.
- Chemical methods for the synthesis of Nano materials.

CO4: Develop skills for providing solutions through:
- Mitigation of hardness of water.
- Newer Nanomaterials and engineering plastics for specific applications

CO5: Acquire awareness to practice engineering in compliance to modern techniques such as:
- Nalgonda technique for defluoridation of water.
- Electroplating technique for control of corrosion.

CO6: Acquire awareness to societal issues on:
- Quality of water.
- Bio-diesel.
- Chemical materials utility and their impact.

DETAILED SYLLABUS:

UNIT–I: WATER TECHNOLOGY (09 Periods)

Introduction: Types of water, impurities in water and their consequences, types of hardness of water, units of hardness of water, disadvantages of hardness of water, estimation of hardness of water by EDTA method, Boiler troubles: Scales and Sludges, Caustic embrittlement, Boiler corrosion and Priming and Foaming.

Softening of water: Zeolite process and Ion exchange process, advantages and disadvantages. Desalination of brackish water by Reverse Osmosis, Numerical problems on estimation of hardness of water.

Fluorides in water: Effects on human health, defluoridation method-Nalgonda method; comparison of merits and demerits of various defluoridation methods (Nalgonda, Bone Charcoal, Activated Alumina, Contact precipitation, Brick, Reverse osmosis).

UNIT – II: CHEMISTRY OF ENGINEERING MATERIALS (09 Periods)

Engineering Plastics: Definition, general properties, synthesis, properties and applications of PC, PTFE, and PMMA.

Conducting polymers: Definition, types of conducting polymers: Intrinsic and extrinsic conducting polymers with examples, engineering applications of conducting polymers.

Biodegradable polymers: Definition, properties, classification, mechanism of degradation of biodegradable polymers and their applications.

Composites – Introduction, types of composites: fiber reinforced particulate and layered composites with examples, advantages of composites and applications.

UNIT– III: NANOCHEMISTRY AND GREEN CHEMISTRY (09 Periods)

Nanochemistry: Introduction, classification, properties and applications of Nano materials (nano particles, nano tubes, nano wires, nano composites, dendrimers); synthesis of Nano materials – Sol-gel process.

Green Chemistry: Introduction, principles of green chemistry, Tools of Green Chemistry with Examples, Applications of Green Chemistry in science and technology.

Biodiesel: Introduction, Synthesis (Transesterification method), advantages, disadvantages and applications.

UNIT–IV: ELECTROCHEMICAL CELLS AND SENSORS (09 Periods)

Electrochemical cell: Introduction, EMF of an electrochemical cell.

Batteries: Introduction, types of Batteries: primary and secondary batteries with examples, Ni-Cd batteries, Lithium-ion batteries, Lithium- Polymer batteries, Applications of batteries.

Fuel Cells: Definition, examples: $H_2 – O_2$ Fuel cell, solid oxide fuel cell, Bio-fuel cell and applications of fuel cells.

Sensors - Introduction, Types of Sensors, electrochemical sensor: construction and working principle of potentiometric sensor, and applications of electrochemical sensors.

UNIT–V: CORROSION AND LUBRICANTS (09 Periods)

Corrosion: Introduction, Definition, types of corrosion (dry and wet corrosion), galvanic corrosion, concentration cell corrosion, Factors influencing corrosion, Corrosion control: cathodic protection; sacrificial anodic protection and impressed current cathodic protection; protective coatings: Galvanizing and Electroplating (Nickel).

Lubricants: Definition, functions of lubricants, mechanism of lubrication, classification of lubricants, properties of lubricants – viscosity, flash and fire points, cloud and pour points, Aniline points, neutralization number and mechanical strength.

Total Periods: 45

TEXT BOOKS:

1. P.C.Jain & Monika Jain*, Engineering Chemistry,* Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 16th edition, 2013.
2. K.N. Jayaveera, G.V. Subba Reddy & C. Ramachandraiah *Engineering Chemistry,* Mc. Graw-Hill Higher Education, Hyderabad, 1st edition, 2015.

REFERENCE BOOKS:

1. A.K. Bandyopadhyay, *Nano Materials***,** New Age international publishers, 2nd edition, 2014.
2. Paul T. Anastas and John C Warner, *Green Chemistry: Theory and practice,* Oxford University Press, 2000.

I B. Tech. - I Semester

(16BT1BS03) **MATRICES AND NUMERICAL METHODS**

(Common to all Branches)

Int. Marks	**Ext. Marks**	**Total Marks**	**L**	**T**	**P**	**C**
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate /Senior secondary mathematics

COURSE DESCRIPTION: Fundamentals of matrix theory; numerical solutions of equations, curve fitting; interpolation; numerical differentiation and integration; numerical solutions of ordinary differential equations.

COURSE OUTCOMES: After completion of the course a successful student is able to

CO1: Acquire basic knowledge in
- Finding the rank of matrices and analyzing them.
- Solving algebraic and transcendental equations by various numerical methods.
- Fitting of various types of curves to the experimental data.
- Estimating the missing data through interpolation methods.
- Identification of errors in the experimental data
- Finding the values of derivatives and integrals through various numerical methods.
- Solving differential equations numerically when analytical methods fail.

CO2: Develop skills in analyzing the
- methods of interpolating a given data
- properties of interpolating polynomials and derive conclusions
- properties of curves of best fit to the given data
- algebraic and transcendental equations through their solutions
- properties of functions through numerical differentiation and integration
- properties of numerical solutions of differential equations

CO3: Develop skills in designing mathematical models for
- Fitting geometrical curves to the given data
- Solving differential equations
- Constructing polynomials to the given data and drawing inferences.

CO4: Develop numerical skills in solving the problems involving
- Systems of linear equations
- Fitting of polynomials and different types of equations to the experimental data
- Derivatives and integrals
- Ordinary differential equations

CO5: Use relevant numerical techniques for
- Diagonalising the matrices of quadratic forms
- Interpolation of data and fitting interpolation polynomials
- Fitting of different types of curves to experimental data
- obtaining derivatives of required order for given experimental data
- Expressing the functions as sum of partial fractions

DETAILED SYLLABUS:

UNIT–I : MATRICES (11 Periods)

Rank of a matrix, echelon form, normal form, inverse of a matrix by elementary row operations. Solutions of linear system of equations. Eigen values, Eigen vectors and properties (without proof), Diagonalization. Quadratic form (QF), reductions to canonical form using orthogonal transformation and nature of QF.

UNIT-II: NUMERICAL SOLUTIONS OF EQUATIONS AND CURVE FITTING (08 Periods)

Solutions of Algebraic and Transcendental equations by bisection method, Regula-Falsi method, Newton – Raphson's method. Curve fitting by the principle of least squares, fitting of a straight line, parabola and exponential curves.

UNIT- III: INTERPOLATION (08 Periods)

Interpolation, difference operators and their relationships, Newton's forward and backward formulae, Lagrange's interpolation formula. Partial fractions using Lagrange's interpolation formula.

UNIT-IV: NUMERICAL DIFFERENTIATION AND INTEGRATION (08 Periods)

Numerical differentiation using Newton's forward and backward formulae. Numerical integration using Trapezoidal rule, Simpson's 1/3rd rule and 3/8th rule.

UNIT-V: NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS (10 Periods)

Numerical solutions of first order Initial value problems using Taylor series method, Euler's method , modified Euler's method, Runge – Kutta method (4 th order only) and Milne's predictor – corrector method.

Total Periods: 45

TEXT BOOK:

1. T.K.V. Iyenger, B. Krishna Gandhi, S.Ranganadham and M.V.S.S.N.Prasad, *Mathematical Methods,* S.Chand and Company, 8/e, 2013

REFERENCE BOOKS:

1. B.S. Grewal, *Higher engineering mathematics*, Khanna Publishers, 42nd Edition. 2012
2. S.S.Sastry, *Introductory methods of Numerical Analysis*, Prentice Hall of India, 5/e, 2013

I B. Tech. - I Semester

(16BT1BS04) MULTI-VARIABLE CALCULUS AND DIFFERENTIAL EQUATIONS

(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate /Senior secondary mathematics

COURSE DESCRIPTION: First order differential equations; higher order linear differential equations; functions of several variables; applications of integration; multiple integrals; vector calculus.

COURSE OUTCOMES: After completion of the course a successful student is able to

CO1: Acquire knowledge in
- Higher order Differential equations
- Maximum and minimum values for the functions of several variables
- Double and triple integrals
- Differentiation and integration of vector functions.
- Line and surface volume
- transforming integrals from three dimensional surfaces and volumes on to plane surfaces

CO2: Develop skills in analyzing the
- Methods for differential equation for obtaining appropriate solutions,
- Properties of oscillatory electrical circuits and heat transfer in engineering systems
- The variations in the properties of functions near their stationary values
- Flow patterns of fluids, electrical and magnetic flux and related aspects

CO3: Develop skills in designing mathematical models for
- R-C and L-R-C oscillatory electrical circuits
- Heat transfer and Newton's law of cooling
- Engineering concepts involving lengths of curves and areas of planes, Flux across surfaces

CO4: Develop analytical skills in solving the problems involving
- Newton's law of cooling
- non homogeneous linear differential equations
- maximum and minimum values for the functions
- lengths of curves, areas of surfaces and volumes of solids in engineering
- transformation of integrals from three dimensional surfaces and volumes on to plane surfaces

CO5: Use relevant mathematical techniques for evaluating
- various types of particular integrals in differential equations
- stationary values for multi variable functions
- multiple integrals in change of variables
- integrations of vector functions.

DETAILED SYLLABUS:

UNIT-I: FIRST ORDER DIFFERENTIAL EQUATIONS (06 Periods)

Linear and Bernoulli type, exact equations and reducible to exact. Orthogonal trajectories (Both Cartesian and polar forms). Newton's law of cooling.

UNIT-II: HIGHER ORDER LINEAR DIFFERENTIAL EQUATIONS (09 Periods)

Method for solution of linear equations- Differential operator *D*, Solution of second order linear homogeneous equations with constant coefficients, Solution of Higher order homogeneous linear equations with constant coefficients.

Solution of Non homogeneous linear equations-Operator methods for finding particular integrals-for cases – e^{ax}, sin ax, cos ax, x^n, $e^{ax}V(x)$, $xV(x)$. Method of Variation of parameters. Applications to oscillatory electrical circuits.

UNIT-III: FUNCTIONS OF SEVERAL VARIABLES (08 Periods)

Functions of Two Variables: Limits, Continuity; **Partial Derivatives**: Total Differential and Derivatives, Jacobian, Functional dependence, Taylor's Theorem, maxima and minima of functions of two variables with and without constraints – Lagrange's method of undetermined multipliers.

UNIT-IV: APPLICATIONS OF INTEGRATION AND MULTIPLE INTEGRALS (10 Periods)

Applications of integration to – lengths of curves, areas of surfaces of revolution, Double and Triple integrals – change of order of integration, change of variables in integrals. Area enclosed by plane curves, volumes of solids.

UNIT-V: VECTOR CALCULUS (12 Periods)

Vector differentiation: Gradient of a scalar field and Directional Derivative, Divergence and Curl of a Vector field

Line integrals: Line integrals independent of path – work done.

Surface area and Surface Integrals: Surface Area, Surface Integrals, Flux across a surface.

Green's Theorem: Green's Theorem (without proof)verification- applications

Gauss Divergence Theorem and Stoke's Theorem: Gauss Divergence theorem (without proof), Stokes's Theorem (without proof) –verifications and applications. **Total Periods: 45**

TEXT BOOK:

1. T.K.V. Iyengar, B. Krishna Gandhi,S.Ranganatham and M.V.S.S.N. Prasad, *Engineering Mathematics,* Vol-1, S. Chand &Company, 13/e, 2014

REFERENCE BOOKS:

1. Grewal, B.S., *Higher engineering mathematics*,Khanna publishers, Delhi, 42/e. 2012.
2. Kreyszig, E., *Advanced Engineering Mathematics*,John Wiley and Sons, Inc.,9/e.2012.

I B. Tech. - I Semester

(16BT10501) **PROGRAMMING IN C**

(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: NIL

COURSE DESCRIPTION:

Program design; Operators and Expressions; Data Input and Output; Control Statements; Functions; Arrays; Strings; Pointers; Structures & Unions and File handling Techniques;

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1: Demonstrate knowledge in:

- Elements of C Language
- Selection and Repetition statements.
- Arrays, Strings and Functional statements.
- Derived data types, Files and Pointers

CO2: Analyze complex engineering problems to develop suitable solutions

CO3: Design algorithms for specified engineering problems

CO4: Use appropriate 'C' language constructs for solving engineering problems

CO5: Write programs using 'C' language to implement algorithms

DETAILED SYLLABUS:

UNIT -I : INTRODUCTION TO C PROGRAMMING, OPERATORS & EXPRESSIONS (08 Periods)

Introduction to C Programming: The C Character set, Writing First Program of C, Identifiers and Keywords, Data types, Constants, Variables and Arrays, Declarations, Expressions, Statements and Symbolic Constants.

Operators and Expressions: Arithmetic Operators, Unary Operators, Relational and Logical Operators, Assignment Operators, the Conditional Operators.

UNIT -II : DATA INPUT AND OUTPUT & CONTROL STATEMENTS (08 Periods)

Data Input and Output: Single Character Input and Output, Input Data & Output data, The gets and puts Function.

Control Statements: Branching: The if-else Statement, Looping: The while Statement, More Looping: The do-while Statement, Still More Looping: The for Statement, Nested Control Statement, The switch Statement, The break & continue Statements, The goto Statement.

UNIT-III: FUNCTIONS, PROGRAM STRUCTURES & ARRAYS (11 Periods)

Functions: A Brief Overview, Defining a Function, Accessing a Function, Function Prototypes, Parsing Argument to a Function, Recursion.

Program Structure: Storage Classes, Automatic Variables, External (Global) Variables, Static Variables, Multi file Programs,

Arrays: Defining an Array, Processing an Array, Processing Array to function, Multidimensional Arrays. Linear search, Binary search, Fibonacci search, Bubble sort and Insertion sort

UNIT-IV: STRINGS & POINTERS (09 Periods)

Strings: Defining a String, NULL Character, Initialization of Strings, Reading and Writing a String, Processing a Strings, Character Arithmetic, Searching and Sorting of Strings, Library Functions for Strings.

Pointers: Pointer Declaration, Passing Pointers to a Function, Pointers and One-dimensional Arrays, Dynamic Memory Allocation, Operations on Pointers, Pointers and Multidimensional Arrays, Arrays of Pointers.

UNIT-V: STRUCTURES AND UNIONS & FILE HANDLING (09 Periods)

Structures and Unions: Defining a Structure, Processing a Structure, User-Defined Data types (typedef), Structures and Pointers, Passing Structures to Function, Self –Referential Structures, Unions

File Handling: Files introduction, Opening and Closing a Data File, Reading and Writing a Data File, Processing a Data File, Unformatted Data File, Concept of Binary Files, Accessing the File Randomly.

Total Periods: 45

TEXT BOOK:

1. Byron Gottfried and Jitender Kumar *C, Programming with C*, Third Edition, McGraw Hill Education (India) Pvt, Ltd, New Delhi, 2016.

REFERENCE BOOKS:

1. PradipDey and Manas Ghosh, *Programming in C,* Second Edition, Oxford University Press, NewDelhi, 2007.

2. E. Balagurusamy, *Programming in C,* Seventh Edition, Mc Graw Hill Education (India) Pvt, Ltd, New Delhi, 2014.

I B. Tech. - I Semester

(16BT1HS31) ENGLISH LANGUAGE LAB

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: English at intermediate or equivalent level.

COURSE DESCRIPTION: Phonetics; Vocabulary Building; Functional Grammar; Just a Minute; Elocution/Impromptu; Giving Directions/Conversation Starters; Role Play; Public Speaking; Describing People, Places, Objects and Events; Reading Comprehension; Listening Comprehension; Information Transfer.

COURSE OUTCOMES:

On successful completion of this course the students will be able to:

CO1: Demonstrate knowledge in
- Phonetics
- Information Transfer

CO2: Analyze the situations in professional context by using
- Vocabulary
- Grammar

CO3: Design and develop functional skills for professional practice.

CO4: Apply the techniques of Listening and Reading skills to comprehend Listening and Reading comprehension.

CO5: Function effectively as an individual and as a member in diverse teams through
- Extempore talk and
- Role Play

CO6: Communicate effectively in public speaking in formal and informal situations.

CO7: Recognize the need to engage in lifelong learning to upgrade competence of knowledge and communication.

LIST OF EXERCISES

1. Phonetics
2. Vocabulary Building
3. Functional Grammar
4. Just a Minute
5. Elocution/Impromptu
6. Giving Directions/Conversation Starters
7. Role Play
8. Public Speaking
9. Describing People, Places, Objects and Events.
10. Reading Comprehension
11. Listening Comprehension
12. Information Transfer

TEXT BOOK:

1. Department Lab Manual

REFERENCE BOOKS:

1. D. Sudha Rani, *A Manual for English Language Laboratories*, Pearson Education.
2. D. Sudha Rani, *Advanced Communication Skills Laboratory Manual*, Pearson Education.
3. R. Manivannan and G. Immanuel, *Communication Skills Laboratory*, VK Publications, Sivakasi, 2013
4. Nira Kumar*, English Language Laboratories*, PHI Learning Pvt. Ltd., New Delhi, 2011.

SUGGESTED SOFTWARE:

1. ETNL Language Lab Software Version 4.0
2. GEMS - Globarena E- Mentoring System.
3. Speech Solutions.
4. English Pronunciation Dictionary by Daniel Jones.
5. Learn to Speak English 8.1, The Learning Company - 4 CDs.
6. Mastering English: Grammar, Punctuation and Composition.
7. English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
8. Dorling Kindersley Series - Grammar.
9. Language in Use 1, 2 & 3.
10. Cambridge Advanced Learner's Dictionary - 3rd Edition.
11. Centronix - Phonetics.
12. Let's Talk English, Regional Institute of English South India.

13.The Ultimate English Tutor.

I B. Tech. - I Semester

(16BT1BS31) ENGINEERING CHEMISTRY LAB

(Common to: CE, CSE, CSSE, IT & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE REQUISITE: Intermediate/Senior Secondary Chemistry

COURSE DESCRIPTION: Estimation of hardness, alkalinity, dissolved oxygen of water samples and estimation of Iron by volumetric methods, determination of effect of P^H on rate of corrosion, measurement of viscosity of lubricants; Instrumental methods like potentiometer, conductivity meter, P^H meter and colorimeter; synthesis of Polymers and Nano materials.

COURSE OUTCOMES:

After completion of the course, a successful student is able to:

CO1: Acquire basic Knowledge about the volumetric analysis and synthesis of materials used for engineering applications.

CO2: Acquire analytical skills in the estimation of hardness of water, alkalinity of water, dissolved oxygen in water and estimation of Iron through wet laboratory methods.

CO3: Develop designing skills for the synthesis of polymers and Nanomaterials.

CO4: Acquire skills to use instrumental techniques for the determination of Electrical conductance of electrolytes, EMF of a cell, PH of a solution, determination of viscosity of lubricants and estimation of iron in cement.

CO5: Provide solutions for environmental issues through determination of quality of water.

List of Experiments

A minimum of any **Ten** experiments are to be conducted among the following:.

1. Estimation of Hardness of water by EDTA method.
2. Estimation of alkalinity of Water.
3. Estimation of Dissolved Oxygen in water.
4. Estimation of Ferrous Iron by Dichrometry.
5. Preparation of Novalac Resin.
6. Synthesis of Nano metal-oxide using sol– gel process.
7. Conductometric titration of strong acid Vs strong base
8. Estimation of Ferrous ion by Potentiometry.
9. Determination of amount of corrosion of metals in different medium
10. Measurement of viscosity of lubricants by Ostwald viscometer.
11. Determination of pH of a given solution by pH metry.
12. Estimation of Ferric iron in cement by Colorimetric method.

I B. Tech. - I Semester

(16BT10331) COMPUTER AIDED ENGINEERING DRAWING

(Common to: CE, CSE, CSSE, IT & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	1	6	3

PRE-REQUISITES: --

COURSE DESCRIPTION:

Engineering drawing conventions; importance of engineering drawing; fundamental concepts of sketching; computed aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.

COURSE OUTCOMES:

After completion of the course, a successful student is able to:

CO1: Understand, write and read the language of engineering drawing in industry through International System of Standards.

CO2: Develop the imagination and mental visualization ability for interpreting the geometrical details of engineering objects.

CO3: Produce different views and projection in drawing.

CO4: Use modern CAD software for design and drafting of drawings.

CO5: Create multi-view drawings suitable for presentation to Engineering community.

CO6: Introduce and communicate universally accepted conventions and symbols for their usage in technical drawing.

DETAILED SYLLABUS:

UNIT-I: BASICS OF ENGINEERING DRAWING PRACTICE, GEOMETRICAL CONSTRUCTIONS, CONICS AND SPECIAL CURVES (18 Periods)

Introduction, drawing instruments and its uses, sheet layout, BIS conventions, lines, lettering and dimensioning practices. Geometrical constructions: Construction of regular polygons: Pentagon, Hexagon, Heptagon and Octagon. Conic sections**:** Introduction, construction of ellipse: rectangular method, eccentricity method. Construction of parabola: rectangular method, eccentricity method. Construction of hyperbola: eccentricity method. Special curves***:*** cycloid, involute.

UNIT-II: INTRODUCTION TO COMPUTER AIDED SKETCHING (18 Periods)

Computer screen, layout of the software, creation of 2D/3D environment, selection of drawing size and scale, Standard tool bar/menus, Coordinate system, description of most commonly used toolbars, navigational tools: commands and creation of lines, Co-ordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination and perpendicularity.

UNIT-III: PROJECTION OF POINTS, STRAIGHT LINES AND PLANES (21 Periods)

Introduction, method of projection, planes of projection, reference line and notations. Projection of points: Points in all the four quadrants. Projection of straight lines**:** lines inclined to HP / VP plane, inclined to both HP and VP planes (straight lines are assumed to be in first quadrant only)**.** Projection of planes**:** projection of triangle, square, rectangle, rhombus, pentagon, hexagon and circular plane for the condition inclined to HP / VP by change of position method.

UNIT-IV: PROJECTION OF SOLIDS AND SECTION OF SOLIDS (21 Periods)

Projections of Solids: Introduction, projection of solids: prisms, pyramids, cylinders and cones with axis perpendicular to VP/HP and axis inclined to VP/HP only. Sections of solids**:** Introduction, Cutting plane, sectional views of right regular solids resting with base on HP: prisms, pyramids, cylinder and cone and true shapes of the sections.

UNIT-V: ORTHOGRAPHIC AND ISOMETRIC PROJECTIONS AND DEVELOPMENT OF SURFACES (22 Periods)

Orthographic projection: simple exercises. Isometric projection: Simple exercises.

Development of surfaces: prisms, pyramids, cylinders, cone and miscellaneous surfaces

Total Periods: 100

Note: *Student shall practice Unit-I using sketch book only and remaining units using sketch book first and later CAD package.*

TEXT BOOKS:

1. D.M.Kulkarni, A.P.Rastogi, A.K.Sarkar, *Engineering Graphics with AutoCAD*, PHI Learning Private Limited, New Delhi, Revised Edition, 2010.
2. N D Bhat & V M Panchal, *Engineering Drawing*, Charotar Publishing House, Gujarat, 51st edition, 2013.

REFERENCE BOOKS:

1. Sham Tickoo, AutoCAD 2013 for Engineers and Designers, Dreamtech Press, 2013.
2. M.H.Annaiah & Rajashekar Patil, *Computer Aided Engineering Drawing*, New Age International Publishers, 4th Edition, 2012.
3. T.Jeyapoovan, E*ngineering Drawing and Graphics Using AutoCAD*, Vikas Publishing House, 3rd Edition, 2010.
4. Jolhe, *Engineering Drawing*, Tata McGraw Hill Education Private Limited, 1st Edition, 2007.

5. Basant Aggarwal, *Engineering Drawing,* Tata McGraw Hill Education Private Limited, 1st Edition, 2008.

I B. Tech. - I Semester

(16BT10531) PROGRAMMING IN C LAB

(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on "Programming in C"

COURSE DESCRIPTION: Hands on practice in developing and executing simple programs using C Programming constructs– Conditional statements, Loops, Arrays, Strings, Functions, Structures, Pointers and Functions.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Demonstrate practical knowledge of using C language constructs:
- Selection and Repetition statements.
- Arrays, Strings and Functional statements.
- Derived data types, Files and Pointers

CO2: Analyze problems to develop suitable algorithmic solutions.

CO3: Design Solutions for specified engineering problems.

CO4: Use appropriate 'C' language constructs for solving engineering problems.

CO5: Implement and execute programs using 'C' language

CO6: Document programs and communicate effectively while conducting Professional transactions.

List of Exercises:

1. a. Let a and b are two integer variables whose values are 10 and 13 respectively. Write a program to evaluate the following arithmetic expressions.
   i) a + b ii) a–b iii) a * b iv) a/b v) a % b

   b. Write a program to evaluate the following algebraic expressions after reading necessary values from keyword.
   i) (ax + b)/(ax – b)
   ii) 2.5 log x + Cos 32^0+ | x^2 + y^2|
   iii) x^5 + 10 x^4 + 8 and x^3 + 4 x + 2
   iv) ae^{kt}

2. a. Mr. Gupta deposited Rs.1000 in a bank. The bank gives simple interest at the rate of 15% per annum. Write a program to determine the amount in Mr. Gupta's account at the end of 5 years. (Use the formula I = P T R / 100)

   b. A cashier has currency notes of denominations Rs.10, Rs. 50 and Rs. 100. If the amount to be withdrawn is input in hundreds, find the total number of notes of each denomination the cashier will have to give to the withdrawer.

   c. In a town, the percentage of men is 52. The percentage of total literacy is 48.If total percentage of literate men is 35 of the total population; write a program to find the total number of illiterate men and women if the population of the town is 8000.

3. a. Write a program that prints the given 3 integers in ascending order using if - else.

   b. Write a program to calculate commission for the input value of sales amount.
   Commission is calculated as per the following rules:
   i) Commission is NIL for sales amount Rs. 5000.
   ii) Commission is 2% for sales when sales amount is >Rs. 5000 and <= Rs. 10000.
   iii) Commission is 5% for sales amount >Rs. 10000.

   c. A character is entered through keyboard. Write a programto determine whether the character entered is a capital letter, a small case letter, a digit or a special symbol. The following table shows the range of ASCII values for various characters.

Characters	**ASCII values**
A - Z	65 - 90
a - z	97 - 122
0 - 9	48 - 57

Special Symbols 0 - 47, 58 - 64, 91- 96, 123 - 127

4. a. If cost price and selling price of an item is input through the keyboard, write program to determine whether the seller has made profit or incurred loss. Also determine how much profit or loss he incurred in percentage.

   b. An insurance company calculates premium as follows:

      i. If a person's health is excellent and the person is between 25 and 35 years of age and lives in a city and is a male then premium is Rs.4 per thousand and the policy amount cannot exceed Rs.2 lakhs.

      ii. If a person satisfies all the above conditions and is female then the premium is Rs.3 per thousand and the policy amount cannot exceed Rs.1 lakh.

      iii. If a person's health is poor and the person is between 25 and 35 years of age and lives in a village and is a male then premium is Rs.6 per thousand and the policy cannot exceed Rs.10000.

      iv. In all other cases the person is not insured.

      Write a program to determine whether the person should be insured or not, his/her premium rate and maximum amount for which he/she can be insured.

5. a. Write a program, which takes two integer operands and one operator as input from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, %. Use switch statement)

   b. Write a program to find the grace marks for a student using switch. The user should enter the class obtained by the student and the number of subjects he has failed in. Use the following rules:

      i. If the student gets first class and the number of subjects failed is >3, then no grace marks are awarded. If the number of subjects failed is less than or equal to '3' then the grace is 5 marks per subject.

      ii. If the student gets second class and the number of subjects failed in is >2, then no grace marks are awarded. If the number of subjects failed in less than or equal to '3' then the grace is 4 marks per subject.

      iii. If the student gets third class and the number of subjects failed in is >1, then no grace marks are awarded. If the number of subjects failed in is equal to '1' then the grace is 5 marks per subject.

6. a. Write a program to find the sum of individual digits of a positive integer.

   b. A Fibonacci sequence is defined as follows:

      The first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a program to generate the first N terms of the sequence. Write a program to generate all the prime numbers between 1 and N, where N is a value supplied by the user.

7. a. Write a program to find the largest and smallest number in a given list of integers.

   b. Write a program to perform the following:

      i. Addition of two matrices.

      ii. Multiplication of two matrices.

8. a. Write a program that uses functions to perform the following operations:

      i. To insert a sub-string in main string at a specified position.

      ii. To delete N characters from a given string from a specified position.

   b. Write a program to determine whether the given string is palindrome or not.

   c. Write a program to display the position or index in the main string S where the sub string T begins. Display -1 if S does not contain T.

   d. Write a program to count the number of lines, words and characters in a given text.

9. a. Write a program to read list of student names and perform the following operations using functions.

      i. to print list of names

      ii. to sort them in ascending order

      iii. to print the list after sorting.

   b. Write a menu driven program to read list of student names and perform the following operations using array of character pointers.

      i. to insert a student name

      ii. to delete a name

iii. to print the name

10. Write a program that uses functions to perform the following operations:
    i. Reading a complex number
    ii.Writing a complex number
    iii. Addition of two complex numbers
    iv. Multiplication of two complex numbers
    (**Note:** Represent complex number using a structure.)
11. a. Write a program to accept the elements of the structure as:
    Employee-name,Basic pay
    Display the same structure along with the DA, CCA and Gross salary for 5 employees.
    Note: DA=51% of Basic pay, CCA=Rs.100 consolidated.
    b. Define a structure to store employee's data with the following specifications:
    Employee-Number, Employee-Name, Basic pay, Date of Joining
    i. Write a function to store 10 employee details.
    ii. Write a function to implement the following rules while revising the basic pay.
    If Basic pay<=Rs.5000 then increase it by 15%.
    If Basic pay> Rs.5000 and <=Rs.25000 then it increase by 10%.
    If Basic pay>Rs.25000 then there is no change in basic pay.
    Write a function to print the details of employees who have completed 20 years of service from the date of joining.
12. a. Write a program which copies one 'text file' to another 'text file'.
    b.Write a program to reverse the first N characters of a given text file.
    (Note: The file name and N are specified through command line.)
13. Write a program to print the output by giving the Customer_ID as an input.

REFERENCE BOOKS:

1. Byron Gottfried and Jitender Kumar *C, Programming with C,* Third Edition, McGraw Hill Education(India) Pvt. ltd, New Delhi, 2016.
2. Pradip Dey and Manas Ghosh, *Programming in C,* Second Edition, Oxford University Press, New Delhi, 2007.

I B. Tech. - II Semester

(16BT1BS02) **ENGINEERING PHYSICS**

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate / senior secondary Physics.

COURSE DESCRIPTION: Lasers; optical fibers; principles of quantum mechanics; band theory of solids; semiconductors; dielectric properties of materials; acoustics of buildings; superconductors; crystallography and nanomaterials.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Acquire basic knowledge of lasers, optical fibers, quantum mechanics, dielectrics, semiconductors and superconductors, acoustic of buildings, crystallography and nanomaterials.

CO2: Analyze the construction and working of various laser systems, semiconductor devices, various types of optical fibers and its communication system and nano materials properties.

CO3: Gain skills in designing lasers, optical fiber cable, semiconductor devices, acoustically good halls and nanomaterials.

CO4: Develop problem solving skills in engineering context.

CO5: Use relevant techniques for assessing ball milling, pulsed laser deposition, p-n junction and Laser.

DETAILD SYLLABUS:

UNIT–I: LASERS AND FIBER OPTICS (11 Periods)

Lasers: Introduction, characteristics of lasers, spontaneous and stimulated emission of radiation, Einstein’s coefficients – condition for amplification, population inversion, Nd:YAG laser, Helium-Neon laser, semiconductor laser and applications of lasers.

Fiber optics: Introduction, principle of optical fiber, acceptance angle, acceptance cone and numerical aperture, classification of optical fibers, optical fiber communication system and applications of optical fibers.

UNIT-II: PRINCIPLES OF QUANTUM MECHANICS AND BAND THEORY OF SOLIDS (07 Periods)

Principles of Quantum Mechanics: Introduction, De-Broglie’s hypothesis, Schrödinger’s one dimensional wave equation (time independent), significance of wave function, particle in a one dimensional potential box, Fermi-Dirac distribution and effect of temperature (qualitative treatment).

Band Theory of Solids: Electron in a periodic potential, Kronig-Penney model (qualitative treatment), origin of energy bands formation in solids, distinction between conductors, semiconductors and insulators based on band theory.

UNIT-III: SEMICONDUCTORS AND DIELECTRIC PROPERTIES OF MATERIALS (13 Periods)

Semiconductors: Introduction, types of semiconductors, intrinsic carrier concentration, electrical conductivity in semiconductors, drift and diffusion currents, Einstein’s relation, Hall effect and its applications, direct and indirect band gap semiconductors, p-n junction, energy band diagram of p-n diode, LED, photo diode and Solar cell.

Dielectric Properties of Materials: Introduction, dielectric constant, electronic, ionic and orientation polarizations (qualitative treatment), local field, frequency dependence of polarizability (qualitative treatment), ferroelectricity.

UNIT-IV: ACOUSTICS OF BUILDINGS AND SUPERCONDUCTIVITY (07 Periods)

Acoustics of Buildings: Introduction, basic requirement of acoustically good hall, reverberation and time of reverberation, Sabine’s formula for reverberation time (qualitative treatment), absorption coefficient of sound and its measurement, factors affecting the architectural acoustics and their remedies.

Superconductivity: Introduction, general properties - Meissner effect, penetration depth, Type-I and Type-II superconductors, flux quantization, Josephson effects, BCS theory (qualitative treatment), applications of superconductors.

UNIT-V: CRYSTALLOGRAPHY AND NANOMATERIALS (07 Periods)

Crystallography: Introduction, crystal planes,crystal directions and Miller indices, separation between successive (hkl) planes, X-ray diffraction by crystal planes, Bragg’s law- powder method.

Nanomaterials: Introduction, principles of nanomaterials, properties of nanomaterials, synthesis of nanomaterials by ball milling and pulsed laser deposition and applications of nanomaterials.

Total Periods: 45

TEXT BOOK:

1. P. K. Palaniswamy, *Engineering Physics,* Scitech Publications India Private Limited, 2nd Edition, 2009.

REFERENCE BOOKS:

1. Dr. S. Mani Naidu, *Engineering Physics*, Pearson Education, 1st edition, 2013.
2. M.N. Avadhanulu,P.G.Kshirsagar, *A Textbook of Engineering Physics*, S.Chand & Company Ltd. Revised edition 2014.

3. K. Thyagarajan, *Engineering Physics-I,* McGraw-Hill Education India: Pvt.Ltd. 2015.

I B. Tech. - II Semester

(16BT2BS01) TRANSFORMATION TECHNIQUES AND PARTIAL DIFFERENTIAL EQUATIONS

(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITE: Intermediate /Senior secondary mathematics

COURSE DESCRIPTION: Fourier series; Fourier integrals and transforms; Laplace transforms; z – transforms; partial differential equations.

COURSE OUTCOMES:

After completion of the course a successful student is able to

CO1: Acquire basic knowledge in

- Fourier series and Fourier transforms
- Fourier integrals
- Laplace transforms and their applications
- z- transforms and their applications
- Solving partial differential equations

CO2: Develop skills in analyzing the

- Properties of Fourier series for a given function
- Partial differential equations through different evaluation methods
- Difference equations through z – transforms
- Engineering systems and processes involving wave forms and heat transfer

CO3: Develop skills in designing mathematical models for

- Problems involving heat transfer and wave forms
- Engineering concepts involving, Fourier transforms, Fourier integrals, Laplace transforms, z-transforms and difference equations

CO4: Develop analytical skills in solving the problems involving

- Fourier series and Fourier transforms
- Laplace transforms
- Z-transforms and difference equations
- Heat transfer and wave motion

CO5: Use relevant transformation techniques for

- Obtaining Fourier transforms for different types of functions
- Laplace transforms
- Z- transforms
- Partial differential equations

DETAILED SYLLABUS:

UNIT- I : FOURIER SERIES **(07 Periods)**

Fourier series: Determination of Fourier coefficients, convergence of Fourier series (Dirichlet's conditions), Fourier series of even and odd functions, Half-range Fourier sine and cosine expansions.

UNIT- II: FOURIER INTEGRALS AND FOURIER TRANSFORMS **(08 Periods)**

Fourier integral theorem (statement only), Fourier sine and cosine integrals, Fourier transform, Fourier sine and cosine transforms –properties, Inverse transform and finite Fourier transforms.

UNIT-III: LAPLACE TRANSFORMS **(12 Periods)**

Laplace transforms of standard functions. Properties of Laplace transforms. First and second shifting Theorems. Laplace transforms of derivatives and integrals. Inverse transforms. Convolution theorem (without proof), inverse Laplace transforms by convolution theorem. Laplace transform of periodic functions, Applications of Laplace transforms to ordinary differential equations of first and second order with constant coefficients.

UNIT-IV: Z- TRANSFORMS **(09 Periods)**

Z – transforms, inverse Z– transforms, damping rule, shifting rule, initial and final value theorems. Convolution theorem (without proof), solution of difference equations by Z– transforms.

UNIT–V: PARTIAL DIFFERENTIAL EQUATIONS **(09 Periods)**

Formation of Partial differential equations – Solutions of first order linear equations by method of grouping. First and second order equations by method of separation of variables – Solutions of one dimensional Wave equation, Heat equation. **Total Periods: 45**

TEXT BOOKS:

1. T.K.V. Iyengar, B. Krishna Gandhi,S.Ranganadham and M.V.S.S.N. Prasad,*Engineering Mathematics,* vol-1, S. Chand & Company 13/e,2014.
2. T.K.V. Iyenger, B. Krishna Gandhi, S.Ranganadham and M.V.S.S.N.Prasad, *Mathematical Methods,* S. Chand and Company, 8/e,2013.

REFERENCE BOOKS:

1. Grewal, B.S., *Higher Engineering Mathematics,*Khanna publishers, Delhi, 42/e,2012.
2. Kreyszig, E., *Advanced Engineering Mathematics*,John Wiley and Sons, Inc.,9/e,2013.

I B. Tech. - II Semester

(16BT20102) ENGINEERING MECHANICS

(Common to CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	4	1	-	4

PRE-REQUISITES: Intermediate Mathematics and Physics.
COURSE DESCRIPTIONS: statics of particles and rigid bodies; support reactions; analysis of perfect frames; friction; centroid, centre of gravity and moment of inertia; kinematics and kinetics.
COURSE OUTCOMES:
After successful completion of this course, the student will be able to:
CO1: Apply the knowledge of engineering mechanics fundamentals to the solutions of basic engineering problems.
CO2: Analyze
- Multi-body systems under equilibrium and dynamic conditions.
- Systems involving dry friction and computing the efficiency of the system of forces in frames under suitable assumptions.
- Sectional properties of surfaces and solids.

CO3: Design sustainable solutions to complex engineering problems using first principles of engineering mechanics.
CO4: Exercise awareness to assess the safety of system related to engineering mechanics.
CO5: Communicate effectively engineering and allied information through free body diagram.
CO6: Sustain interest in engineering mechanics to upgrade knowledge and skills through self learning concepts in mechanics.

DETAILED SYLLABUS:
UNIT–I: STATICS OF PARTICLES **(10 Periods)**
Basic concepts, System of units, System of concurrent coplanar forces in plane, Resultant of forces, Laws of mechanics, Equilibrium of forces, Lami's theorem, Vectorial representation of forces.
UNIT–II: STATICS OF RIGID BODIES **(14 Periods)**
Moment of a force, Varignon's theorem, Moment of a couple, Vectorial representation of moments and couples, Coplanar non-concurrent forces, Equilibrium of rigid bodies, Types of supports and loads, Types of frames, Perfect frame analysis, Method of joints, Method of sections, Principle of virtual work.
UNIT–III: FRICTION **(10 Periods)**
Frictional force, Types of friction, Laws of friction, Co-efficient of friction, Angle of friction, Angle of repose, Cone of friction, Applications: Body on horizontal/inclined plane, Two bodies in contact, Ladder friction, Wedge friction.
UNIT–IV: CENTROID, CENTRE OF GRAVITY AND MOMENT OF INERTIA **(12 Periods)**
Centroids of simple and composite areas, centre of gravity of bodies, Theorems of Pappus and Guldinus, Parallel axis and perpendicular axis theorems, Moment of Inertia of Composite areas, Radius of gyration – Section modulus, Mass Moment of Inertia of simple and composite masses.
UNIT–V: KINEMATICS AND KINETICS **(14 Periods)**
Kinematics of Particles Rectilinear and Curvilinear motion, Velocity, Acceleration, Motion of a projectile, Relative motion.
Kinetics of Particles and Rigid Bodies Kinetics of rectilinear motion, Newton's laws of motion, D'Alembert's principle, Work-energy method, Impulse-momentum equation, Kinetics of circular motion, Rotation. **Total Periods: 60**

TEXT BOOKS:
1. S. S. Bhavikatti and K. G. Rajashekarappa, *Engineering Mechanics*, New Age International (P) Ltd., 3rd Edition, 2009.
2. J. L. Meriam and L. G. Kraige**,** *Engineering Mechanics: Statics* (Vol. 1), *Dynamics* (Vol. 2), John Wiley & Sons Ltd., 5th Edition, 2008.

REFERENCE BOOKS:
1. Arthur P. Boresi and Richard J. Schmidt, *Engineering Mechanics - Statics and Dynamics*, Cengage Learning, 1st edition, Indian Edition, 2008.
2. S. Rajasekaran and G. Sankarasubramanian, *Engineering Mechanics – Statics and Dynamics*, Vikas Publishing House Pvt. Ltd., 3rd edition, 2009.
3. K. Vijaya Kumar Reddy and J. Suresh Kumar, *Singer's Engineering Mechanics - Statics and Dynamics,* BS Publications, 3rd edition, 2010.

4. S. Timoshenko, D. H. Young and J. V. Rao, *Engineering Mechanics*, Tata McGraw-Hill Education Pvt. Ltd., Revised 4^{th} edition, Special Indian Edition, 2007.

I B. Tech. - II Semester

(16BT20241) **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**

(Common to CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate Mathematics and Physics.

COURSE DESCRIPTION: Basics of electrical DC and AC circuits; principle of operation and applications of DC machines, transformers, and induction motors; Transducers and measuring instruments; rectifier devices; bipolar transistors and its characteristics.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Demonstrate knowledge on
- Electrical and electronic circuits.
- Construction and operation of electrical machines, electrical and electronic instruments.

CO2: Analyze various electrical & electronic circuits and different transducers.

CO3: Evaluate the electrical and electronic circuit parameters and performance of electrical machines.

CO4: Select and apply various machines and transducers.

DETAILED SYLLABUS:

UNIT-I: BASICS OF ELECTRICAL ENGINEERING (10 Periods)

Sources of electricity, basic circuit components, electric field, electric current, potential and potential difference, EMF, electric power, Ohm's law, node, path, loop, branch, resistive networks, inductive networks, capacitive networks, Kirchhoff's laws, series-parallel circuits, nodal analysis, mesh analysis, star-delta and delta-star transformations – problems.

UNIT–II: AC FUNDAMENTALS (09 Periods)

Production of alternating voltage, phase and phase difference, phasor representation of alternating quantities, behavior of AC series, parallel and series-parallel circuits, power in AC circuit - problems.

UNIT–III: DC AND AC MACHINES (10 Periods)

DC Machines: Construction and working of a DC Generator and DC motor and their types, EMF equation of a DC generator, torque equation of a DC motor, applications of DC generators and DC motors - problems.

Transformers: Construction and working of a single phase transformer, EMF Equation.

AC Machines: Construction and working of a three phase induction motor, applications of three phase induction motors.

UNIT–IV: TRANSDUCERS AND MEASURING INSTRUMENTS (08 Periods)

Transducers, Basic requirements of transducers, passive transducers - strain gauge, thermistor, Hall-Effect transducer, LVDT, and active transducers, Piezoelectric and thermocouple, Load cells, Data loggers, Data acquisition system (overview and concept only), Digital voltmeters, Digital ammeter, Digital multi-meters (elementary concepts only).

UNIT–V: RECTIFIER CIRCUITS AND BIPOLAR JUNCTION TRANSISTORS (08 Periods)

Rectifier Circuits: DC voltage and current, Peak Inverse Voltage (PIV), ripple factor, efficiency and regulation of half wave and full wave rectifiers.

Bipolar Junction Transistors: Formation of PNP / NPN junctions, Transistor as an amplifier, need for biasing, single stage CE amplifier.

Total Periods: 45

TEXT BOOKS:

1. V.K. Mehta and Rohit Mehta, *Principles of Electrical and Electronics Engineering,* 2nd edition, S.Chand & Sons, New Delhi, 2007.
2. M.S. Naidu and S. Kamakshaiah, *Introduction to Electrical Engineering,* Tata McGraw-Hill Publishing Company Limited, New Delhi, 2007.

REFERENCE BOOKS:

1. Theraja B.L & Theraja A.K, *A Text Book of Electrical Technology*, Vol-1, S.Chand, New Delhi, 2009.
2. A. K. Sawhney, *Electrical & Electronics Measurement and Instrumentation*, Dhanpat Rai & Co.(P) Ltd, New Delhi, 15th edition, 2014.
3. K. Lal Kishore, *Electronic Devices and Circuits,* BS Publications, Hyderabad, 3rd edition, 2008.

I B. Tech. - II Semester

(16BT20301) ENGINEERING MATERIALS

(Mechanical Engineering)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate Physics, Engineering Chemistry.

COURSE DESCRIPTION: Classification, properties and applications of materials; atomic and crystal structure of metals; formation of alloys; structure and properties of ferrous and non-ferrous metals; properties and applications of ceramics and composite materials; testing of materials.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Gain basic knowledge on engineering materials such as,

- Classification.
- Structure, properties and applications.
- Various testing procedures.

CO2: Analyze

- Material microstructure.
- Characterization and properties of various materials.

CO3: Design a crystallographic model of a material at microscopic level.

CO4: Use modern material testing instruments such as ultrasonic flaw detector, Radiography.

CO5: Identify the impact of materials on the environmental issues.

DETAILED SYLLABUS:

UNIT-I: ENGINEERING MATERIALS AND PROPERTIES (9 Periods)

Introduction, classification and applications of engineering materials. Mechanical Properties: tensile strength, compressive strength, ductility, malleability, hardness, toughness, brittleness, impact strength, fatigue, creep resistance. Physical properties: density, melting point, specific heat, corrosion resistance. Thermal properties: Thermal conductivity, Thermal expansion and Specific heat. Electrical properties and Magnetic properties.

UNIT-II: STRUCTURE OF MATERIALS (09 Periods)

Primary and secondary bonding in materials, space lattice, unit cell, structure of materials: simple cubic, body centered cubic, face-centered cubic, hexagonal closed-pack. Crystal defects: point, line, planar, and volume, grain and grain boundaries, effect of grain boundaries on properties of metal/alloys, determination of grain size.

UNIT-III: FERROUS, NON- FERROUS METALS AND THEIR ALLOYS (09 Periods)

Ferrous metals and its alloys: Structure, properties and applications of plain carbon steel, low carbon steel, Hadfield manganese steel, stainless steel, and tool steel. Structure, properties and applications of grey cast iron, white cast iron, malleable cast iron, spheroidal cast iron, alloy cast iron.

Non-ferrous metals and its alloys: Properties and applications of copper, Tin, Lead, Aluminum, Titanium and their alloys and super alloys.

UNIT-IV: CERAMICS AND COMPOSITE MATERIALS (09 Periods)

Ceramics: Properties and applications of crystalline ceramics, glasses, cermets, abrasive Materials.

Composite materials: Introduction, types of matrices and reinforcement, Polymer-Matrix Composites: Glass-Fiber Reinforced Plastic, Carbon-Fiber Reinforced Plastic, Metal-Matrix Composites , Ceramic-Matrix Composites.

UNIT-V: TESTING OF MATERIALS (09 Periods)

Destructive testing: tensile, compressive, shear, hardness and impact tests.

Non-destructive testing: gamma ray detection, magnetic particle inspection, eddy current inspection, die penetration, radiography and ultrasonic testing.

Total Periods: 45

TEXT BOOKS:

1. William. D. Callister, *Materials Science and Engineering-An Introduction*, John Wiley and sons, 8th edition, 2009.
2. Serope Kalpakjian, Steven R Schmid, *Manufacturing Engineering and Technology,* Pearson Publications,
   6th Edition, 2009.

REFERENCE BOOKS:

1. Sidney H Avner, *Introduction to Physical Metallurgy,* Tata Mc Graw Hill, 2nd edition, 2009.
2. V.D. Kodigre, *Material Science and Metallurgy*, Everest Publishing House, 12th edition, 2002.

3. V. Raghavan, *Physical Metallurgy: Principles and Practices*, PHI, 3rd edition, 2015.

I B. Tech. - II Semester

(16BT1BS32) ENGINEERING PHYSICS LAB

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Intermediate / senior secondary Physics.

COURSE DESCRIPTION:

Characteristics of p-n junction diode, Photodiode, LED, and semiconductor laser diode. Experimental determination of carrier concentration and energy gap of a semiconductor material, wave length of a laser source, size of fine particle, numerical aperture and acceptance angle of optical fiber. Determination of frequency of electrically vibrating tuning fork and A.C source using A.C sonometer, magnetic field along axial line of a current carrying coil and rigidity modulus of material of a wire using torsional pendulum.

COURSE OUTCOMES:

After completion of the course, a successful student will be able to:

CO1: Acquire basic knowledge about semiconductor materials, magnetic materials and lasers.

CO2: Acquire analytical skills in the estimation of carrier concentration of semiconductor materials and characterization of p-n junction.

CO3: Develop skills in designing electronic circuits using semiconductor components.

CO4: Acquire skills to use instrumental techniques in A.C sonometer and Melde's experiment.

CO5: Apply diffraction techniques for determination of sizeof tiny particles and wave length of lasers.

LIST OF EXPERIMENTS

Conduct a minimum of any **Ten** of the following experiments.

1. Determination of wavelength of a laser source using Diffraction Grating.
2. Determination of particle size by using a laser source.
3. Determination of Numerical aperture and acceptance angle of an optical fiber.
4. Melde's experiment - transverse & longitudinal modes.
5. Magnetic field along the axis of a current carrying coil- Stewart and Gee's method.
6. Calculation of A.C frequency using sonometer.
7. I-V Characteristics of a p-n Junction diode.
8. Energy gap of a material of a p-n Junction.
9. Characteristics of LED source.
10. Characteristics of Photo diode.
11. Hall Effect.
12. Determination of rigidity modulus of the material of the wire using torsional pendulum.

I B. Tech. - II Semester
(16BT20251) ELECTRICAL AND ELECTRONICS ENGINEERING LAB

(Mechanical Engineering)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Physics.

COURSE DESCRIPTION: Verification of Kirchhoff's laws; study performance of AC/DC motors; various tests on DC shunt motors; brake test on 3-phase induction motors; V-I characteristics of diode, Half wave rectifier with/without capacitive filter; bipolar junction transistor amplifier.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Employ knowledge acquired to determine appropriate type of electrical machine or circuit to be used in a given situation.

CO2: Analyzing the performance of electrical machines, rectifiers and amplifiers.

CO3: Develop skills in selecting and developing suitable rectifiers and amplifiers for a specific use.

CO4: Function effectively as individual and as a member in a team.

CO5: Communicate effectively in both oral and written forms.

LIST OF EXPERIMENTS

PART A: ELECTRICAL ENGINEERING

1. Verification of Kirchhoff's laws.
2. Study of DC shunt motor starter.
3. Swinburne's test on DC shunt machine (Predetermination of efficiency of a given DC shunt machine working as motor and generator).
4. Speed control of DC shunt motor by
   a) Armature Voltage control
   b) Field flux control method.
5. Brake test on DC shunt Motor.
6. Magnetization characteristics of DC shunt generator. Determination of critical field resistance.
7. OC and SC tests on single phase transformer (Predetermination of efficiency and regulation at given power factors).
8. Brake test on 3-phase Induction motor (Determination of performance characteristics).

(**Note:** Student shall perform minimum of **Six** experiments)

PART B: ELECTRONICS ENGINEERING

1. V–I characteristics of p-n junction Diode.
2. Half wave rectifier without capacitive filter.
3. Half wave rectifier with capacitive filter.
4. Full wave rectifier without capacitive filter.
5. Full wave rectifier with capacitive filter.
6. Input and output characteristics of transistor in Common Emitter (CE) configuration.
7. Frequency response of a single stage CE amplifier.
8. Sinusoidal signal generation using RC phase shift oscillator circuit.

(**Note:** Student shall perform minimum of **Six** experiments)

I B. Tech. - II Semester

(16BT20331) ENGINEERING WORKSHOP PRACTICE

(Common to CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: None

COURSE DESCRIPTION: Knowledge on various workshop hand and power tools; utilization in different manufacturing trades such as carpentry, fitting, house wiring, sheet metal forming, foundry; overview of metal cutting processes, plumbing and welding through live demonstrations.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Acquire knowledge on utilization of hand and power tools for engineering applications.
CO2: Employ analytical skills for the production of a component for real time applications.
CO3: Design and model different prototypes in the carpentry, fitting and sheet metal operations.
CO4: Comprehend the usage of modern power tools.
CO5: Abide by workshop safety regulations and adopt environmentally safe practices.
CO6: Engage in self study for solving engineering related problems.

DETAILED SYLLABUS:

1. **FITTING:** Introduction, types of fitting tools: holding tools, marking and measuring tools, cutting tools, finishing tools and miscellaneous tools, fitting operations, safety precautions, care and maintenance of hand tools.
   EXERCISES:
   - Square Mating
   - V- Mating
   - Half Round Mating
   - Dovetail Mating.
2. **CARPENTRY:** Introduction, types of wood, carpentry tools, wood working techniques, types of joints, safety precautions, care and maintenance of tools.
   EXERCISES:
   - Cross lap Joint
   - Briddle Joint
   - Dovetail Joint
   - Mortise and Tenon Joint.
3. **SHEET METAL FORMING:** Introduction, sheet metal materials, hand tools, sheet metal fabrication, safety and precautions.
   EXERCISES:
   - Fabrication of Tray
   - Fabrication of Square vessel
   - Fabrication of Funnel
   - Fabrication of Cylinder
4. **WIRING**: Introduction, elements of wiring, wiring methods, earthing, electrical fittings and accessories, types of wires and colors, safety and precautions.
   EXERCISES:
   - One Lamp Controlled by one One- way Switch
   - Two Lamps Controlled by one One-Way Switch in series/ parallel
   - One Lamp Controlled by two Two- way Switches (Stair case wiring)
   - Tube Light Connection
5. **FOUNDRY:** Introduction, moulding sand, properties of moulding sand, types of patterns and pattern , materials, foundry tools, safety and precautions.
   EXERCISES:
   - Mould Preparation with single piece pattern (cube)
   - Mould Preparation with single piece pattern (stepped pulley)
   - Mould Preparation with Split piece Pattern (Tumble)
   - Mould Preparation with Split piece Pattern (pipe bent)

6. **THEMES FOR DEMONSTRATION:** Machine shop, Plumbing, Welding and Power Tools.

Note: Student shall perform any **Two** exercises from each trade. **Total Periods: 42**

REFERENCE BOOKS:

1. P.Kannaiah and K.L.Narayana, *Workshop Manual*, SciTech Publishers, 2009.

2. K. Venkata Reddy, *Workshop Practice Manual*, BS Publications, 2008.
3. V. Ramesh Babu, *Engineering Workshop Practice*, VRB Publishers Private Limited, 2009.

I B. Tech. - II Semester

(16BT20332) MATERIALS SCIENCE LAB

(Mechanical Engineering)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Intermediate Physics, Engineering Chemistry

COURSE DESCRIPTION: Characterization of microstructures of steels, cast irons and non-ferrous metals; heat treatment procedures; data acquisition and recording; grain size analysis; phase segmentation; non-destructive tests; metal powder preparation.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Acquire knowledge in preparing metallographic specimen and various non-destructive testing methods.

CO2: Analyze the material for
- Material Microstructure.
- Phase distribution.
- Grain size.

CO3: Model appropriate material suitable for engineering applications.

CO4: Use the advanced software testing tool 'Material Plus' for detailed characterization of metal.

CO5: Choose acceptable engineering material for societal and industrial needs.

LIST OF EXPERIMENTS

1. Study of metallurgical instruments & microscope
2. a) Preparation of specimen using cold setting die
   b) Preparation of specimen using hydraulic press
3. Preparation and study of the microstructure of cast irons
4. Preparation and study of the microstructure of carbon steels
5. Preparation and study of the microstructure of Non-Ferrous alloys
6. a) Study of the microstructures of heat treated steels
   b) Measurement of hardness of heat treated and untreated steels
7. Determination of hardenability of steel by Jominy End Quench Test
8. Determination of grain size, porosity and phase distribution of specimens (any four materials) by Material Plus software
9. Visual Inspection
10. Ultrasonic flaw detection test
11. Magnetic particle inspection
12. Die-penetration test
13. Eddy current testing
14. Preparation of metal powders by ball milling machine
15. Compaction of powders

(**Note:** Student shall perform minimum of **Twelve** experiments.)

II B. Tech. – I Semester

(16BT3BS01) PROBABILITY DISTRIBUTIONS AND STATISTICAL METHODS

(Common to CE, ME, CSE, IT, and CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE -REQUISITE: Course on Intermediate/Senior Secondary Mathematics

COURSE DESCRIPTION: Random variables; mathematical expectations; probability distributions; correlation and regressions; statistical quality control; sampling distributions; tests for small and large samples and their significances.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1: Acquire basic knowledge in
- Probability distributions, correlation and regressions
- Statistical quality control and testing of hypotheses
- Simple linear regression
- Tests of significance for small and large samples

CO2: Develop skills for analyzing the data with
- Mathematical expectations for realistic results
- Probability distributions for practical situations.
- Control charts of statistical quality control
- Correlation and regression concepts
- Suitable tests of significance for practical situations.

CO3: Develop skills in designing
- Probability distributions
- Limitations of statistical quality control
- Control charts,
- X, R, np, and c charts

CO4: Develop analytical skills forsolvingproblems involving
- Probability distributions, means,variances and standard deviations
- Statistical techniques employed for quality
- Sampling techniques for decision making
- Tests of significances for small and large samples

CO5: Use relevant probability and statistical techniques for
- Mathematical expectations of desired results
- Fitting probability distributions for experimental data.
- Quality control and testing of hypothesis.

DETAILED SYLLABUS:

UNIT - I: RANDOM VARIABLE AND MATHEMATICAL EXPECTATIONS (09 Periods)

Random Variables: Discrete and Continuous random variables, Distribution function of random variable, Properties, Probability mass function, Probability density function, Mathematical expectation, Properties of Mathematical expectation, Mean and Variance.

UNIT - II: PROBABILITY DISTRIBUTIONS (09 Periods)

Discrete Distributions: Binomial and Poisson Distributions, Mean, variance and standard deviations.
Continuous Distributions: Normal Distribution, Mean, Variance and properties.

UNIT - III: CORRELATION, REGRESSION AND STATISTICAL QUALITY CONTROL (09 Periods)

Definition of correlation, correlation coefficient, Rank correlation. Simple linear regression, regression lines and properties.

Introduction, advantages and limitations of statistical quality control, Control charts, specification limits, , R, np and c charts.

UNIT - IV: SAMPLING DISTRIBUTIONS AND TEST OF SIGNIFICANCE FOR LARGE SAMPLES (09 Periods)

Population and Sample, Parameter and Statistic, Sampling Distribution of Statistic, Standard Error of Statistic, Null and Alternative Hypothesis, Type I and II errors, Level of Significance, Critical region, Degrees of freedom. Tests of significance for proportions and means.

UNIT - V: TEST OF SIGNIFICANCE FOR SMALL SAMPLES (09 Periods)

Student's t-test: single mean, difference of means, F-test for equality of population variance, Chi-Square Test for Goodness of fit, contingency table, Chi-Square Test for Independence of Attributes.

Total periods: 45

TEXT BOOKS:

1. T.K.V. Iyengar, B. Krishna Gandhi, S.Ranganatham and M.V.S.S.N. Prasad, *Probability and Statistics*, S. Chand & Company, 4/e, 2013.
2. S.P.Gupta, *Statistical Methods*, Sultan and Chand, New Delhi, 28/e, 2005.

REFERENCE BOOKS:

1. S.C.Gupta and V.K.Kapoor, *Fundamentals of Applied Statistics*, Sultan and Chand,New Delhi,11/e, 2004.

2. Shahnaz Bathul, *A text book of Probability and Statistics*, Ridge Publications, 2/e,2007.

II B.Tech. - I Semester

(16BT30301) ENGINEERING METALLURGY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Engineering Materials.

COURSE DESCRIPTION: Extraction of metals from the ores; Different melting techniques; Phase diagrams; Heat treatment procedures and their influence on Mechanical properties; Surface hardening methods; Modern material characterization techniques; Production of metal powders.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1: Demonstrate the knowledge of engineering metallurgy in extraction of materials by various melting techniques.

CO2: Analyze the structures of various metals influencing various engineering applications.

CO3: Design a suitable heat treatment method to endow required mechanical behavior as per industrial requirements.

CO4: Interpret the data on microstructure of materials using phase diagram and modify the microstructure and properties using different heat treatments.

CO5: Select modern material characterization techniques for analyzing the properties of various materials.

CO6: Identify hazardous substances in metallurgical production and source of environment pollution and propose measures to protect the environment.

DETAILED SYLLABUS:

UNIT – I: MELTING OF METALS (08 Periods)

Introduction, Ores of various metals, Melting of iron, Blast furnace, Cupola furnace, Puddling furnace, Melting of steel, Bessemer converter process, L-D process, Basic open hearth process, Electric furnace Melting of super alloys, Vacuum induction melting, Vacuum arc remelting.

UNIT – II: PHASE DIAGRAMS (10 Periods)

Cooling curve of pure metals and alloys, phase, Phase diagram, Gibbs's phase rule, Hume Rothery rules, binary isomorphous system, binary eutectic alloy system (Lead-Tin System),invariant Reactions-Eutectic, Eutectoid, Peritectic, Peritectoid; Iron-Iron Carbide phase diagram, Effect of alloying elements on Iron-Iron carbon system.

UNIT – III: HEAT TREATMENT OF STEELS (09 Periods)

Introduction, Annealing, Full annealing, Isothermal annealing, Spheroidal annealing, Process annealing, Normalizing, Hardening, Age hardening, Tempering, Austempering, Martempering, Sub zero treatment, TTT diagram, CCT diagrams.

UNIT – IV: SURFACE HARDENING METHODS AND MATERIAL CHARACTERIZATION TECHNIQUES (09 Periods)

Surface hardening methods: Introduction, Carburizing, Nitriding, Cyaniding, Carbonitriding, Flame and Induction hardening

Material characterization techniques: Introduction, Steps in metallographic specimen preparation, Optical microscope, Scanning electron microscope, Transmission electron microscope, X-ray diffraction.

UNIT - V: POWDER METALLURGY (09 Periods)

Introduction, Methods of production of metal powders, Atomization process, Electrolysis, Reduction, Mechanical Alloying, Particle size, Shape and distribution, Mixing, Blending, Compacting, Hot Isostatic pressing, Cold Isostatic pressing, Sintering, Applications, Advantages and limitations of powder metallurgy.

Total Periods: 45

TEXT BOOKS:

1. William. D. Callister, *Materials Science and Engineering-An Introduction*, John Wiley and sons, 8th Edition, 2009.
2. P.N.Rao, *Manufacturing Technology*, Vol.1, TMH, 4th Edition, 2013

REFERENCE BOOKS:

1. Avner, *Introduction to Physical Metallurgy*, Tata Mc Graw Hill, 2nd Edition, 2009.
2. Kodigre V D, *Material Science and Metallurgy*, Everest Publishing House, 12th Edition, 2002.

3. V. Raghavan, *Physical Metallurgy: Principles and Practices*, PHI, 3rd Edition, 2015.

II B. Tech. – I Semester

(16BT30302) KINEMATICS OF MACHINERY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Engineering Mechanics and Computer Aided Engineering Drawing.

COURSE DESCRIPTION: Basic concepts and description of various plane mechanisms; Calculation of Displacement; Velocity and acceleration of simple plane mechanisms; Straight line mechanisms; Steering mechanisms; Hook's joint; Preparation of cam profiles; Concepts of Gears and Gear trains.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1: Demonstrate various mechanisms and choose one best suited for a given situation.

CO2: Analyze a given mechanism and find motion characteristics.

CO3: Design suitable gear train mechanism for specific requirement.

CO4: Investigate problems associated with machine components such as gears, gear trains.

CO5: Apply appropriate techniques to design cam profiles.

CO6: Integrate the kinematic mechanisms to the societal needs within realistic constraints.

DETAILED SYLLABUS:

UNIT - I: MECHANISMS AND MACHINES (08 Periods)

Elements or Links, Classification- Rigid, Flexible and Fluid link; Types of kinematic pairs- Sliding, Turning, Rolling, Screw and Spherical pairs, Lower and Higher pairs, Closed and Open pairs; Constrained motions- Completely, Partially or successfully and incompletely constrained motion; Kinematic chain, Types of joints- Binary, Ternary and Quaternary joints; Number of Degrees of Freedom, Kutzbach and Grubler's Criteria, Inversions of plane mechanisms- Quadric cycle, Single slider and Double slider crank chains.

UNIT - II: VELOCITY AND ACCELERATION ANALYSIS OF MECHANISMS (08 Periods)

Instantaneous center of rotation, Centrode and Axode, Relative motion between two bodies, Kennedy theorem (Three centers in line), Instantaneous center method to determine angular velocity of links and linear velocity of point, Relative velocity method to determine velocity and acceleration diagrams for

four bar mechanism, Slider-crank mechanism and its inversions, Coriolis component of acceleration.

UNIT - III: STRAIGHT LINE, STEERING GEAR MECHANISMS AND HOOK'S JOINT (10 Periods)

Pantograph, Exact Straight Line Motion Mechanisms- Peaucellier, Hart and Scott Russell's mechanism; Approximate Straight Line Motion Mechanisms- Modified Scott Russell's mechanism, Watt's, Grasshopper, Tchebicheff's and Robert mechanisms; Steering mechanisms, Condition for correct steering, Davis Steering gear and Ackerman steering gear mechanisms, Single and double Hooke's joints.

UNIT - IV: GEARS AND GEAR TRAINS (11 Periods)

Friction wheels and toothed gears, Types, Law of gearing, Sliding velocity of teeth, Forms of teeth- Cycloidal, Involute profiles; Expressions for path of contact and arc of contact, Contact ratio, Phenomena of interference, Condition for minimum number of teeth to avoid interference, Gear trains - Simple, Compound, Reverted and Epicyclic gear train; Compound Epicyclic Gear Train (sun and planet wheel), Differential gear box for automobile.

UNIT - V: CONSTRUCTION OF CAM PROFILE (08 Periods)

Introduction to cams and followers, Types, Terminology, Types of follower motion, Cam profile- For uniform velocity, SHM, Uniform acceleration and retardation of Knife edge, Roller followers (axis of follower passes through the axis of cam shaft and offset), Maximum velocity and maximum acceleration during outward and return stroke.

Total Periods: 45

TEXT BOOKS:

1. S. S. Rattan, *Theory of Machines and Mechanisms*, Tata McGraw Hill Education, 4th Edition, 2016.
2. R.S. Khurmi, *Theory of machines, S.Chand Publications*, 14th Revised Edition, 2012

REFERENCE BOOKS:

1. Ballaney. P. L., *Theory of Machines and Mechanisms*, Khanna Publishers, 2005
2. Joseph Edward Shigley and John Joseph Uicker,Jr., *Theory of Machines and Mechanisms*, MGH, 4th Edition, New York, August 2013.
3. Bevan T, *Theory of Machines*, CBS Publishers and Distributors, New Delhi, 2002.

II B.Tech. – I Semester
(16BT30303) **MANUFACTURING TECHNOLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Engineering Materials.

COURSE DESCRIPTION: Manufacturing Processes; Foundry and Special Casting Processes; Joining Processes; Gas Welding; Electric Arc Welding; Resistance Welding; Metal Forming Processes; Sheet Metal Operations and Plastic Processing.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1: Demonstrate the knowledge required for Manufacturing Process suitable for fabricating a product.

CO2: Analyze the components of moulds and select materials and allowances of patterns used in casting.

CO3: Design Core, Core Print and Gating System in Metal Casting Processes.

CO4: Conduct investigations on manufacturing process for a particular application.

CO5: Use methodology to manufacture components with less human effort.

DETAILED SYLLABUS:

UNIT – I: FOUNDRY (09 Periods)

Introduction, Sand mould making procedure, Types of Patterns, Pattern Materials, Pattern Allowances, Gates and Risers, Design of Gating systems, Properties of Moulding Sand, Testing of Moulding Sand, Moulding Machines, Types of Cores.

UNIT – II: SPECIAL CASTING PROCESSES (09 Periods)

Introduction, Special Casting Processes – Shell Moulding, Precision Investment Casting, Permanent Mould Casting, Full Mould Casting, Die Casting, Centrifugal casting, Continuous Casting; Cleaning and Finishing of Castings - Inspection and Testing of Castings, Casting Defects .

UNIT – III: METAL FORMING PROCESSES AND SHEET METAL OPERATIONS (09 Periods)

Metal forming processes: Introduction, Hot Working and Cold Working, Forging, Extrusion – Direct, Indirect and Tube Extrusion; Rolling – Types of Rolling Mills; Drawing – Rod, Wire and Tube Drawing.

Sheet Metal Operations: Shearing operations, Types of dies - Progressive Die, Compound Die and Combin Magnetic Pulse Forming, Electro-Hydraulic Forming.

UNIT – IV: METAL WELDING PROCESSES (09 Periods)

Introduction, Classification of Welding Processes - Arc Welding, TIG Welding, MIG Welding, Submerged Arc Welding; Gas Welding Process – Types of Flames; Resistance Welding – Spot Welding, Seam Welding; Thermit Welding, Electron Beam Welding, Laser Beam Welding, Ultrasonic Welding, Welding Defects - Causes and Remedies; Destructive and Non-destructive Testing of Welds, Soldering and Brazing.

UNIT – V: PLASTIC PROCESSING (09 Periods)

Introduction, Plastics – Properties of Plastics, Additives in Plastics; Types of Plastics- Thermoforming Plastics, Thermosetting Plastics; Injection Moulding, Blow Moulding, Compression Moulding, Transfer Moulding, Extrusion Process, Calendering, Casting of Plastics, Sheet Forming Processes.

Total Periods: 45

TEXT BOOKS:

1. P.N.Rao, *Manufacturing Technology*, Vol.1, TMH, 4th Edition, 2013
2. Kalpakjian, Serope, *Manufacturing Engineering and Technology*, Pearson Education, 7th Edition, 2014.
3. Hazra Choudary S.K. and Hazra Choudary A.K., *Elements of Workshop Technology*, Vol I, Media Promoters, 12th Edition, 2007.

REFERENCE BOOKS:

1. R.K.Jain, *Production Technology*, Khanna Publishers, 17th Edition, 2010.
2. Rosenthal, *Principles of Metal Castings*, McGraw-Hill Professional Publishing, 3rd Edition, 2013.

3. Mikell P.Groover, *Fundamentals of Modern Manufacturing, Materials*, *Processes and Systems*, John Wiley and Sons, 9th Edition, 2007.

II B.Tech. – I Semester

(16BT30304) STRENGTH OF MATERIALS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Engineering Mechanics.

COURSE DESCRIPTION: Analysis of stresses and strains of mechanical and structural components; action of shear; bending and torsional stresses; deflection of beams due to axial and transverse loadings; thin and thick walled pressure vessels.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1: Demonstrate the basic behavior of materials when subject to external influences.

CO2: Analyze the internal and external behavior of members during loading.

CO3: Develop the solution for complex loading conditions by simplifying under suitable assumptions.

CO4: Investigate the behavioral changes of materials and provide valid conclusion.

CO5: Relate the contextual knowledge to access safety issues.

CO6: Communicate the mechanical properties under loading through graphical representation.

DETAILED SYLLABUS:

UNIT - I: SIMPLE STRESSES AND STRAINS (10 Periods)

Types of Stresses, Strains, Hooke's law, Stress–Strain diagram, Working Stress, Factor of safety, Lateral strain, Poisson's ratio, Volumetric strain, Elastic Moduli and relationship between them, Bars of Varying section, Composite bars, Temperature stresses, Strain energy.

UNIT - II: SHEAR FORCE AND BENDING MOMENT (08 Periods)

Concept of shear force and bending moment, S.F and B.M. diagrams for cantilever, Simply supported, Over hanging beams subjected to Point loads, Uniformly distributed loads, Uniformly varying loads and combination of these loads, Point of contraflexure.

UNIT - III: BENDING, SHEAR AND TORSIONAL SHEAR STRESSES (13 Periods)

Theory of simple bending, Bending equation, Determination of flexural stresses for simple cases, Section modulus, Shear stress formula, Shear stress distribution across various beams & sections - Rectangular, Circular, Triangular, I, T sections; Theory of pure torsion, Torsion Equation, Torsional moment of resistance, Polar section modulus.

UNIT - IV: DEFLECTION OF BEAMS (07 Periods)

Relationship between curvature, slope and deflection, Slope and deflection of cantilever and simply supported beams by Double Integration method and Macaulay's method, Principal stresses, Mohr's circle.

UNIT - V: PRESSURE VESSELS (07 periods)

Thin seamless cylindrical shells, Derivation of formula for longitudinal and circumferential stresses, Volumetric strain, Thin spherical shells, Thick cylinders under internal and external pressure.

Total Periods: 45

TEXT BOOKS:

1. S.Ramamrutham, R.Narayanan, *Strength of Materials*, Dhanpat Rai Publications,14th Edition, 2011.
2. Dr. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, *Mechanics of Materials*, Laxmi Publications, Revised Edition, 2017.

REFERENCE BOOKS:

1. James M.Gere, Stephen Timoshenko, *Mechanics of Materials*, CBS Publications, 2nd Edition, 2004.
2. Beer, Johnston & Dewolf, *Mechanics of Materials*, Tata McGraw-Hill Education, 3rd Edition, 2004.
3. R.K.Rajput, *Strength of materials*, S.Chand Publications, Revised Edition, 2006.

II B. Tech. – I Semester

(16BT30305)THERMODYNAMICS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Engineering Physics and Engineering Chemistry.

COURSE DESCRIPTION: Thermodynamic system; Energy interactions; Heat and work Transfer in flow and non- flow systems; Laws of thermodynamics; Reversible and irreversible processes; Entropy; Equation of state; Pure substance and Gas power cycles.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1: Demonstrate the knowledge of thermodynamic systems, properties, laws of thermodynamics, entropy, pure substance and gas power cycles.

CO2: Identify, formulate and analyze various thermodynamic systems and provide analytical and numerical solutions.

CO3: Design and develop the solutions for the thermodynamic systems to achieve the required physical process parameters.

CO4: Conduct investigations and address the complex problems on availability, entropy and gas power cycles.

CO5: Use thermodynamic laws (exergy analysis) in estimating the performance of heat engines.

DETAILED SYLLABUS:

UNIT - I: BASIC CONCEPTS OF THERMODYNAMICS (08 Periods)

Microscopic and macroscopic point of view, Thermodynamic systems, Control volume, Thermodynamic properties, Processes, Cycle, Homogeneous and Heterogeneous systems, Thermodynamic equilibrium, Quasi – static process, Concept of continuum, Work transfer and Heat transfer, Point and path function, Zeroth law of thermodynamics.

UNIT - II: FIRST LAW AND SECOND LAW OF THERMODYNAMICS (10 Periods)

First Law of Thermodynamics: First law for a closed system undergoing a cycle, First law for a closed system undergoing a change of state, Limitations of first Law, Perpetual motion machine (PMM1) of first kind, Energy a property of system, First law applied to a flow process - steady flow energy equation (SFEE).

Second Law of Thermodynamics: Energy reservoir, Kelvin-planck and Clausius statements of second law and their equivalence, PMM of second kind, Heat engine, Refrigerator, Heat pump, Reversibility and Irreversibility, Carnot cycle, Carnot's theorem, Absolute thermodynamics temperature scale.

UNIT - III: ENTROPY AND AVAILABILITY (09 Periods)

Entropy: Introduction, Clausius theorem, Clausius inequality, Entropy as a property, Principle of entropy increase and applications, Third law of thermodynamics.

Availability: Availability and irreversibility, Available Energy, Maximum Work in a Reversible Process, Availability in Non - Flow and Flow Processes.

UNIT - IV: PROPERTIES OF PURE SUBSTANCES, GASES AND GAS MIXTURES (09 Periods)

Properties of pure substances: Introduction, P-V, P-T and T-S Diagrams for a Pure Substance, Quality and Dryness Fraction, Use of Steam Tables and Mollier Chart for thermodynamic properties.

Properties of gases and gas mixtures: Ideal gas, equation of state, Mole Fraction, Mass fraction, Gravimetric and volumetric Analysis, Dalton's Law of partial pressure, Equivalent Gas constant and Molecular Internal Energy, Enthalpy, Specific Heats and Entropy of Mixture of perfect Gases and Vapour.

UNIT - V: GAS POWER CYCLES (09 Periods)

Air standard cycles - Stirling cycle, Ericsson cycle, Joule cycle, Atkinson cycle, Lenoir cycle, Otto cycle, Diesel cycle and Dual cycle; Comparison of Otto, Diesel and Dual cycles. **Total Periods: 45**

TEXT BOOKS:

1. P. K. Nag, *Engineering Thermodynamics*, TMH, 5th Edition, 2013.
2. Chatttopadhyay, *Engineering Thermodynamics*, Oxford Publishers, 1st edition, 2011.

REFERENCE BOOKS:

1. Yunus Cengel & Boles, *Thermodynamics–An Engineering Approach*, TMH, 8th Edition, 2015
2. Dr.R.Yadav, *Fundamentals of Engineering Thermodynamics*, Central publishing House, 7th Edition, 2004.

Note: Steam Tables with Mollier Chart shall be supplied during examination.

II B.Tech. - I Semester
(16BT30331) COMPUTER AIDED MACHINE DRAWING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Course on Computer Aided Engineering Drawing.

COURSE DESCRIPTION: Principles of machine drawing; Sectional views; Tolerances; Thread profiles; Bolted joints; Locking arrangements for nuts; Foundation bolts; Keys; Assembling and Disassembling; Part drawing;.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Read and infer a given CAD drawing.

CO2. Analyze features on a drawing part.

CO3. Develop suitable drawing views to represent part drawings of different machine parts in CAD software.

CO4. Investigate the requirements of complex components and interpret the implications of drawings of machine components.

CO5. Apply appropriate techniques, resources to complex engineering activities for modeling machine components with understanding of limitations.

CO6. Function effectively as an individual and as a member of team to combine various part components into a single assembly.

CO7. Communicate about the assemble and part drawings through the computer aided drawings.

LIST OF EXPERIMENTS

Any Twelve Exercises are to be conducted and three from each section.

1. **Exercises on machine drawing conventions using drafting software.** (Any three exercises out of five)
   - Conventional representation of materials.
   - Conventional representation of machine components.
   - Conventional representation sectional views.
   - Conventional representation of limits, Fits and tolerances-form and positional tolerances and machining symbols.
   - Conventional representation of dimensioning on the drawings.
2. **Exercises on drawing of machine elements and simple parts using drafting software.** (Any three exercises out of five)
   - Types of thread profiles-Square, Metric, ACME, Worm.
   - Bolted joints-Hexagonal bolt and nut, Square bolt and nut.
   - Locking arrangements for nuts-Locking by split pin, castle nut.
   - Foundation bolts- Eye, Bent, Rag foundation bolts.
   - Keys-Saddle key, Sunk key, Woodruff key, Kennedy key.
3. **Assembly drawings.**
   Drawing of assembled views for the part drawings of the following, using conventions and easy drawing proportions. (Any three ONLY)
   - Stuffing box
   - Pipe vice
   - Eccentric
   - Screw jack
4. **Part drawings.**
   Preparation of part drawing representing limits, fits and tolerances and surface finish indications (Below mentioned part drawings ONLY).
   - Petrol Engine connecting rod
   - Single tool post
   - Plummer block

II B. Tech. - I Semester

(16BT30332) MANUFACTURING TECHNOLOGY LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Course on Manufacturing Technology.

COURSE DESCRIPTION: Use of hand tools; Power tools for various manufacturing methods; Provides skill on sand testing; Pattern making; Mould preparation; Metal casting; Mechanical press working; Welding; Sheet metal works; Plastic moulding.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the practical usage and utilization of hand and power tools for engineering applications.

CO2. Analyze the part to be fabricated and manufacture using a combination of the manufacturing techniques.

CO3. Design and develop different components in the casting, welding, press work and plastic moulding.

CO4. Conduct investigation and provide best sequence of operations to manufacture a complex component.

CO5. Use modern tools and methods to solve engineering problems.

CO6. Follow safe practices during work practice in laboratory.

CO7. Function effectively as an individual and as a member of team to perform various process in Manufacturing of products.

CO8. Communicate the information of the components through drawings.

LIST OF EXPERIMENTS

Any **Twelve** Experiments are to be conducted and three from each section.

1. FOUNDRY

- Determination of grain fineness number of sand using sieve shaker.
- Determination of moisture content, clay content, permeability of moulding sand.
- Design and making a solid pattern using wood turn lathe.
- Preparation of green sand moulding arrangement and metal casing of solid pattern.
- Preparation of green sand moulding arrangement and metal casing of split pattern.
- Preparation of green sand moulding arrangement of hollow pipe/ T bent using core.

2. WELDING

- Exercises in welding lap joint and butt joint using arc welding process.
- Exercises in welding lap joint and butt joint using gas welding process.
- Exercises in welding lap joint by TIG and MIG welding process.
- Exercises in welding butt joint by spot welding process.
- Exercises in Metal cutting practice by gas cutting process.
- Exercises in brazing, braze welding and soldering.
- Simulation of welding.

3. SHEET METAL WORK

- Blanking and Piercing operation using fly press machine (one Exercise).
- Deep drawing and Extrusion operation using hydraulic press (one Exercise).
- Bending operation using bending machine (One Exercise).
- Simulation of sheet metal process.

4. PLASTIC MOULDING

- Making a component using injection moulding machine.
- Making a component using blow moulding machine.
- Making a component using compression moulding machine.
- Simulation of casting.

II B.Tech. – I Semester
(16BT30132) STRENGTH OF MATERIALS LAB
(Common to CE and ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Course on Strength of Materials.

COURSE DESCRIPTION: Tension test; Compression test; Bending test; Shear test; Torsion test; Hardness test; Maxwell reciprocal theorem.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Acquire the knowledge on conducting experiments for testing strength of materials such as steel, timber, metals, beams and springs.

CO2. Analyze test results on steel, timber, metals, beams and springs.

CO3. Recommend suitable materials for construction after interpreting test results.

CO4. Use appropriate method of testing construction materials.

CO5. Consider safety in construction material testing with societal perspective.

CO6. Follow ethics in reporting exact testing results.

CO7. Function effectively as an individual and as a team member in construction material testing.

CO8. Communicate effectively on construction material testing in written, oral and graphical forms.

ANY **TWELVE** EXPERIMENTS ARE TO BE CONDUCTED

1. Tension test on mild steel / HYSD bar
2. Compression test on wood
3. Compression test on coiled spring
4. Tension test on coiled spring
5. Bending test on carriage spring
6. Brinell and Rockwell hardness tests
7. Charpy and Izod impact tests
8. Shear test on mild steel
9. Bending test on simply supported beam
10. Bending test on cantilever beam
11. Bending test on fixed beam
12. Bending test on continuous beam
13. Bending test on overhanging beam
14. Verification of Maxwell's reciprocal theorem
15. Torsion test on mild steel

II B.Tech. - II semester

(16BT3HS01) ENVIRONMENTAL STUDIES

(Common to CE, ME, CSE, IT & CSSE)

Int. Marks	**Ext. Marks**	**Total Marks**	**L**	**T**	**P**	**C**
30	70	100	3	-	-	3

PRE-REQUISITES: Course on Engineering Chemistry

COURSE DESCRIPTION: Multidisciplinary nature of environment; Natural resources; Ecosystems; Biodiversity; Environment pollution and control; Social issues and environment; Human population and environment; Field studies.

COURSE OUTCOMES: On successful completion of this course, students will be able to

CO1. Acquire knowledge on nature of environment, natural resources, ecosystems, biodiversity, environmental pollution and control, social issues and human population.

CO2. Analyze natural resources, ecosystems, biodiversity, environmental pollution and control, social issues and human population.

CO3. Develop strategies for environmental pollution control and natural resource management.

CO4. Solve environmental problems through proper analysis and interpretation of environmental data.

CO5. Choose appropriate techniques in environmental pollution control and natural resource management.

CO6. Understand the impact of social issues and population on environment.

CO7. Provide solutions to individuals, industries and government for environmental sustainable development.

CO8. Follow environmental protection laws for sustainable development.

CO9. Communicate effectively on environmental issues in the form reports.

DETAILED SYLLABUS:

UNIT - I: MULTIDISCIPLINARY NATURE OFENVIRONMENT AND NATURAL RESOURCES (11 Periods)

Multidisciplinary Nature of Environment: Multidisciplinary nature of environment, Segments of environment - Lithosphere, Hydrosphere, Atmosphere, Biosphere; Need for public awareness.

Natural Resources: Renewable and non-renewable resources and associated problems - (a) Forest resources: Use and over exploitation, Deforestation-causes, effects and remedies, Case studies, (b) Water resources: Use and over utilization of surface and groundwater, Conflicts over water, Benefits and problems of large dams, Case studies, (c) Mineral resources: Mining, Adverse effects, Case studies, (d) Food resources: World food problems, Changes caused by agriculture and overgrazing, Effects of modern agriculture, Water logging and salinity, Case studies, (e) Energy resources: Growing needs, Renewable energy resources – Solar, Wind, Hydropower, Hydrogen fuel; Non-renewable energy resources - Coal, Natural gas, Nuclear energy, Role of an individual in conservation of natural resource and equitable use of resources for sustainable lifestyles.

UNIT - II: ECOSYSTEMS AND BIODIVERSITY (10 Periods)

Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem - Producers, Consumers, Decomposers; Food chains, Food webs, Ecological pyramids – Types; Characteristic features, Structure and functions of forest ecosystem, Desert ecosystem, Aquatic ecosystem, Energy flow in the ecosystem, Ecological succession.

Biodiversity: Concept and value of biodiversity, Role of biodiversity in addressing new millennium challenges, Hot spots of biodiversity, Threats to biodiversity, Man-wild life conflicts, Endemic, Endangered and extinct species of India, Conservation of biodiversity – In-situ and ex-situ.

UNIT - III: ENVIRONMETAL POLLUTION AND CONTROL (08 Periods)

Causes, Adverse effects and control measures of pollution - Air pollution, Water pollution, Soil pollution, Noise pollution, Thermal pollution, Nuclear pollution; Solid waste management – Causes, Effects and control measures of urban and industrial wastes; Hazards and disaster management – Floods, Earthquakes, Tsunamis, Case studies.

UNIT - IV: SOCIAL ISSUES AND THE ENVIRONMENT (08 periods)

Sustainable development, Urban problems related to energy, Environmental ethics – Issues, Solutions; Global warming, Acid rain, Ozone layer depletion, Nuclear accidents and case studies, Wasteland reclamation, Consumerism and waste products, Concept of green technologies, Environment protection act, Air act, Water act, Wildlife protection act, Forest conservation act, Issues involved in enforcement of environmental legislation, Public environmental awareness.

UNIT - V: HUMAN POPULATION AND THE ENVIRONMENT (08 periods)

Population growth, Population characteristics and variation among nations, Population explosion, Family welfare programme, Environment and human health, Human rights, Value education, HIV/AIDS, Women and child welfare, Role of information technology in environment and human health, Case studies,

Field Work/Assignment/Seminar: Environmental assets – Pond/Forest/Grassland/Hill/ Mountain/Environment impact assessment procedures for local environmental issues.

Total periods: 45

TEXT BOOKS:

1. A. Kaushik and C. P. Kaushik, *Environmental Studies*, New Age International (P) Ltd Publications, 4th Edition, 2014.
2. Erach Barucha, *Environmental Studies*, Orient Blackswan, 2nd Edition, 2013.

REFERENCE BOOKS:

1. R. Rajagopalan, *Environmental Studies*, Oxford University Press, 2nd Edition, 2011.
2. Benny Joseph, *Environmental Studies*, Tata McGraw-Hill, 2nd Edition, 2009.
3. B. S. Chauhan, *Environmental Studies*, University Science Press, 2008.
4. M. Anji Reddy, *Text Book of Environmental Sciences and Technology*,BS Publications, 2007.

II B. Tech. – II Semester

(16BT40301) **DESIGN OF MACHINE ELEMENTS-I**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Engineering Materials and Strength of Materials

COURSE DESCRIPTION: General considerations of design, design process; Manufacturing considerations, BIS codes of materials; Preferred numbers; Simple stresses, Combined stresses; theories of failure; Fatigue; Stress concentration; Goodman's line, Soderberg's line; design of welded joints; threaded joints; shafts; keys; sleeve or muff, and Flange couplings, Flexible couplings; spigot and socket cotter joint, Knuckle joint.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on design of machine elements under different loading criteria.

CO2. Identify the design problems and analyze the stresses and strains induced in a machine element.

CO3. Design and develop the components for engineering problems.

CO4. Conduct investigations on complex problems in design of machine elements and provide suitable solutions.

CO5. Apply numerical techniques to determine the stress and strains induced in the components under mechanical loading.

CO6. Use the codes and standards of BIS, ASME and ISO in design procedures.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO DESIGN AND STRESSES IN MACHINE ELEMENTS (09 Periods)

Introduction: Types of design, General considerations of design, Design process; Selection of engineering materials, Properties, Manufacturing considerations in the design. BIS codes of materials, Preferred numbers.

Stresses in Machine Members: Simple stresses, combined stresses, Torsional and bending stresses, Impact stresses, Stress-strain relation, Various theories of failures, Factor of safety.

UNIT - II: DESIGN FOR FLUCTUATING LOADS (07 periods)

Stress concentration, Notch sensitivity, Design for fluctuating stresses fatigue failure, Endurance limit, Estimation of Endurance strength - Goodman's line, Soderberg's line; Design of components for finite and infinite life.

UNIT - III: DESIGN OF THREADED AND WELDED JOINTS (11 periods)

Threaded Joints: Basic Types of screw fastenings - cap screws, set screws; Bolts of uniform strength, locking devices, I.S.O. metric screw threads, bolts under tension, eccentrically loaded bolted joint in shear, eccentric load parallel and perpendicular to the axis of bolts, and plane containing the bolts.

Welded Joints: Introduction, welding process, types of welded joints, working stresses in welds, Strength of welds, Special cases of fillet welds, Eccentric loads on welded connections, Design procedure.

UNIT - IV: SHAFTS, KEYS AND COUPLINGS (11 periods)

Shafts: Shaft design on the basis of strength, Torsional rigidity and Lateral rigidity, ASME code for shaft design.

Keys: Design of Keys - Sunk, Saddle, Tangent, Round, woodruff, Keyways and Splines.

Couplings: Design of couplings - Sleeve or Muff, Unprotected and Protected Flange couplings, Bushed–Pin type flange coupling.

UNIT - V: DESIGN OF COTTERS AND KNUCKLE JOINTS (07 periods)

Sleeve and cotter joint, socket and spigot Joint, Gib and cotter joints, Knuckle joint.

Total Periods: 45

TEXT BOOKS:

1. V. B. Bhandari, *Design of Machine Elements*, Tata McGraw-Hill, 3rd Edition, 2011.
2. Dr. N. C. Pandya and Dr. C. S. Shah, *Machine Design*, Charotar Publishing House Pvt. Limited, 20th Edition, 2015.

REFERENCE BOOKS:

1. Joseph E. Shigley, *Mechanical Engineering Design*, TMH, 9th Reprint Edition, 2011.

2. Kannaiah, *Machine Design*, Scitech, 3rd Edition, 2010.

II B. Tech. - II Semester

(16BT40302) **DYNAMICS OF MACHINERY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Kinematics of Machinery.

COURSE DESCRIPTION: Clutches, brakes and dynamometers; Gyroscopic couple, Turning moment diagrams, flywheel design; Analysis and balancing of shaking forces in machines; Governors; Vibrations, single degree, Multi degrees of freedom vibrations, spring mass systems; transmissibility of forces, Dunkerley's method, Rayleigh's method; Whirling of shafts; isolation of systems.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on dynamical analysis of machine elements for design process.

CO2. Analyze dynamic systems through systematic approach by identifying suitable sub systems.

CO3. Design dynamic systems involving imbalance, flywheel and gyroscopic effects.

CO4. Conduct investigations on the unbalanced forces in a multi-cylinder reciprocating engine.

CO5. Apply the various methods to reduce the vibration effects in the operation of mechanical components.

DETAILED SYLLABUS:

UNIT - I: CLUTCHES, BRAKES AND DYNAMOMETERS: (09 Periods)

Clutches: Friction clutches- Single Disc or plate clutch, Multiple Disc Clutch, Cone Clutch, Centrifugal Clutch.

Brakes and Dynamometers: Simple block brakes-Single block, Pivoted block, Double block; simple Band brake, Differential Band Brake, Band and Block Brake, internal expanding brake. Dynamometers– absorption and transmission types; General description and methods of operation.

UNIT - II: GYROSCOPE AND FLYWHEEL (09 Periods)

Gyroscope: Gyroscopic couple, effect of precession motion on the stability of moving vehicles such as motor car, motor cycle, aeroplanes and ships.

Fly wheel: Turning moment diagrams for steam engine, IC Engine and multi cylinder engine, Crank effort - coefficient of Fluctuation of energy, coefficient of Fluctuation of speed – Fly wheels and their design, Fly wheels for Punching machines.

UNIT - III: GOVERNORS (09 Periods)

Watt, Porter and Proell governors; Spring loaded governors – Hartnell and Hartung governors with auxiliary springs; Sensitiveness, isochronism and hunting; Effort and power of a governor.

UNIT - IV: BALANCING OF MASSES (09 Periods)

Balancing of Rotating Masses: Single and multiple – Single and different planes.

Balancing of Reciprocating Masses: Primary and Secondary balancing of reciprocating masses, Analytical and graphical methods, Unbalanced forces and couples – V-engine, multi cylinder inline and radial engines for primary and secondary balancing.

UNIT - V: VIBRATIONS (09 Periods)

Classification, Free and forced vibration of single degree of freedom system, Role of damping, whirling of shafts and critical speeds, Simple problems on free, forced and damped vibrations, Vibration Isolation & Transmissibility, Transverse vibrations of beams with concentrated and distributed loads, Dunkerly's method, Torsional vibrations - two and three rotor systems. **Total Periods: 45**

TEXT BOOKS:

1. S.S.Rattan, *Theory of Machines and Mechanisms*, Tata McGraw Hill Publishers, 4th Edition, 2016.
2. R.S. Khurmi, *Theory of Machines*, S.Chand Publications, 14th Revised Edition, 2012.

REFERENCE BOOKS:

1. Joseph Edward Shigley and John Joseph Uicker, Jr. *Theory of Machines and Mechanisms*, 2nd Edition, MGH, New York.
2. Ballaney P L, *Theory of Machines and Mechanisms*, Khanna Publishers, New Delhi,2005
3. Bevan T, *Theory of Machines*, CBS Publishers and Distributors, NewDelhi, 3rd Edition, 2002.

4. J.S. Rao and R.V. Dukkipati, *Mechanism and Machine Theory*, New age International, 2nd Edition, 2007.

II B. Tech. – II Semester

(16BT40303) FLUID MECHANICS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Engineering Mechanics.

COURSE DESCRIPTION: Properties of Fluids; Pressure Measurements; Types of flow; One-dimensional steady flow energy & momentum Equations; Flow measurements; Impact of jets on stationary & moving plate; Hydraulic turbines and its performance; Pumps; Components and phenomena of hydroelectric power stations.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the basic knowledge of hydraulics in finding fluid properties, performance parameters of hydraulic turbines and pumps.
CO2. Identify, formulate and analyze hydraulic machines to study the characteristics of various flow of fluids.
CO3. Develop feasible design solutions to the construction of efficient hydraulic turbines and pumps.
CO4. Conduct investigations and address the complex problems in fluid Mechanics.
CO5. Apply mathematical models for hydraulic systems to study their characteristics.
CO6. Design various Hydraulic systems as per requirements of society based on standard engineering norms and practices.

DETAILED SYLLABUS:

UNIT - I: PROPERTIES OF FLUIDS AND PRESSURE MEASUREMENT (09 Periods)

Properties of Fluids: Dimensions and units, Physical properties of fluids - Mass density, Specific weight, Specific volume, Specific gravity, Viscosity, Surface tension, Capillarity, Vapor pressure and its influence on fluid motion, Bulk modulus, compressibility; Types of fluids - Ideal and Real fluids, Newtonian and Non Newtonian fluids.

Pressure Measurement: Absolute Pressure, Gauge Pressure, Atmospheric Pressure, Vacuum Pressure, Manometers - Piezometer, U-tube, Single column manometer and Differential manometers.

UNIT - II: FLUID KINEMATICS AND DYNAMICS (09 Periods)

Kinematics: Classification of fluid flows – Steady, Unsteady, Uniform, Non-uniform, Laminar, Turbulent, Rotational flows, Irrotational flows, Compressible flows, incompressible flows; Types of flow lines - Path line, Stream line, Streak line, stream tube; Equation of continuity for one dimensional flow.

Dynamics: Surface and body forces, Different types of heads, Euler's and Bernoulli's equations for flow along a stream line, Momentum equation and its application on force on pipe bend.

Measurement of Flow: Pitot tube, Venturimeter, and Orifice meter.

UNIT - III: FLOW THROUGH PIPES AND IMPACT OF JETS (09 Periods)

Flow Through Pipes: Reynold's experiment, Darcy Weisbach equation, Chezy's equation, Minor losses in pipes, Equivalent pipe, Pipes in series and pipes in parallel, Total energy line and Hydraulic Gradient Line.

Impact of Jets: Hydrodynamic force of jets on stationary, Moving flat, Inclined, Curved vanes, Jet striking centrally and at tip, Velocity diagrams, Work done and Efficiency.

UNIT - IV: HYDRAULIC TURBINES AND THEIR PERFORMANCE (09 Periods)

Hydraulic turbines: Classification of turbines - Impulse, Reaction turbines; Pelton wheel – Construction, Working principle, Work done, Efficiencies; Francis turbine – Construction, Working principle, Work done, Efficiencies;Kaplan turbine - Construction, Working principle, Work done, Efficiencies; Draft tube theory - functions and efficiency.

Performance of hydraulic turbines: Geometric similarity, Specific speed, Unit quantities, Characteristic curves, Governing of turbines, Selection of type of turbine, Water hammer, Cavitation, Surge Tank.

UNIT - V: HYDRAULIC PUMPS (09 Periods)

Centrifugal pumps: Classification, Single stage Centrifugal pump - Working Principle, Work done, heads, Losses and Efficiencies; Multi stage Centrifugal pump, Pumps in series, Pumps in parallel, Characteristic curves, Specific speed, Net positive suction head.

Reciprocating pumps: Construction and Working Principle of single acting, Double acting reciprocating pumps, Discharge, Slip, Air vessels, Indicator diagrams. **Total Periods: 45**

TEXT BOOKS:

1. R.K. Rajput, *Fluid Mechanics and Hydraulic Machines*, S. Chand, 4th Edition, 2008.
2. Modi and Seth, *Fluid Mechanics and Hydraulic Machinery*, Standard book house, 17th Edition, 2011.

REFERENCE BOOKS:

1. R.K. Bansal, *Fluid Mechanics and Hydraulic Machinery*, Laxmi publications, 9th Edition 2005.

2. D.S. Kumar, *Fluid Mechanics and Fluid Power Engineering*, Kotaria & Sons, 7th Edition 2009.

II B. Tech. – II Semester

(16BT40304) MACHINE TOOLS AND MODERN MACHINING PROCESSES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Manufacturing Technology.

COURSE DESCRIPTION: Theory of Metal Cutting; Geometry of Cutting Tools; Merchants Force Diagram; Lathe Machine-Principle of Operation; Tools; Multi spindle lathes; shaping; slotting and planning machines; drilling; boring; jigboring; milling machine Specifications; grinding; lapping; honing.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the concepts of machining methods using various machine tools.

CO2. Identify various cutting tools used for different operations and analyze its behavior.

CO3. Design the cutting tools for appropriate machining operation.

CO4. Conduct investigation on complex problems during metal cutting operation.

CO5. Apply Modern Machining processes to produce intricate shapes.

CO6. Use the ORS and ASA system of standards in single point cutting tools for engineering practice.

DETAILED SYLLABUS:

UNIT – I: THEORY OF METAL CUTTING (09 Periods)

Introduction, Basic elements of machining, Nomenclature and Geometry of single point cutting tool, ORS and ASA systems, Cutting speed, Feed, Depth of cut, Chip formation and Types of chips, Chip breakers, Orthogonal and Oblique cutting, Mechanics of Orthogonal cutting - Cutting forces, Merchant's circle diagram, Tool life, Tool failure, Thermal aspects-Coolants, Tool materials.

UNIT – II: LATHE MACHINES (09 Periods)

Engine Lathe: Principle of operation, Specifications of lathe, Types of lathes, Work and tool holding devices, Operations on Lathe, Methods of Taper turning, Special attachments.

Turret and capstan lathes: Construction and working,Tool layout.

Automatic lathes: Classification–single spindle and multi-spindle automatic lathes.

UNIT – III: SPECIAL MACHINES-I (09 Periods)

Shaping; Slotting and planning machines: Principle of operation, Classification, Principal parts, specifications, Operations performed, Machining time calculations.

Drilling and Boring Machines: Principle of operation, Specifications, Types of Drilling machines, Different Operations, Tool holding devices, Twist drill, Boring machines –Jig boring machines.

UNIT – IV: SPECIAL MACHINES-II (10 Periods)

Grinding machine: Principle of operation, Types - cylindrical grinding machine, Surface grinding machine, Tool and cutter grinding machine, special types of grinding machines; Different types of abrasives, bonds, specification and selection of grinding wheel, Balancing, Loading and Glazing, Truing, Dressing of grinding wheel, Comparison of grinding, lapping and honing.

Milling machine: Principle of operation, Classification, Specifications, Up milling and Down milling, Types of Horizontal milling machines, Vertical milling machines, Milling operations, Types of milling cutters, Tool and work holding devices, Methods of indexing, Accessories .

UNIT – V: MODERN MACHINING PROCESSES (08 Periods)

Introduction, Classification of modern machining processes- Ultrasonic machining (USM), Abrasive jet machining(AJM), Electro chemical machining(ECM), Electro discharge machining(EDM), Electron beam machining(EBM), Laser beam machining(LBM), Plasma arc machining(PAM).

Total Periods: 45

TEXT BOOKS:

1. Hazra Choudary S.K. and Hazra Choudary A.K., *Elements of Workshop Technology*, Vol II, Media Promoters, 12th Edition, 2007.
2. B.S.Raghuwanshi, *A course in Workshop Technology*, Vol II, Dhanpat Rai and Co(P) Ltd, 9th Edition, 1998.

REFERENCE BOOKS:

1. H.M.T. (Hindustan Machine Tools), *Production Technology*, Tata Mcgrawhill Education, 2013.

2. Vijay K Jain, *Advanced Machining Processes*, Allied publishers, 2012.
3. R.K. Jain, *Production Technology*, Khanna Publishers, 17th Edition, 2012.

II B. Tech. – II Semester

(16BT40305)THERMAL ENGINEERING-I

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Thermodynamics.

COURSE DESCRIPTION: Comparison of air-standard and actual cycles; Components and working of 2-stroke and 4-stroke engines; Combustion phenomena in spark ignition and compression ignition engines; Performance parameters of an internal combustion engine; Estimating heat losses in an engine; Components and working of reciprocating and rotary compressors.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the basic knowledge of an engine and air compressor in developing the analytical models.

CO2. Analyze the combustion and performance parameters of SI engines and CI engines and analyze the performance of air compressors.

CO3. Provide solutions in the design of IC engine.

CO4. Conduct investigation on IC engines for performance improvement and emission reduction.

CO5. Apply new combustion techniques to analyze the combustion in IC Engines.

DETAILED SYLLABUS:

UNIT - I: I.C. ENGINES (09 Periods)

Classification of I.C. Engines, engine components, Working of two stroke and four stroke engines, Comparison of two stroke and four stroke engines, comparison of SI and CI engines, Valve and port timing diagrams, application of I.C engines, Fuel air cycles **-**Composition of cylinder gases, variable specific heats, dissociation, number of moles Actual cycle - heat loss, time loss, exhaust blow down factors and loss due to rubbing friction.

UNIT - II: COMBUSTION IN S.I. AND C.I. ENGINES (10 Periods)

Combustion in S.I. Engines: Stages of combustion in SI engines, Flame front propagation, Factors influencing the flame speed, Abnormal combustion, Phenomenon of knock in S.I engines, Combustion chambers for SI Engines, Fuel Requirements and Fuel Rating.

Combustion in C.I. Engines: Stages of combustion in C.I engines, Factor affecting delay period; Phenomenon of knock in C.I engine, comparison of knock in S.I and C.I engines, Combustion chambers for C.I engines, Fuel Requirements and Fuel Rating.

UNIT - III: PERFORMANCE OF I.C. ENGINES (10 Periods)

Performance parameters: Brake power, Indicated power, Friction power, Mean effective pressure, Engine efficiencies, Performance calculations, Heat balance.

Measurement of Performance parameters: Brake power **-** Rope brake, hydraulic, Eddy current and swinging field DC dynamometers; Measurement of Friction power - Willian's line method, Morse test, motoring test and retardation test; Air and fuel measurement.

UNIT - IV: FUELS AND COMBUSTION (08 Periods)

Introduction, Classification of fuels - Solid fuels, Liquid fuels, Gaseous fuels; Combustion equation, Theoretical air and excess air; Stoichiometric air fuel ratio, Air fuel ratio from analysis of product, Analysis of exhaust gas and flue gas, Internal energy and enthalpy formation, Determination of calorific values of fuels, Adiabatic flame temperature, Chemical equilibrium.

UNIT - V: AIR COMPRESSORS (08 Periods)

Air Compressors - Reciprocating Compressors, Effect of Clearance volume in Compressors, Volumetric Efficiency, Single Stage and Multi Stage Compressors, Effect of Inter cooling and Pressure Drop in Multi - Stage Compressors; Working principles of Roots blower, Vane type Blower, Centrifugal Compressor, Axial Flow Compressors.

Total Periods: 45

TEXT BOOKS:

1. V. Ganesan, *I.C. Engines*, TMH, 3rd Edition, 2008.
2. R.K.Rajput, *Thermal Engineering*, Laxmi publications, 8th Edition, 2010

REFERENCE BOOKS:

1. M.L Mathur & R.P.Sharma, *Internal combustion engines*, Dhanpat Rai & Sons, 8th Edition, 2014.
2. Mahesh M Rathore, *Thermal Engineering*, Tata Mcgrawhill Education, 2010.

II B. Tech. - II Semester

(16BT40331) **FLUID MECHANICS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Course on Fluid Mechanics.

COURSE DESCRIPTION: The study and calibration of gauges, Orifice meter, Venturi meter. Determination of Darcy's coefficient; Performance test on Hydraulic Machines like Centrifugal Pump, Reciprocating pump, Francis Turbine, Kaplan Turbine, and Pelton wheel turbine; Study of Bernoulli's theorem verification, Head losses in pipes and impact of jet on vanes.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on various flow measuring instruments.

CO2. Analyze the losses and discharge in pipes.

CO3. Design systems for evaluate the performance of hydraulic machineries

CO4. Conduct experiments, analyze the data and interpret results.

CO5. Provide solutions to various hydraulic systems by using computational tools.

CO6. Work with others to accomplish the common goals.

CO7. Communicate effectively and express the results with clarity.

LIST OF EXPERIMENTS

ANY **TWELVE** EXPERIMENTS ARE TO BE CONDUCTED.

1. Calibration of Venturimeter
2. Calibration of Orifice meter
3. Determination of coefficient of discharge for a small Orifice by a constant head method
4. Calibration of Rectangular notch
5. Determination of loss of head due to sudden contraction
6. Determination of friction factor for pipes
7. Verification of Bernoulli's equation
8. Impact of jet on vanes
9. Study of hydraulic jump
10. Performance test on Pelton wheel turbine
11. Performance test on Francis turbine
12. Performance test on Kaplan turbine
13. Performance test on Single stage centrifugal pump
14. Performance test on Multi stage centrifugal pump
15. Performance test on Reciprocating pump

II B. Tech. - II Semester
(16BT40332) **MACHINE TOOLS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Course on Machine Tools and Modern Machining Processes.

COURSE DESCRIPTION: Demonstration on lathe; drilling; milling; slotting machine; shaper; grinding machine; milling machine; provides skill on making products using machines tools.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate practical knowledge on utilization of machine tools for engineering and domestic applications

CO2. Analyze and perform step turning, taper turning, thread cutting, drilling and tapping operations on lathe, operations on shaper, planer and milling machines.

CO3. Design and model different components using machine tools .

CO4. Conduct experiments, investigate the products quality and interpret the results.

CO5. Select and apply relevant cutting tools for machining operations.

CO6. Relate knowledge based on standard engineering norms and practices to make products to cater the needs of the society.

CO7. Formulate the team to attain multidisciplinary settings.

CO8. Communicate effectively and present technical information in oral and written form

LIST OF EXPERIMENTS

ANY **TWELVE** EXPERIMENTS ARE TO BE CONDUCTED AND SIX FROM EACH SECTION.

1. TRADE: LATHE

1. Study of a centre lathe and turret lathe
2. Straight turning, Facing and chamfering operation
3. Step turning, chamfering and knurling operation
4. Taper turning, grooving operation
5. Thread cutting (RH -V-Thread) and grooving operation
6. Thread cutting (LH - V-Thread) and grooving operation
7. Drilling and boring operation

2. TRADE: SPECIAL MACHINE

1. Study of special machines
2. Drilling, tapping and reaming using radial drilling machine
3. V - Block shaping using shaping machine
4. 4 Internal splines cutting using slotting machine
5. Single point cutting tool Grinding using tool and cutter grinder
6. Profile cutting using vertical milling machine
7. Spur gear cutting using horizontal milling machine
8. Surface grinding operation using surface grinder
9. Cylindrical grinding machine using cylindrical grinder
10. Gear Hobbing using gear Hobbing machine

II B. Tech. - II Semester
(16BT4HS31) SOFT SKILLS LAB
(Common to CE, ME, CSE, IT & CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Courses on English Language Laboratory in I B.Tech or English Laboratory at Diploma Level.

COURSE DESCRIPTION: This course covers Body Language; Assertiveness; Goal Setting; Creative Thinking; Interpersonal Skills; Team Work; Conflict Management; Etiquette; Report Writing; Group Discussions; Interviewing Skills.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Acquire knowledge in
- Goal Setting
- Creative Thinking
- Leadership Skills and
- Team Work

CO2. Analyse the situations and develop skills for
- Body Language
- Personality Development and
- Stress Management

CO3. Apply the techniques of soft skills in a problem situation enhanced through multimedia software.
CO4. Function effectively as an individual and as a member in diverse teams.
CO5. Communicate effectively in public speaking in formal and informal forums.

LIST OF EXERCISES
1. Body Language
2. Assertiveness
3. Goal Setting
4. Creative Thinking
5. Interpersonal Skills
6. Team Work
7. Conflict Management
8. Etiquette
9. Report Writing
10. Resume Writing
11. Group Discussions
12. Interviewing Skills

REFERENCE BOOKS:

1. R. C. Sharma & Krishna Mohan, *Business Correspondence and Report Writing*, Tata McGraw-Hill Publishing Company Limited, Third Edition, New Delhi, 2012.
2. Gopalswamy Ramesh and Mahadevan Ramesh, *The Ace of Soft Skills*, Pearson, Noida, 2010.
3. Jeff Butterfeild, *Soft Skills for Everyone*, Cengage learning, Delhi, 2011.
4. Barun K. Mitra, *Personality Development and Soft Skills*, Oxford University Press, Noida, 2012.

SUGGESTED SOFTWARE
1. ETNL Language Lab Software Version 4.0
2. GEMS – Globarena E- Mentoring System
3. Speech Solutions
4. English Pronunciation Dictionary by Daniel Jones
5. Learning to Speak English 8.1, The Learning Company – 4 CDs
6. Mastering English: Grammar, Punctuation and Composition
7. English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge
8. Dorling Kindersley Series of Grammar, Punctuation, Composition etc.
9. Language in Use 1, 2 & 3
10. Cambridge Advanced Learner's Dictionary - 3rd Edition
11. Centronix – Phonetics
12. Let's Talk English, Regional Institute of English South India

13. Ultimate English Tutor

III B. Tech. - I semester

(16BT50301)DESIGN OF MACHINE ELEMENTS -II

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Design of Machine Elements-I.

COURSE DESCRIPTION: Study, analysis and design of machine components such as Journal bearings - anti friction bearings; spur gears, helical gears; Design of helical and leaf springs; internal combustion engine parts such as piston, crank and connecting rod; Design of belt drives; Safety and reliability consideration in machine design; detailed design to define the shape, size and material.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge in design of machine elements to withstand the loads and deformations for a given application, while considering additional specifications.

CO2. Analyze the forces acting and stresses in the machine components for designed mechanical properties.

CO3. Design the bearing, gears, mechanical springs and IC engine parts.

CO4. Investigate the reasons for failure of machine elements and provide solutions/improvisation to improve trial designs.

CO5. Use empirical relationships for solving complex problems in the design of IC engine parts.

CO6. Apply the contextual knowledge to provide safe designs as per the standards and needs for real time applications.

DETAILED SYLLABUS:

UNIT – I: JOURNAL BEARINGS (09 Periods)

Lubricants, Types of lubrication, Hydrodynamic and hydrostatic lubrication, Bearing modulus, Friction circle, Bearing characteristic number, McKee's equation, Sommerfeld number, Types of journal bearings, Full and partial journal bearings, Clearance ratio, Bearing materials, Journal bearing design, Bearing life, Failure of bearings.

UNIT – II: ANTI FRICTION BEARINGS (09 Periods)

Ball and Roller Bearings, Nominal life, Average life, Static load, Dynamic load, Equivalent radial load, Design and Selection of ball and roller bearings.

UNIT – III: GEARS (09 Periods)

Classification of Gears, Gear materials, Force analysis of spur and helical gear, Beam Strength of Gear Teeth – Lewis Equation, Wear strength of Spur and Helical gear tooth, Causes of Gear Tooth Failure, Design Procedure for Spur and Helical Gears.

UNIT – IV: MECHANICAL SPRINGS (09 Periods)

Introduction, Classification of springs, Stress and deflections of helical springs, Design of helical springs, Springs for fatigue loading, Energy storage capacity in helical springs, Concentric springs, Design of leaf springs.

UNIT – V: I.C. ENGINE PARTS AND POWER TRANSMISSIONS SYSTEMS (09 Periods)

Design of I.C. Engine Parts: Piston, Cylinder, and Connecting Rod.

Design of Power Transmissions Systems: Design of Flat belt drives, V-belt drives & rope drives.

Total Periods: 45

TEXT BOOKS:

1. V. B. Bhandari, *Design of Machine Elements*, Tata McGraw-Hill, 3rd Edition, 2010.
2. T. Krishna Rao, *Design of Machine Elements Vol-II*, I K International, 1st Edition, 2008.

REFERENCE BOOKS:

1. Joseph E. Shigely, *Mechanical Engineering Design*, TMH Publishers, 9th Edition, 2011.
2. R.S. Khurmi & J.K. Gupta, *Machine Design*, Eurasia Publishing House (pvt.) Ltd. 2005.

Data Book: Design data hand book for Mechanical Engineers in SI and Metric units by Balaveera Reddy and Mahadevan.

NOTE: Specified design data books are permitted in the examinations.

III B. Tech. – I Semester

(16BT50302)INDUSTRIAL ENGINEERING AND MANAGEMENT

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Concepts and functions of management and organization; selection and analysis of plant location and plant layout; method study and work measurement; inventory, stores and purchase management functions; techniques of statistical process control; Engineering ethics; industrial safety.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge of Industrial Engineering and Management concepts to the Solution of complex engineering problems in an industrial scenario.

CO2. Analyze Industrial problems, identify probable causes and suggest suitable solutions to increase the productivity by reducing the wastages using Principles of Management, and Industrial engineering concepts.

CO3. Design and develop integrated systems that include people, materials, information and equipment that meet the specified needs with appropriate considerations.

CO4. Investigate and employ systematic approach to simplify a complex problem in to a Manageable Sub problem for quicker solution.

CO5. Apply appropriate techniques such as method study, control charts, skills, resources, and modern engineering tools like TQM necessary for engineering practices with an understanding of the limitations.

CO6. Consider safety issues in the providing engineering solutions in industrial scenario.

DETAILED SYLLABUS:

UNIT – I: PRINCIPLES OF MANAGEMENT (09 Periods)

Concepts of Management and Organization - Evolution of management thought, Taylor's scientific Management, Fayol's principles of Management; Managerial Skills, levels of Management, Systems approach to management, Functions of management, Theory of Motivation - McGregor Theory X and Y; Hierarchy of Needs - Maslow's Theory of Human Needs; Corporate planning process, SWOT Analysis, Corporate Social Responsibility.

UNIT – II: FACILITIES PLANNING AND MAINTENANCE (10 Periods)

Types of production, Plant location – definition, factors affecting the plant location, comparison of rural and urban sites; Plant layout – definition, Objectives, Types of plant layout; Plant Maintenance - objectives, functions, Types and Advantages of Plant Maintenance; Types of maintenance, Concepts of Reliability – Definition, MTBF, Series, Parallel and Series-Parallel device configurations; Redundancy.

UNIT – III: WORK STUDY (07 Periods)

Productivity, Objectives of Work Study, Method study - Definition, Objectives, Steps involved; Work measurement – definition, Time study, Steps involved, Equipment, Different methods of performance rating, allowances; Work sampling – definition, Steps involved, Standard time calculations.

UNIT – IV: MATERIALS MANAGEMENT (10 Periods)

Objectives of Materials Management, Stores management and stores records, Purchase management, Value Analysis, Inventory – Functions, Types, Associated costs, Inventory classification techniques, Factors involved in inventory problem analysis, Inventory costs and deterministic inventory control models - single item inventory control models without shortages, with shortages, with quantity discounts.

UNIT – V: QUALITY CONTROL & INDUSTRIAL SAFETY (09 Periods)

Quality control: Introduction and Definition of Quality, quality control, process control, Control charts for variables and attributes, Process capability, Acceptance sampling- OC Curve, Sampling Plan; Total Quality Management (TQM)-Total Quality Control, Concepts of TQM, Elements of TQM, Benefits of TQM, Benchmarking.

Industrial safety: General Safety Rules, Duties of Plant Safety Inspector, Investigation and analysis of Accidents, Indian Factories Act, Workmen Compensation Act, Industrial Disputes Act.

Total Periods: 45

TEXT BOOKS:

1. O.P. Khanna, *Industrial Engineering and Management*, Dhanpat Rai Publications, 17th Edition, 2014.
2. Martand Telsang, *Industrial Engineering and Production Management*, S.Chand, 2nd Edition, 2006.

REFERENCE BOOKS:

1. Stoner, Freeman, Gilbert, *Management*, Pearson Education, 6th Edition, 2003.
2. M. Mahajan, *Industrial Engineering and Production Management*, Dhanpat Rai Publications, 2nd Edition, 2005.
3. R. Panneerselvam, *Production and Operations Management*, PHI, 3rd Edition, 2012.

4. Ralph M. Barnes, *Motion and Time Study:Design and Measurement of Work*, John Wiley & Sons, 7th Edition, 1980.

III B. Tech. – I Semester

(16BT50303)METROLOGY AND MEASUREMENTS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Engineering Physics, Computer Aided Machine Drawing Lab and Machine Tools and Modern Machining Processes.

COURSE DESCRIPTION: Limits, Fits and Tolerances; Limit Gauges and Gauge Design; Comparators; Linear Measurement; Measurement of Angles and Tapers; Flatness Measurement, Surface Roughness Measurement; Measurement of Displacement; Measurement of Speed, Stress & Strain Measurements; Measurement of Temperature; Measurement of Pressure.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on various instrument/measurement methods for a given application.

CO2. Identify, formulate and analyze complex problems related to metrology and measurements.

CO3. Design and Develop the solutions for real time problems related to measurements and its applications.

CO4. Conduct investigation on advanced measuring techniques for the Industrial applications.

CO5. Use modern tools and methods to solve engineering problems.

DETAILED SYLLABUS:

UNIT- I: INTRODUCTION, LINEAR MEASUREMENT, LIMITS, FITS AND TOLERANCES (10 Periods)

Introduction: Metrology, Measurement, units, Range, accuracy, precision, typesoferrors, readability, calibration and reproducibility.

Linear Measurement: Length standard, Line and End & Wavelength standards, Slip Gauges, Calibration of the slip gauges, Numericals related to slip gauges.

Limits, Fits and Tolerances: Introduction, Definitions, fits and their types, Unilateral and Bilateral Tolerance System, Hole and Shaft basis systems, Interchangeability and Selective Assembly, Fundamental Tolerance, Numericals related to limits and fits.

UNIT-II: **LIMIT GAUGES, COMPARATORS, ANGULAR AND TAPER MEASUREMENT (10 Periods)**

Limit Gauges: Gauges- Plug, Ring, Snap, Gap, Taper gauges, Taylor's principle.

Comparators: Introduction to comparator, Characteristics, Classification of comparators, Mechanical comparators- Sigma Comparators, Optical Comparators, LVDT, Pneumatic Comparators.

Measurement of Angles and Tapers: Different methods-Bevel protractor, Angle gauges Spirit levels, Sine bar, Sine plate, Rollers and Spheres used to determine the tapers.

UNIT-III: FLATNESS, SURFACE ROUGHNESS MEASUREMENT (09 Periods)

Flatness Measurement: Measurement of flatness of surfaces, Straight edges, Surface plates optical flat and Auto collimators, Interferometer and their uses.

Surface Roughness Measurement: Differences between surface roughness and Surface waviness, Methods of measurement of surface finish- Profilograph, Talysurf; BIS symbols for indication of surface finish.

UNIT-IV: SCREW THREAD AND GEAR MEASUREMENT (09 periods)

Screw Thread Measurement: Elements of measurement, Errors in screw threads, Measurement of effective diameter, Angle of thread and Thread pitch by 2-wire and 3-wire methods, Profile thread gauges.

Gear Measurement: Gear measuring instruments, Gear tooth profile measurement, Measurement of diameter, Pitch, Finding pressure angle and Tooth thickness.

UNIT-V: STRESS, STRAIN, TEMPERATURE AND PRESSURE MEASUREMENT (07 Periods)

Measurement of Stress and Strain: Various types- Electrical strain gauge, Gauge factor, Method of usage of resistance strain gauge for bending, Compressive and tensile strains, Usage for measuring torque, Strain gauge rosettes.

Measurement of Temperature and Pressure: Standards and calibration, Thermal expansion methods, Thermo electric sensors (thermocouples), Electrical Resistance sensors, Junction semiconductor sensors, Digital thermometers, Radiation methods, Pressure measurements - Standards and Calibration, Basic methods of pressure measurement, Dead weight gauge. **Total Periods: 45**

TEXT BOOKS:

1. R.K. Jain, *Engineering Metrology*, Khanna Publishers, 20th edition, 2013.
2. N.V Raghavendra, L.Krishnamurthy, *Engineering Metrology and Measurements*, Oxford University Publisher, 2013.
3. M. Mahajan, *Engineering Metrology*, Dhanpat Rai and Co., 2nd edition, 2013.

REFERENCE BOOKS:

1. Thomas G. Beckwith, Roy D. Maragoni, John H. Lienhard V, *Mechanical Measurements*, Pearson Education International Publishers, 6th edition, 2013 .
2. Anand K Bewoor, Vinay A Kulkarni, *Metrology & Measurement*, Mc Graw Hill, 1st Edition, 2013.
3. B.C.Nakra & K.K. Choudhary, *Instrumentation, Measurement & Analysis*, Tata Mcgraw Hill, 6th edition, 2011.

III B. Tech. – I Semester
(16BT50304) REFRIGERATION AND AIR – CONDITIONING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Thermodynamics and Fluid Mechanics.

COURSE DESCRIPTION: Refrigeration cycles; Application of thermodynamics; heat transfer to the refrigeration cycles; Analysis and design of various refrigeration systems; Study of components of refrigeration system; refrigerants selection; Psychrometry; Heat gain and Heat loss calculations. Air conditioning equipment; load calculations.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on the concepts and applications of RAC systems.

CO2. Identify the RAC problems and analyze refrigeration requirements to arrive at an outline configuration of the refrigeration system.

CO3. Design RAC systems for physical systems and predict their performance.

CO4. Conduct investigation on complex problems of RAC systems.

CO5. Apply Psychrometric charts and refrigeration charts in evaluate the performance of RAC systems.

CO6. Consider health and safety issues in the design of RAC systems for societal needs.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO REFRIGERATION SYSTEM (09 Periods)

Introduction, Unit of Refrigeration, C.O.P., Refrigerator, Heat pump, Classification, open and dense air refrigeration cycle, Carnot refrigerator, Bell-Coleman cycle; Air Refrigeration - simple air cooling system, simple air evaporative cooling system and bootstrap air cooling system.

UNIT - II: VAPOUR COMPRESSION REFRIGERATION (VCR) SYSTEM (09 Periods)

Basic cycle, Working principle and essential components of the plant, COP, Representation of cycle on T-S and P-H charts, Cycle analysis, Actual cycle, effect of super heating, sub cooling on system performance.

Refrigerants: Classification, Desirable properties, Nomenclature, selection of refrigerants, and newer refrigerants.

UNIT - III: VAPOUR ABSORPTION REFRIGERATION SYSTEM (09 Periods)

Classification, Working principle of NH_3 – water system, Li Br – water (Two shells & four shells) system, Calculation of maximum COP, Operation of three fluid absorption system.

Steam jet refrigeration system: Working principle, basic components, Estimation of motive steam required.

Non conventional refrigeration system: Principle and operation of Thermo-electric refrigerator and Vortex tube.

UNIT - IV: AIR CONDITIONING SYSTEMS (09 Periods)

Psychrometry, psychrometric chart, psychrometric processes, classification of air-conditioning systems, summer, winter and year round air conditioning systems; Room Sensible Heat Factor(RSHF), Grand Sensible Heat Factor (GSHF), Effective Room Sensible Heat Factor (ERSHF); cooling load calculations, sensible heat load, latent heat load.

UNIT - V: COMFORT AIR CONDITION AND EQUIPMENT (09 Periods)

Comfort Conditions: Requirements of human comfort, concept of effective temperature, Comfort chart.

Humidifiers: Humidification by atomizing the water and Air washing, Dehumidifiers - Spray type dehumidifier; Air-filters, Fans, Blowers, Ducts.

Heat pump: Introduction, different heat pump circuits, air to air, water to air.

Total Periods: 45

TEXT BOOKS:

1. Domkundwar Arora Domkundwar, *A Course in Refrigeration and Air conditioning*, Dhanpat Rai publication, 8th Edition, 2011.
2. C.P Arora, *Refrigeration and Air Conditioning*, TMH, 8th Edition, 2011.

REFERENCE BOOKS:

1. P.L.Ballaney, *Refrigeration and Air Conditioning*, Khanna Publications, 15th Edition, 2003.
2. Manohar Prasad, *Refrigeration and Air Conditioning*, New Age International, 3rd Edition, 2015.
3. R. S. Khurmi, J.K.Gupta, *A Text book of Refrigeration & Air Conditioning*, S. Chand, 5th Edition, 2014.

III B. Tech. – I Semester
(16BT50305) **THERMAL ENGINEERING-II**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Thermal Engineering-I.

COURSE DESCRIPTION: Concept of Rankine Cycle in Steam Power Plant; Working of Steam Boilers; Functions of Various Boiler Mountings and Accessories; Performance of Boiler parameters and Boiler Draught; Characteristics of flow through steam nozzles; Working of Steam Condensers and their performance; Steam turbines and their analysis; Introduction to gas turbines and jet propulsion.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on components of thermal power plant and gas turbines.

CO2. Analyze the components of thermal power plants using thermodynamic cycles and velocity diagrams.

CO3. Provide suitable solutions by analyzing the various components of thermal power generation system.

CO4. Conduct an elementary energy audit and develop heat balance sheet for boilers.

CO5. Use Steam Tables and Mollier Chart in solving complex problems of Thermal Engineering.

DETAILED SYLLABUS:

UNIT - I: BASIC STEAM POWER CYCLE AND STEAM BOILERS (10 Periods)

Basic Steam Power Cycle: Rankine Cycle-Schematic Layout, Thermodynamic Analysis; Effect of operating variables on the performance, Reheating and Regeneration, Modified Rankine Cycle.

Steam Boilers: Classification of Boilers, Working of Fire Tube Boilers - Simple Vertical Boiler, Cochran Boiler, Cornish Boiler and Locomotive Boiler; Working of Water Tube Boilers - Babcock and Wilcox Boiler, Lamont Boiler and Benson Boiler; Functions of Boiler Mountings and Accessories.

UNIT - II: PERFORMANCE OF BOILERS AND BOILER DRAUGHT (08 Periods)

Performance of Boilers: Boiler Horse Power, Equivalent Evaporation, Factor of Evaporation and Boiler Efficiency, Heat Balance Sheet.

Boiler Draught: Classification - Natural and Artificial Draught; Chimney Height, Condition for maximum discharge through a chimney, Chimney Efficiency.

UNIT - III: STEAM NOZZLES AND IMPULSE TURBINES (10 Periods)

Steam Nozzles: Classification , functions, Flow of steam through the Nozzles, Velocity of Steam at the exit of Nozzle-Ideal and Actual expansion through the Nozzle; Discharge through the Nozzle - Condition for maximum discharge through the Nozzle, Critical Pressure Ratio; Nozzle Efficiency and Velocity Coefficient, Wilsons Line.

Impulse Turbines: Classification of Steam Turbines, Working of Delaval Impulse Steam Turbine, Stage Velocity diagram and Combined Velocity diagrams, Effect of friction, Axial thrust, Tangential Thrust and Resultant Thrust, Power developed, Diagram Efficiency, Condition for Maximum Diagram Efficiency, Compounding and Governing.

UNIT - IV: REACTION TURBINES AND STEAM CONDENSERS (08 Periods)

Reaction Turbines: Working of Parson's Reaction Turbine, Degree of Reaction, Combined velocity diagram of Reaction Turbines, Condition for Maximum efficiency.

Steam Condensers: Classification, Working of Jet and Surface Condensers, Vacuum Efficiency, Condenser Efficiency, Sources of air, Effect of air leakage in Condenser-Edward's Air Pump; Cooling Water Requirement.

UNIT - V: GAS TURBINES AND JET PROPULSION (09 Periods)

Gas Turbines: Classification of Gas Turbines, Components of simple gas turbine plant-Ideal Gas Turbine Cycle and its deviations with actual cycle; Turbine Work and Efficiency of Simple Gas Turbine Cycle, Condition for Optimum Pressure Ratio, Methods to improve Turbine Work - Inter cooling and Reheating; Methods to improve efficiency -Regeneration.

Jet Propulsion: Introduction, Classification of Jet Propulsion devices, Working of Air breathing engines- Turbojet Engine, Turbo Prop Engine, Ram Jet Engine and Pulse Jet Engine; Introduction to Rocket Engine. **Total Periods: 45**

TEXT BOOKS:

1. R.K.Rajput, *Thermal Engineering*, Laxmi Publication, 9th Edition,2013.
2. R.S.Khurmi & J.S. Gupta, *Thermal Engineering*, S.Chand, 15th Edition, 2015.

REFERENCE BOOKS:

1. V.Ganesan, *Gas Turbines*, TMH, 3rd Edition, 2010.
2. R.Yadav, *Thermodynamics and Heat Engines*, Pearson, 7th Edition, 2007.

III B. Tech. – I Semester

(16BT50306) HUMAN RESOURCE MANAGEMENT

(Interdisciplinary Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Concepts of HRM; Environmental Scanning; Human Resource Planning; Job analysis; Job design; Job evaluation; Recruitment; Selection; Placement; Orientation; Training and Development; Performance appraisal; Merit rating; Compensation; Industrial relations; Trade unions; Industrial disputes; Ethical issues; Employee safety.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on the principles, processes and practices of human resource management.
CO2. Analyze the key issues related to administering the human elements such as motivation, recruitment, training and development, compensation, appraisal, and career development.
CO3. Provide solutions to plan and manage human resource functions effectively within organization.
CO4. Apply HRM concepts and techniques in strategic planning to improve organizational effectiveness.
CO5. Evaluate HRM related social, cultural and safe responsibilities and issues in a global context.
CO6. Exercise discernment in following ethical code of conduct in human resource planning.

DETAILED SYLLABUS:

UNIT – I: INTRODUCTION TO HRM & HRP (09 Periods)

Introduction to Human Resource Management (HRM): Objectives, Scope and Significance of HRM, Functions of HRM, Prospects in HRM, Environmental scanning.

Human Resource Planning (HRP): Introduction, Nature and importance of HRP, Factors affecting HRP, The planning process, Human resource planning and the Government, Requisites for successful HRP, Barriers to HRP.

UNIT – II: RECRUITMENT AND PLACEMENT: (09 Periods)

Job Analysis – Nature and process of job analysis, Methods of collecting job data, Potential problems with job analysis, Requisites for job analysis; Job Design - Factors, Job design approaches, Contemporary issues; Job evaluation - Process, Methods; Recruitment - Nature, Purposes and importance, Factors governing recruitment, Recruitment process, Evaluation and control; Selection – Nature, Process, Barriers to effective selection, Evaluation of selection process, Placement; Separation.

UNIT – III: HUMAN RESOURCE DEVELOPMENT AND COMPENSATION (09 Periods)

Orientation - Orientation programme, Requisites of an effective programme, Evaluation of orientation programme, Problems of orientation; Training and development – Nature, Inputs, Training process, Methods, Impediments to effective training, Management development, Career development, Talent management; Performance Appraisal - Nature, Appraisal process, Challenges of performance appraisal; Merit rating; Compensation - Philosophy, Components, Theories, Factors influencing employee compensation, Challenges, Wage and salary administration.

UNIT – IV: INDUSTRIAL RELATIONS AND TRADE UNIONS (09 Periods)

Industrial Relations (IR): Nature of IR, Importance of Peaceful IR; Approaches to IR - Unitary Approach, Pluralistic approach, Marxist approach; Parties to IR; IR strategy; Industrial Disputes - Nature, Causes, and Settlement.

Trade unions: Nature of trade unions, Strategic choices before unions, Union tactics, Trade union movement in India, Trends in trade union movement, Managing unions; Indian Factories Act; Employee's compensation Act; Industrial disputes Act.

UNIT – V: ETHICAL ISSUES AND SAFETY ADMINISTRATION (09 Periods)

Managing Ethical Issues in HRM: Nature of ethics, Sources of business ethics, Myths about ethics, Ethical dilemmas, HR ethical issues, Managing ethics, Improving ethical decision making.

Employee safety: Safety, Need for safety, Types of accidents, Safety programme, ISO safety standards.

Total Periods: 45

TEXT BOOKS:

1. Aswathappa K, *Human Resource Management*, Tata McGraw Hill Private Limited, 7th edition, 2013.
2. Garry Dessler and Biju Varkkey, *Human Resource Management*, Pearson India, 12th Edition, 2011.

REFERENCE BOOKS:

1. Raymond A. Noe, John R. Hollenbeck, *HRM: Gaining a Competitive Advantage*, TMH, 7th edition, 2010.

2. Bohlander George W, Snell Scott, *Principles of Human Resource Management*, Cengage Learning, 16th edition, 2012.
3. Edwin B. Flippo, *Personnel Management*, McGraw-Hill International editions, 6th edition, 1984.

III B.Tech. - I Semester

(16BT50307) INSTRUMENTATION AND CONTROL SYSTEMS

(Interdisciplinary Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Basic Electrical and Electronics Engineering.

COURSE DESCRIPTION: Fundamentals of instrumentation; Static and Dynamic characteristics; Working principle of instruments used for measurement of level and flow; Basic elements of control systems; Electrical analogue of mechanical, thermal, hydraulic and pneumatic systems; Process contol; PID controllers; Data acquisition systems; Programmable Logic Controllers; SCADA system.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge of fundamentals of instrumentation, measurement and control systems.
CO2. Select the instruments based on the physical considerations for a particular application.
CO3. Build mathematical models of simple physical systems using transfer functions and design logical control systems.
CO4. Investigate the suitable calibration methodology and error analysis related to measuring instruments for real time applications.
CO5. Apply control engineering techniques to the automatic control systems found in modern mechanical systems.

DETAILED SYLLABUS:

UNIT – I: FUNDAMENTALS OF INSTRUMENTATION: (09 Periods)

Importance of Instrumentation, Types of instruments, Selection of instruments, Static characteristics-Static calibration, Linearity, Static Sensitivity, Accuracy, Static error, Precision, Reproducibility, Threshold, Resolution, Hysteresis, Drift, Span and Range; Dynamic performance characteristics - Sources of error, Classification and Elimination of error; Errors in measurement- Types of errors, Effect of component errors, Probable errors, Performance of instruments; Calibration of Instruments - Methods and analysis; Communication Protocols, Hybrid System – HART Communication; Foundation Field Bus – Introduction and classification.

UNIT — II: MEASUREMENT OF LEVEL AND FLOW (09 Periods)

Measuremnet of Level: Purpose of level measurement, Vessel characteristics, Categories of level measurement, Direct methods of level measurement – Hook type, Sight glass, Float actuated mechanism; Inferential methods in level measurement- Servo level gauge, Pressure transmitters, Differential head devices, Torque tube displacers, Ultrasonic gauging, Capacitive probes, load cells; Interface level measurement, calibration of level transmitters.

Measurement of Flow: Purpose of measuring flow, Categories of flow measurement, Principles of flow measurement, Working and applications of Magnetic flow meter, Turbine flow meter, Vortex shedding flow meter, Mass flow meter, Ultrasonic flow meter, Flow measurement device selection criteria, Calibration procedures for flow meters.

UNIT - III: CONTROL SYSTEMS: (09 Periods)

Introduction, Basic elements of control system, Open loop control system, Closed loop control system, Manually controlled closed loop systems, Automatic controlled closed loop systems, Basic elements of a servo mechanism - Electrical analogue of mechanical, Thermal, Hydraulic and Pneumatic systems; Transfer functions of elements, systems and processes, Transient and steady state response of control systems, effect of various types of control actions on dynamic performance, Stability of control systems.

UNIT - IV: PROCESS CONTROL (09 Periods)

Process control symbols and hardware components of a control loop, Characteristics of industrial processes – Integrating processes, Inverse acting processes, First order Dead Time Model, PID Controllers – Types, Design, Anaysis, PID controller tuning procedures; Applications of Cascade/feedforward control, Split range control and inferential control.

UNIT-V: DATA ACQUISITION SYSTEMS, PROGRAMMABLE LOGIC CONTROLLERS, SCADA (09 Periods)

Data Acquisition Systems: Basic architecture, Various elements/subsystems of a data acquisition system, General telemetry systems.

Programmable Logic Controllers: Architeture and functionality of PLCs, Different programming languages and operations of PLCs.

SCADA: Basic elements of SCADA systems, SCADA architecture-Monolithic, Distributed, Networked systems.

Total Periods: 45

TEXT BOOKS:

1. K. Padma Raju, Y.J. Reddy, *Instrumentation and Control Systems*, McGraw Hill Education (India) Private Limited, 1st Edition, 2016.
2. Dr.R.K.Rajput, *Mechanical Measurements and Instrumentation (Including Metrology and Control Systems)*, Katson Books, 2nd Edition, 2015.

REFERENCE BOOKS:

1. B.C.Nakra, K.K. Chaudhry, *Instrumentation Measurement and Analysis*, McGraw Hill Education (India) Private Limited, 4th Edition, 2016.
2. I.J. Nagrath and M.Gopal, *Control System Engineering*, New Age International Publishers, 5th Edition, 2007.

III B. Tech. – I Semester

(16BT50308) MECHATRONICS

(Interdisciplinary Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Basic Electrical and Electronics Engineering and Programming in C.

COURSE DESCRIPTION: Mechatronics system; Sensors; Transducers; Actuating systems; DC Motors; Micro controller; Signal Conditioning; Programmable Logic Controllers; Programmable Motion Controllers; Design Approach; Case Studies.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on integrative nature of Mechatronics and different components of mechatronics systems.

CO2. Select the appropriate sensors and actuators required for a system by identifying and analyzing real life engineering problems thoroughly.

CO3. Design signal conditioning circuits for mechatronics systems and establish the controlling methods required for that system to meet the specified needs.

CO4. Select, and apply appropriate programmable motion controller techniques and adaptive controllers to complex mechatronics systems with an understanding of the limitations.

CO5. Exhibit the knowledge on design approach, keeping in view of environmental contexts, to reflect the sustainable development.

CO6. Perform under a standard of professional behavior that requires adherence to the highest principles of ethical conduct.

DETAILED SYLLABUS:

UNIT - I: MECHATRONICS SYSTEMS (07 periods)

Definition, Elements of mechatronics System, Mechatronics design process, Measurement systems, Control systems, Examples of Automatic control systems, Advantages and Disadvantages.

UNIT - II: SENSORS AND ACTUATORS (11 periods)

Sensors: Introduction, Types of transducers and sensors, Characteristic Parameters - static and dynamic; Displacement sensors- Potentiometer, Strain gauge, Linear Variable Differential Transformer; Position sensors- Hall effect sensor, Optical Encoder; Proximity- Inductive, Capacitive; Acceleration-Piezoelectric accelerometer; Temperature- Bimetallic strips, Resistance Temperature Detectors (RTD); Light sensors- photo diodes, photo electric transducer; Selection of Sensors.

Actuators: Hydraulic systems, Pneumatic systems, Control valves, Linear and Rotary actuators, Electrical Actuation systems - Switches, Solenoids, Relays, DC motors, AC motors, Stepper motors.

UNIT - III: SIGNAL CONDITIONG (10 Periods)

Elements of signal conditioning, Types- Analog, Amplification, Operation Amplifiers; Noise Filters, Bridge circuits, Current-voltage converters, Voltage-frequency converters; Digital signals - Nyquist Sampling theorem, Analog to digital converter, Digital to analog Converter, Data Acquisition System.

UNIT - IV: PROCESS CONTROLLERS (10 Periods)

Controller principles, Two position controller, Proportional (P) controllers, Integral (I) controllers, Derivative (D) controllers; Composite controller Modes – Proportional Integral (PI), Proportional Derivative (PD), Three mode controller (PID); Selection of controllers, Controller tuning, Adaptive controllers.

UNIT - V: DESIGN OF MECHATRONICS SYSTEMS (07 periods)

Mechatronics approach to design, Case Studies, Future trends, Ethics as design constraint.

Total Periods: 45

TEXT BOOKS:

1. K.P.Ramachandran, *Mechatronics Integrated Mechanical Electronic Systems*, Wiley, 2012.
2. W. Bolton, Mechatronics *Electronics Control systems in Mechanical and Electrical Engineering*, Pearson, 4th edition, 2005.

REFERENCE BOOKS:

1. N.P. Mahalik, *Mechatronics Principles Concepts and Applications*, McGraw Hill Education (India) Private Limited, 2012.
2. Devdas Shetty, Richard, *Mechatronic System Design*, Cengage Learning, 2nd edition, 2012.

III B. Tech. – I Semester

(16BT40502) DATABASE MANAGEMENT SYSTEMS

(Common to EEE & ME)

(Interdisciplinary Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Database Systems; Database Design; Relational Model; SQL Queries, Constraints and Triggers; Schema Refinement and Normal Forms; Transaction Management; Concurrency Control; Overview of Storage and Indexing.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on
- Data models and Database Languages
- Database design
- Normal forms
- Storage and Indexing

CO2. Analyze databases using normal forms to provide solutions for real time applications.

CO3. Design solutions for database problems using database design, views design and framing queries.

CO4. Use database techniques for designing databases, managing databases and its security.

CO5. Select SQL, Hash based Indexing and Tree based Indexing to manage data in databases.

CO6. Apply contextual knowledge to develop database applications related to societal applications like Information Retrieval Systems, Banking and Financial systems.

DETAILED SYLLABUS:

UNIT- I: INTRODUCTION TO DATABASE SYSTEMS & DATABASE DESIGN (09 periods)

Database Systems: Database system applications, Purpose of database systems, View of data-Data abstraction, Instances and Schemas, Data models; Database languages - DDL, DML; Database architecture, Database users and administrators.

Database Design: ER diagrams, Beyond ER design, Entities, Attributes and entity sets, Relationships and relationship sets, Additional features of ER model, Conceptual design with ER model.

UNIT-II: THE RELATIONAL MODEL & RELATIONAL ALGEBRA AND CALCULUS (08 periods)

Relational Model: Integrity constraints over relations, Enforcing integrity constraints, Querying relational data, Logical database design, Introduction to views, Destroying/altering tables and views.

Relational Algebra and Calculus: Preliminaries, Relational Algebra operators; Relational Calculus - Tuple and Domain Relational Calculus; Expressive power of Algebra and calculus.

UNIT-III: SQL & SCHEMA REFINEMENT (10 periods)

SQL: Form of basic SQL query- Examples of basic SQL queries; Nested queries- Introduction to nested queries, Correlated nested queries, Set-comparison operators; Aggregate operators, NULL values- Comparison using NULL values, Logical connectives AND, OR and NOT, Impact on SQL constructs, Outer joins, Disallowing NULL values; Complex integrity constraints in SQL,Triggers and active databases.

Schema Refinement: Problems caused by redundancy, Decompositions, Problem related to decomposition, Functional dependencies, Reasoning about FDS, Normal forms – First, second and third normal forms, BCNF; Multi valued dependencies, Fourth normal form, Join dependencies, Fifth normal form.

UNIT-IV: TRANSACTIONS AND CONCURRENCY CONTROL (09 periods)

Transactions: Transaction concept, Transaction state, Implementation of atomicity and durability, Concurrent executions, Serializability, Recoverability, Implementation of isolation, Testing for serializability.

Concurrency Control: Lock based protocols, Timestamp based protocols, Validation based protocols, Multiple granularity, Deadlock handling.

UNIT-V: STORAGE AND INDEXING (09 periods)

Storage and Indexing: Data on external storage, File organization and indexing – Clustered indexes, Primary and secondary indexes; Index data structures – Hash based indexing, Tree based indexing; Comparison of file organizations.

Tree Structured Indexing: Intuition for tree indexes, Indexed Sequential Access Method (ISAM), B+ Trees- A dynamic index structure; Search, Insert, Delete; B-Tree index files. **Total Periods: 45**

TEXT BOOKS:

1. Raghu Ramakrishnan and Johannes Gehrke, *Database Management Systems*, Tata McGraw Hill, 3rd Edition, 2014.
2. A. Silberschatz, H.F.Korth and S. Sudarshan, *Database System Concepts*, Tata McGraw Hill, 5th Edition, 2006.

REFERENCE BOOKS:

1. Ramez Elmasri and Shamkant B. Navathe, *Database Systems*, Pearson Education, 6th Edition, 2013.
2. Peter Rob and Carlos Coronel, *Database Systems Design, Implementation and Management,* Cengage Learing, 7th Edition, 2009.

III B. Tech. – I Semester

(16BT50331)**DYNAMICS AND VIBRATIONS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Course on Dynamics of Machinery.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the working principle of measuring devices used for dynamic testing.

CO2. Analyze the primary and secondary out-of-balance forces in reciprocating machinery.

CO3. Design the experiments to assess the performance of static and dynamic balancing rotating machinery systems.

CO4. Investigate the effect of forces and moments acting on particles and bodies.

CO5. Work in teams in measurement of various parameters of vibration systems.

CO6. Report experimental results, calculations, and inferences systematically.

LIST OF EXPERIMENTS:

1. Determination of Gyroscopic couple on Motorized Gyroscope
2. Determination of the unbalanced couple and forces in
   - Static and Dynamic Balancing
   - Balancing of Reciprocating Masses
3. Determination of radius of gyration of a given compound pendulum
4. Determination of the natural frequency of undamped torsional vibration using single rotor shaft system
5. Estimation of the frequency of damped force vibration of a spring mass system
6. Determination of Natural frequency of bending vibration of cantilever beam using FFT analyzer
7. Determination of pressure distribution in journal bearing
8. Determination of moment of inertia of a flywheel
9. Determination of the Coriolis Component of acceleration
10. Determination of critical speed using Whirling of shaft
11. Determination of characteristics of Universal Governor
12. Study of Jump-Off phenomenon in a cam-follower mechanism

III B. Tech. - I Semester
(16BT50332)**INTERNAL COMBUSTION ENGINES LAB**

Int. Marks	**Ext. Marks**	**Total Marks**	**L**	**T**	**P**	**C**
50	50	100	-	-	3	2

PRE-REQUISITES: Course on Thermal Engineering-I.

COURSE DESCRIPTION: Calculating the performance parameters of 2-stroke and 4- stroke I.C. Engines; Heat balancing of an engine; Practicing the valve and port timing diagrams; Determining frictional power for single and multi-cylinder engines; Compressor performance. Assembly and disassembly of an automobile models; Determining the Fuel properties;

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the theoretical knowledge of Thermal Engineering in finding the Performance of I.C. Engines.

CO2. Analyze the Performance and Exhaust Emissions of an I.C. Engine by conducting various Tests.

CO3. Design and Conduct experiments as well as analyze and interpret the experimental data.

CO4. Conduct investigations on the IC engines for performance improvement and emission reductions.

CO5. Work in teams to achieve common Objectives.

CO6. Report experimental results, calculations, and inferences systematically.

LIST OF EXPERIMENTS

Any TWELVE experiments are to be performed.

1. (a) Valve Timing Diagram using a model of 4–S Diesel, CI engine
   (b)Port timing diagram of a model of 2-S, SI engine
2. Morse Test on 4-S, 4-C, Petrol Engine using Hydraulic Loading
3. Retardation Test on 4-S, 1-C, Diesel Engine using Electrical Loading
4. Performance Test on 2-S, 1-C, Petrol Engine using Electrical Loading
5. Economic speed test on 2-S, 1-C, Petrol Engine using Electrical Loading
6. Performance Test on 4-S, 1-C diesel Engine using Mechanical Loading
7. Heat Balance Test on 4-S, 1-C diesel Engine using Mechanical Loading
8. Performance Test Variable Compression Ratio Engine (VCR Engine)
9. Motoring Test on Variable Compression Ratio Engine (VCR Engine)
10. Performance Test on 2-Stage Reciprocating Air compressor Unit
11. Dismantling / Assembly of Engines to identify the parts and their position in an engine
12. Experiments on Fuels:
    (a) Bomb calorimeter for Calorific Value of Solid and Liquid fuel
    (b) Junker’s Gas Calorimeter for Calorific Value of gaseous fuel
    (c) Viscosity measurement using saybolt and redwood viscometer
13. Flue gas analysis for engine emissions using Exhaust Gas Analyser and Smoke Meter
14. Performance Test on Computerized 4-S, 1-C, C.I. engine with Eddy Current loading
15. Demonstration of Vapour Compression Refrigeration System

III B. Tech. – I Semester

(16BT50333) METROLOGY AND INSTRUMENTATION LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Courses on Computer Aided Machine Drawing Lab and Machine Tools and Modern Machining Processes.

COURSE DESCRIPTION: High precision Metrology; Standardization; Calibration of instruments such as Vernier calipers, Micrometer, Vernier height gauge; Measure dimensions of shafts, bearings; Alignment tests on lathes and milling machines; Straightness and flatness measurements; Identifying uncertainties in dimensional metrology; Measurement of gear and threaded profiles; Measurement of level, speed, viscosity, density, humidity, temperature, pressure and discharge coefficient; Data acquisition and analysis using LabVIEW; Data logging and analysis.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on measure variables like temperature, pressure, torque, humidity etc. using transducers and gauging instruments for a given system.

CO2. Analyse and select suitable measurement tool and/or measurement system in a practical situation.

CO3. Apply analytical skills to design instrumentation to measure different physical parameters.

CO4. Investigate the sources of measurement errors and eliminate them by use of reference materials to ensure good quality, accurate and traceable measurement results.

CO5. Apply dimensional analysis techniques and use reference values for unit conversions, accurately perform associated mathematics and present final values.

CO6. Function effectively as an individual, and as a member of a team to express the results of measurement and calculations and correctly reflect the effects of measurement uncertainty.

CO7. Document the traceability of measurement standards and specify a dimension validation process.

Any TWELVE experiments to be conducted (SIX from each)

Metrology:

1. (a) Calibration of Vernier Calipers, Micrometer, Vernier Height Gauge, Dial Gauge and measurement of dimensions of components
   (b) Measurement of dimensions of a part using limit gauges
2. (a) Measurement of internal bores by dial bore indicators
   (b) Measurement of coordinates of a jig plate
   (c) Measurement of radius of curvature of a given ring
3. (a) Measurement of angle and taper by using Bevel protractor, Sine bars
   (b) Measurement of angle of Taper plug gauge, Taper ring gauge, V- groove
4. Measurement of gear elements by using Gear Tooth Vernier
5. (a) Measurement of screw elements by using Tool Makers microscope
   (b) Measurement of screw elements by using profilometer
   (c) Measurement of effective diameter of an external thread by using Two Wire/Three wire method
6. (a) Measurement of straightness and flatness using spirit level and Autocollimator
   (b) Measurement of surface roughness using surface roughness tester
7. Checking the limits of dimensional tolerances using electrical and optical comparators
8. Alignment test on lathe and milling machines and measurement of the Resultant force acting on the tool using Tool Dynamometers

Instrumentation:

1. Measurement and calibration of liquid level and analysis of different techniques
2. Measurement of speed and analysis of different techniques
3. Meaurement of viscosity, density, humidity and torques
4. Design of circuit to measure resistance and calibration to respective voltage
5. Calibration and verification of discharge coefficient of orifice plate
6. Measurement of temperature and pressure
7. Data acquisition, calibration and analysis using LabVIEW

8. Data logging and analysis

III B. Tech. – II Semester

(16BT3HS02)MANAGERIAL ECONOMICS AND PRINCIPLES OF ACCOUNTANCY

(Common to ME, CSE, IT & CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Managerial Economics; Demand and Elasticity of Demand; Production Functions; Markets and Pricing Policies; Basic concepts of Accounting (Journal, Ledger and Trial balance); Trading Account, Profit and Loss Account and Balance sheet with simple adjustments; Computerized Accounting.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Acquire Knowledge in
- Tools and concepts of Micro Economics
- Basic Principles and concepts of Accountancy
- Financial Accounting
- Significance of Economics and Accountancy

CO2. Demonstrate analytical skills in managerial decision making of an organization by applying economic theories

CO3. Develop effective communication in Business and Accounting transactions

CO4. Ascertain the profitability and soundness of an organization

CO5. Practice Financial Accounting

DETAILED SYLLABUS:

UNIT – I : INTRODUCTION TO MANAGERIAL ECONOMICS, DEMAND ANALYSIS (09 Periods)

Definition, Nature and Scope of Managerial Economics. **Demand:** Determinants of demand – Demand function - Law of demand, assumptions and exceptions - Elasticity of demand – Types of elasticity of demand - Demand forecasting and methods of demand forecasting.

UNIT – II : THEORY OF PRODUCTION AND COST ANALYSIS (09 Periods)

Production Function: Isoquants and Isocosts – Input-output relationship - Law of returns. **Cost Concepts:** Total, Average and Marginal Cost **-** Fixed vs. Variable costs – Opportunity Costs Vs Outlay Costs– Separable Costs Vs Joint Costs, Urgent Costs Vs Postponable Costs- Avoidable Costs Vs Unavoidable Costs - **Break Even Analysis (BEA)** – Assumptions, Merits and demerits - Determination of Break Even Point (Simple problems).

UNIT – III : INTRODUCTION TO MARKETS AND PRICING (09 Periods)

Market Structure: Types of Markets - Features of perfect competition - Monopoly and monopolistic competition - Price and Output determination in perfect competition, monopoly and monopolistic Markets.

Pricing : Objectives and policies of pricing – Sealed bid pricing - Marginal cost pricing - Cost plus pricing - Going rate pricing – Penetration Pricing –skimming Pricing - Block pricing – Peak load pricing - Cross subsidization.

UNIT – IV : INTRODUCTION TO PRINCIPLES OF ACCOUNTING & CAPITAL (09 Periods)

Accountancy: Introduction – Concepts – Conventions – Double Entry Book Keeping – Journal – Ledger - Trial Balance (Simple problems).

Capital : Significance - Types of capital – Sources of Capital.

UNIT – V : FINAL ACCOUNTS - COMPUTERIZATION OF ACCOUNTING SYSTEM (09 Periods)

Introduction to Final Accounts - Trading account - Profit and Loss account and Balance Sheet with simple adjustments (Simple problems).

Computerization of Accounting System : Basic Concepts **Total Periods: 45**

TEXT BOOKS:

1. A.R. Aryasri, *Managerial Economics and Financial Analysis*, Tata Mc- Graw Hill, New Delhi, 3rd Edition, 2007.
2. Kumar & Rao, *Managerial Economics and Financial Analysis*, Cengage Publications.

REFERENCE BOOKS:

1. Varshaney and Maheswari, *Managerial Economics*, Sultan Chand and Sons, New Delhi, 19th Edition, 2005.
2. R.Cauvery, U.K. Sudhanayak, M. Girija and R. Meenakshi, *Managerial Economics*, S. Chand and Company, New Delhi, 2nd Edition, 2010.
3. S.P. Jain and K.L. Narang, *Financial Accounting*, Kalyani Publishers, Ludhiana, 6th Edition, 2002.

III B. Tech. – II Semester
(16BT60301)**CAD/CAM**

Int. Marks	**Ext. Marks**	**Total Marks**	**L**	**T**	**P**	**C**
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Computer Aided Machine Drawing Lab and Manufacturing Technology.

COURSE DESCRIPTION: Fundamental and conventional CAD processes; Raster scan graphics co-ordinate system; Transformations; Geometric construction models; Curve representation methods; Computer Control in NC; GT; CAPP.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the basic concepts of CAD/CAM to generate a suitable geometric model of an object.
CO2. Analyze the features on an object and develop process planning chart/ part program.
CO3. Model the components and develop part programs for real time applications.
CO4. Evaluate the sequential steps required for computer aided design and manufacturing of components.
CO5. Apply software tools for numerical control of fabrication processes.
CO6. Utilize the safe practices in developing codes for designing and manufacturing components with realistic constraints.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO CAD/CAM (08 Periods)

Computers in Industrial Manufacturing, Computer Aided Design (CAD), Computer Aided Manufacturing (CAM), Computer Integrated Manufacturing (CIM), Design process, Product Life Cycle, CAD Standards-Introduction, classification and Importance of CAD standards.

UNIT – II: COMPUTER GRAPHICS & GEOMTERIC MODELING (14 Periods)

Computer Graphics: Raster Scan Graphics: DDA Line Algorithm, Bresenham's Line algorithm, Coordinate system, 2D &3D Transformations (Scaling, Translation, Rotation & Reflection).

Geometric Modeling: Requirements of Geometric Modeling, Definition to Parametric and Non-parametric representation , Introduction to curve representation, Analytical and Synthetic curve representation(Bezier, B-spline & Nurbs), Introduction to surface representation (Bezier & B-spline), Introduction to Solid representation methods(B-rep & CSG).

UNIT – III: COMPUTER NUMERICAL CONTROL (07 Periods)

Introduction to CNC, CNC Hardware basics (Structure of CNC machine tools, Actuation systems, Feedback devices), CNC Tooling (Automatic tool changers, Work holding, CNC Programming-Part Programming fundamentals, Manual part programming methods, Preparatory Functions, Miscellaneous Functions, Canned Cycles.

UNIT - IV: GROUP TECHNOLOGY & COMPUTER AIDED PROCESS PLANNING (07 Periods)

Group Technology: Introduction, Part Family, Classification and Coding, Types of coding systems, Identification systems (RFID, Barcodes), Group Technology Cells, Benefits of Group Technology.

Computer Aided Process Planning: Retrieval & Generative Computer Aided Process Planning systems, Benefits of CAPP.

UNIT - V: COMPUTER INTERGRATED MANUFACTURING AND COMPUTER AIDED QUALITY CONTROL (09 Periods)

Computer Intergrated Manufacturing: Introduction, Types of Manufacturing System, CIMS Benefits, Introduction to Rapid Prototyping and its types (SLA, SLS, FDM and 3D printing), Advantages, Limitations and applications of RPT. Introduction to Flexible Manufacturing System.

Computer Aided Quality Control : Introduction, Inspection and Testing, Contact & Non-Contact inspection methods.

Total Periods: 45

TEXT BOOKS:

1. P.N. Rao, *CAD/CAM: Principles and Applications*, TMH, 2004.
2. Michel P.Groover, *Computer Aided Design & Computer Aided Manufacturing*, Pearson Education, 2006.

REFERENCE BOOKS:

1. Ibrahim Zeid, *CAD/CAM Theory and Practice*, Mc Graw Hill, 2010.
2. Radhakrishnan and Subramanian, *CAD/CAM/CIM*, New Age International, 2004.
3. E. Michael, *Geometric Modeling*, John Wiley & Sons, 3rd Edition 2013.

III B.Tech. – II Semester

(16BT60302) HEAT TRANSFER

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Multi-Variable Calculus and Differential Equations, Thermodynamics and Fluid Mechanics.

COURSE DESCRIPTION: Modes of heat transfer; One-dimensional steady and transient conduction; Analysis of extended surfaces; Convection heat transfer; free and forced convection; boiling and condensation; Heat exchangers; radiation; Concept of black body; irradiative heat exchange between surfaces.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on the concepts of conduction, convection and radiation heat transfer processes.
CO2. Identify, analyze and formulate heat transfer process for the thermal design of systems.
CO3. Design thermal systems for real time applications.
CO4. Conduct investigations on complex heat transfer problems and provide solutions.
CO5. Use analytical and numerical solution techniques in solving heat transfer problems, including heat generation and extended surfaces

DETAILED SYLLABUS:

UNIT - I: CONDUCTION HEAT TRANSFER (09 Periods)

Basics of Heat Transfer, Modes and Mechanism of heat transfer, Conduction, convection and radiation, General differential equation of heat conduction - Cartesian, Cylindrical and Spherical Coordinates; Boundary and Initial Conditions, One dimensional steady state heat conduction - Conduction through plane wall, cylinders and spherical systems; Composite systems, Critical thickness of insulation.

UNIT - II: FINS AND TRANSIENT HEAT CONDUCTION (09 Periods)

Extended surfaces - Efficiency, Effectiveness and Temperature distribution on Long Fin, Fin with Insulated Tip and Short Fin; Unsteady heat conduction - Lumped heat analysis, Infinite and semi infinite solids.

UNIT - III: CONVECTION HEAT TRANSFER (09 Periods)

Hydrodynamic and thermal boundary layer theory, Dimensional analysis, Buckingham's ð-theorem applied to free and forced convection heat transfer.

Forced convection: External flows - Flow over plates, cylinders and spheres; Internal flows- flow through Horizontal pipe, Annular pipe.

Free convection: Flow over vertical plate, horizontal plate, and cylinders.

UNIT - IV: HEAT EXCHANGERS AND PHASE CHANGE HEAT TRANSFER (09 Periods)

Heat Exchangers: Classification of Heat Exchangers, Overall Heat Transfer Coefficient and Fouling Factor, Concepts of LMTD and NTU Methods.

Boiling: Pool Boiling Regimes, Determination of Heat Transfer Coefficient in Nucleate Boiling, Critical Heat Flux and Film Boiling.

Condensation: Filmwise and Dropwise Condensation, Nusselt's Theory of Condensation on a Vertical Plate.

UNIT - V: RADIATION HEAT TRANSFER (09 Periods)

Fundamentals of Radiation, Emission Characteristics and Laws of Black Body Radiation, Irradiation, Total and Monochromatic radiation, Laws of Planck, Wien's displacement, Kirchoff, Lambert's cosine, Stefan and Boltzmann, Radiative Heat Exchange - Heat Exchange between Two Black Bodies, Concepts of Shape Factor, Emissivity, Heat Exchange between Gray Bodies, Radiation Shields.

Total Periods: 45

TEXT BOOKS:

1. R.C. Sachdeva, *Fundamentals of Engineering Heat and Mass Transfer*, New Age International, 4th Edition, 2014.
2. R.K.Rajput, *Heat and Mass Transfer, S.Chand & Company Ltd*, 6th Edition, 2015.

REFERENCE BOOKS:

1. P.K.Nag, *Heat Transfer*, TMH, 2nd Edition, 2010.
2. Holman.J.P, *Heat Transfer*, TMH, 9th Edition, 2010.
3. Yunus Cengel, *Heat and Mass Transfer*, Mc Graw Hill Publications, 4th Edition, 2014.
4. C.P Kothandaraman and S.Subramanyan, *Heat and Mass Transfer data book*, New Age International, 8th Edition, 2014.

Note: Heat Transfer Data Book mentioned in Reference No.4 is needed during examinations.

III B. Tech. – II Semester
(16BT60303) NON- CONVENTIONAL ENERGY SOURCES
(Interdisciplinary Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Overview and importance of non-conventional energy sources; Solar Energy collection, solar energy storage and applications; Wind energy conversion; Biomass energy conversion; Geothermal energy Conversion; Ocean energy conversion: Ocean thermal energy conversion, Wave energy and tidal energy conversion.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge of Non-Conventional energy resources.
CO2. Identify, analyze and formulate requirements for various non-conventional energy conversion systems.
CO3. Propose probable designs for various non-conventional energy conversion systems to solve real time applications.
CO4. Conduct investigations in selection of non-conventional energy conversion systems for a particular geographic region.
CO5. Consider health and safety issues in designing non-conventional energy conversion systems to solve industrial and social problems.
CO6. Optimize the utilization of the natural resources using non-conventional energy conversion systems to reduce the environmental pollution.

DETAILED SYLLABUS:

UNIT - I: ENERGY CONSERVATION AND SOLAR ENERGY (09 Periods)

Basics of energy sources and Conservation: Classification and potential of energy sources, Importance of renewable energy sources and energy chain, Principles of energy conservation.

Fundamentals of Solar Energy: Solar constant and solar radiation geometry, Solar time and day length, Estimation of monthly average daily total radiation on horizontal surface and tilted surface, Measurement of solar radiation - Pyranometer, Pyrheliometer and Sunshine recorder.

UNIT - II: SOLAR ENERGY COLLECTION DEVICES (09 Periods)

Flat plate collector, Losses through flat plate collector - Top loss, Side loss and Bottom loss coefficients; Transmissivity of the cover system, Transmittance – Absorptance product, Parameters affecting the collector performance, Efficiency of flat plate collector, Selective surfaces, Air collectors and types, Classification and types of concentrating collectors.

UNIT - III: SOLAR THERMAL ENERGY APPLICATIONS (09 Periods)

Solar Thermal Applications: Methods of storing solar energy, Solar water heating, Impact of conventional energy sources on environment, Applications of solar thermal energy: Solar Refrigeration, Solar thermal power generation, Solar distillation, Solar space heating and Space cooling.

Solar Voltaic Systems & Emerging Technologies : Basic principle of PV cell, Arrangements of PV cells, classification of PV cell, Principle of power generation through Magneto Hydro Dynamics, Power thermo electric and thermionic power generation**.**

UNIT - IV: WIND ENERGY AND BIOMASS ENERGY CONVERSION (09 Periods)

Wind Energy Conversion: Origin of wind, application of wind power, components and working of horizontal axis wind turbine - Betz limit, Types of blades, upwind and downwind turbines, vertical axis Wind turbines- Savonius type, Darrieus type.

Biomass Energy Conversion: Photosynthesis process, Classification of biogas plants, Types of Digesters - KVIC and Deenabandhu digesters, Factors affecting digester performance of digester, Gasification.

UNIT - V: GEOTHERMAL AND OCEAN ENERGY CONVERSION (09 Periods)

Geothermal Energy Conversion: Introduction, geothermal sources - Hydro thermal resources, geopressurized resources, hot dry rocks, Power generation through liquid dominated system, vapour dominated system and hot dry rocks, applications of geothermal energy, environmental consideration.

Ocean Energy Conversion: Ocean thermal Energy conversion - Lambert's law, OTEC. conversion technologies- Claude cycle and Anderson cycle**;** Tidal energy conversion - Introduction, tidal energy conversion - single basin and double basin systems.

Total Periods: 45

TEXT BOOKS:

1. G.D, Rai, *Non-conventional Energy Sources*, Khanna Publichers, 5th Editon, 2011.
2. B.H.Khan, *Non-conventional Energy Sources*, TMH, 3rd Edition, 2016.

REFERENCE BOOKS:

1. S.P.Sukhatme and J.K Nayak, *Solar Energy Principles of Thermal Collection and Storage*, TMH, 3rd edition, 2008.

2. W.R.Murphy & G.Mckay, *Energy Management*, Butterworth, London, 2nd Edition, 2007.

III B. Tech. - II Semester
(16BT50402) **MICROPROCESSORS AND MICROCONTROLLERS**
(Interdisciplinary Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Basic Electrical and Electronics Engineering.

COURSE DESCRIPTION: Architecture, Instruction set and programming of 8086; Programmable interfacing devices - architecture and programming; Interfacing Memory and I/O devices with 8086; 8051 Microcontroller - Architecture, programming, interrupts and applications.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge in
- Internal hardware details of Intel 8086, 8051 and programmable devices like 8255, 8251, 8259, 8257.
- Interfacing various peripherals to build stand alone systems.

CO2. Critically analyze the requirements to meet the specifications of microprocessors and microcontrollers based systems.

CO3. Design and develop suitable interfaces for real time applications.

CO4. Exhibit programming skills, choose suitable hardware and program the devices to solve Engineering problems.

CO5. Apply appropriate techniques, resources to complex engineering activities for modeling microcomputer and microcontroller based systems with understanding of limitations.

CO6. Apply concepts of microprocessors and microcontrollers for solving societal problems.

DETAILED SYLLABUS:

UNIT - I: 8086 ARCHITECTURE AND PROGRAMMING (10 Periods)

Microprocessor Evolution, Review of Intel 8085, 8086 internal Architecture - register organization, memory segmentation, memory organization; Introduction to programming the 8086 - Assembler directives, addressing modes, instruction set, simple programs, procedures and macros.

UNIT - II: 8086 INTERFACING AND INTERRUPTS (08 Periods)

Pin description, minimum & maximum mode operation of 8086, timing diagram. Interfacing memory (RAM and EPROM) to 8086. 8086 Interrupts - types and interrupt responses, Interrupt vector table, priority of interrupts; 8259 priority interrupt controller - architecture, system connections and cascading, initialization of 8529.

UNIT - III: PROGRAMMABLE DATA COMMUNICATION DEVICES (11 Periods)

Introduction to serial and parallel communication, methods of parallel data transfer. 8255 PPI - Internal architecture and system connections, operational modes and initialization, interfacing stepper motor, ADC, DAC, Optical Shaft Encoder; Methods of serial data transfer, 8251 USART - architecture and its initialization, sending and receiving characters; Serial communication standard - RS232C, USB; Architecture and operation of 8257 DMA controller.

UNIT - IV: MICROCONTROLLERS AND PROGRAMMING (08 Periods)

Microcontroller Vs General purpose microprocessor, 8051/8052 Microcontroller – architecture, features, register organization, pin diagram, internal and external memories & their interfacing, instruction set, addressing modes, simple programs.

UNIT - V: 8051 INTERFACING (08 Periods)

Timer/Counters – Registers, modes and programming; Serial communication – registers, programming 8051 for serial communication; Interrupts – registers, programming; 8051 applications – Interfacing key board, LEDs and LCD.

Total Periods: 45

TEXT BOOKS:

1. Douglas V. Hall, *Microprocessors and Interfacing: Programming and Hardware*, Tata McGraw-Hill, revised 2nd Edition, 2006.
2. Mazidi and Mazidi, *The 8051 Microcontroller and Embedded Systems*, Prentice Hall of India, 2000.

REFERENCE BOOKS:

1. A.K. Ray and K.M. Bhurchandi, *Advanced Microprocessors and Peripherals- Architecture*, Programming and Interfacing, Tata McGraw Hill, 2002 Reprint.
2. Kenneth J. Ayala, *The 8051 Microcontroller*, Thomson Delmar Learning, 3rd Edition, 2004.

III B. Tech. – II Semester

(16BT41202) JAVA PROGRAMMING

(Interdisciplinary Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Programming in C.

COURSE DESCRIPTION: Introduction of Java, Classes and Objects; Inheritance, Packages, Interfaces; Exception handling, Multithreading; Event handling, AWT, Collection Classes; Applets, Servlets.

COURSE OUTCOMES: On successful completion of this course, the student will be able to:

CO1. Demonstrate knowledge on:
- Object Oriented Programming concepts - classes, objects, inheritance, polymorphism, encapsulation and abstraction.
- Packages, interfaces, multithreading, exception handling, event handling.

CO2. Analyze complex engineering problems using object oriented concepts.

CO3. Design and develop reusable code to provide effective solutions for real world problems using inheritance and polymorphism.

CO4. Apply AWT and Applets to create interactive Graphical User Interfaces.

CO5. Use advanced programming languages to develop web applications.

CO6. Build Java Applications suitable for societal requirements.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION (10 Periods)

Data types, Variables, Arrays, Operators, Control statements.

Classes and Objects: Concepts of Classes, Objects, Constructors, Methods, this keyword, Garbage collection, Overloading Methods and Constructors, Parameter passing, Access control, Recursion, String Class.

UNIT-II: INHERITANCE, PACKAGES AND INTERFACES (09 Periods)

Inheritance: Inheritance basics, Super keyword, Multi-level hierarchy, Abstract classes, Final keyword with inheritance.

Packages: Definition, Creating and accessing a package, Understanding CLASSPATH, Importing packages.

Interfaces: Definition, Implementing interfaces, Nested interfaces, Applying interfaces, Variables in interface and Extending interfaces.

UNIT-III: EXCEPTION HANDLING AND MULTITHREADING (08 Periods)

Exception Handling: Concepts of exception handling, Exception types, Usage of Try, Catch, Throw, Throws and Finally, Built in exceptions, Creating own exception sub classes.

Multithreading: Java thread model, Creating threads, Thread priority, Synchronizing threads, Inter-thread communication.

UNIT-IV: COLLECTION CLASSES, THE APPLET CLASS AND AWT (10 Periods)

Collection Classes: ArrayList Class, LinkedList Class, Hashset Class, LinkedHashSet Class, TreeSet Class, PriorityQueue Class, EnumSet Class.

The Applet Class: Types of applets, Applet basics, Applet architecture, Applet skeleton, Passing parameters to applets.

AWT Control Fundamentals: User interface components, Layout managers.

UNIT-V: EVENT HANDLING AND SERVLETS (08 Periods)

Delegation event model: Event classes, Event Listener Interfaces – Mouse and Key; Adapter classes.

Servlets: Life cycle of a servlet, Using Tomcat for Servlet development, Create and compile the servlet source code, Servlet API, Javax.Servlet package.

Total Periods: 45

TEXT BOOK:

1. Herbert Schildt, *Java the Complete Reference*, Oracle Press, 9th Edition, 2014.

REFERENCE BOOK:

1. Sachin Malhotra and Saurab Choudhary, *Programming in Java*, Oxford University Press, 2nd Edition, 2014.

III B. Tech. – II Semester
(16BT51201) COMPUTER GRAPHICS AND MULTIMEDIA
(Interdisciplinary Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Matrices and Numerical Methods.
COURSE DESCRIPTION: Introduction to Computer Graphics, Output Primitives; 2D Geometric Transformations and Viewing; 3D object representation and Visible Surface Detection Methods; Introduction to Multimedia, Audio and Video; Multimedia Data Compression.
COURSE OUTCOMES: On successful completion of this course, the student will be able to:
CO1. Demonstrate knowledge on:
- Graphical interactive devices
- Viewing transformations
- 3-D object representations
- Surface detection methods
- Image, audio, video representations and standards.

CO2. Analyze multimedia compression issues using image, audio and video compression techniques.
CO3. Design algorithms to generate points, lines, polygons for 2-D, 3-D objects.
CO4. Apply Transformations and Clipping algorithms for 2-D and 3-D objects, various lossy/ lossless coding techniques on text and images for compression and decompression.
CO5. Build multimedia applications for societal requirements.

DETAILED SYLLABUS:
UNIT –I: INTRODUCTION TO GRAPHICS AND OUTPUT PRIMITIVES (09 Periods)
Introduction: Raster-Scan systems, Random Scan systems, Graphics monitors, Work stations and Input devices.
Output Primitives: Points and Lines, Line Drawing algorithms, Mid-point Circle and Ellipse algorithms.
Filled area primitives: Scan Line Polygon Fill algorithm, Boundary-fill algorithms and Flood-Fill algorithms.
UNIT –II: 2-D GEOMETRICAL TRANSFORMS AND 2-D VIEWING (09 Periods)
2-D Transforms: Translation, Scaling, Rotation, Reflection and Shear transformations, Homogeneous coordinates, Composite Transforms, Transformations between coordinate systems.
2-D Viewing: The Viewing Pipeline, Viewing coordinate reference frame, Window to View-Port coordinate Transformation, Cohen-Sutherland line clipping algorithms.
UNIT –III: 3-D OBJECT REPRESENTATION AND VISIBLE SURFACE DETECTION METHODS (09 Periods)
3-D Object representation: Polygon Surfaces, Quadric surfaces, Spline Representation, Hermite Curve, Bezier Curve and B-Spline Curves, Bezier and B-Spline Surfaces.
Visible Surface Detection Methods: Classification, Back-Face detection, Depth-Buffer, Scan-Line, Depth Sorting, BSP-Tree methods, Area Sub-Division and Octree methods.
UNIT-IV: INTRODUCTION TO MULTIMEDIA, AUDIO AND VIDEO (09 Periods)
Introduction: Definition of Multimedia, Multimedia and Hypermedia, Multimedia Software tools, Graphics and Image Data representations-Graphics and Image Data types, File Formats, Color models in images, Color models in video.
Audio and Video: Definition of sound, Digitization, Nyquist Theorem, Signal to Noise ratio, Signal to Quantization-Noise ratio; Types of video signals, Analog video, Digital video.
UNIT-V: MULTIMEDIA DATA COMPRESSION (09 Periods)
Lossless compression algorithms- Introduction, Basics of Information Theory, Run Length Coding, Variable Length coding, Dictionary Based coding, Arithmetic coding; Lossy Compression algorithms-Quantization; Introduction to Transform Coding-DCT, DFT; Image compression techniques-JPEG standard, JPEG 2000; Introduction to video compression- Video compression based on Motion Compensation, MPEG-1, MPEG-2.

Total Periods: 45

TEXT BOOKS:
1. Donald Hearn and M. Pauline Baker, *Computer Graphics C version*, Pearson Education, 2nd Edition, 2006.
2. Ze-Nian Li and Mark S. Drew, *Fundamentals of Multimedia*, Pearson Education, 2nd Edition, 2008.

REFERENCE BOOKS:
1. James D. Foley, Andries van Dam, Steven K. Feiner and John F. Hughes, *Computer Graphics: Principles and Practice in C*, Addison Wesley Professional, 2nd Edition, 2013.
2. Nigel Chapman and Jenny Chapman, *Digital Multimedia*, Wiley Dreamtech, 2nd Edition, 2004.

III B. Tech. – II Semester
(16BT60304) **GAS TURBINES AND JET PROPULSION**
(Program Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Thermal Engineering - II

COURSE DESCRIPTION: Jet propulsion gas turbine; Engine types; Performance; Turbojet and turbofan engines; Design of Compressor; Combustor and Turbines; Jet and Rocket propulsions.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on gas turbines, Jet and Rocket propulsion systems.

CO2. Identify, Analyze and formulate the performance of components in the engine.

CO3. Design the propulsion systems with an influence on engine output considering the required parameters for a particular gas turbine engine.

CO4. Investigate and carry out a cyclic analysis of a gas turbine engine, including ramjet and turbofan.

CO5. Utilize appropriate analytical methods in integrating the engine into an aircraft system for better performance analysis.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION & ANALYSIS OF GAS TURBINE CYCLES (09 Periods)

Development of gas turbine, Classification of gas turbines, Gas turbine vs. reciprocating I.C. engine, Gas turbine vs steam turbine, Applications of gas turbines, the basic cycle Analysis of simple gas turbine cycle, Effect of thermodynamic variables on the performance of simple gas turbine plant, Improvements in simple gas turbine cycle, Actual gas turbine cycle, Closed cycle gas turbine, Helium cooled, closed gas turbine for nuclear power plants , Total energy system incorporating gas turbine, Semi-closed cycle gas turbine, Gas turbine plant arrangement.

UNIT - II: COMPRESSOR AND TURBINES (09 Periods)

Centrifugal and Axial flow compressors, Blowers and Fans, Theory and design of impellers and Blading, Axial flow turbines, Blade diagrams and Design of blading, Performance characteristics, Matching of turbines and compressors.

UNIT - III: GAS TURBINE COMBUSTION CHAMBER (08 Periods)

Introduction, Requirements, Combustion process in gas turbine, Types of combustion chamber, Flow pattern in a combustion chamber, Performance and operating characteristics of combustion chambers, Fuel injection in combustion chamber.

UNIT - IV: JET PROPULSION (09 Periods)

Introduction, Thrust, Thrust vs. thrust horse power, Efficiencies, Airscrew, Turbojet, Thrust augmentation, Turboprop engine, Bypass and ducted fan engines, Regenerative ducted fan engine, Turbo shaft engine, Ram jet, Pulsejet, Comparison of various propulsion devices.

UNIT - V: ROCKET PROPULSION (10 Periods)

Introduction, classification of rockets, Principle of rocket propulsion, Analysis of an ideal chemical rocket, Optimum expansion ratio for rocket, The chemical rocket, Advantages of liquid propellant rockets over solid propellant rockets, Free radical Propulsion, Nuclear Propulsion, Ion propulsion, Plasma propulsion.

Total Periods: 45

TEXT BOOKS:

1. Mathur, M., and Sharma, R.P., *Gas Turbines and Jet & Rocket Propulsion*, Standard Publishers, New Delhi, 2014.
2. Ganesan, V., *Gas Turbines*, Tata McGraw Hill Book Company, New Delhi, 3rd edition, 2010

REFERENCE BOOKS:

1. Yahya. S.M., *Fundamental of Compressible Flow with Aircraft and Rocket Propulsion*, New Age International (p) Ltd., New Delhi, 2005.
2. Cohen.H., Rogers R.E.C and Sravanamutoo, *Gas Turbine Theory*, Addison Wesley Ltd., 1987.

3. Rathakrishnan. E., *Gas Dynamics*, Prentice Hall of India, New Delhi, 1^{st} Edition, 2001.

III B. Tech. – II Semester

(16BT60305) HYDRAULICS AND PNEUMATICS

(Common to ME & EIE)
(Program Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Fluid Mechanics and Basic Electrical and Electronics Engineering

COURSE DESCRIPTION: Basic fluid power system; Hydraulic components and its use; Hydraulic circuits and its application; Fundamentals of pneumatics; Pneumatic components and its use; Pneumatic circuits; Application; Design of hydraulic and pneumatic systems for various applications; Electro Pneumatics; Logic gates.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the basic mechanism of fluid power systems and automation.
CO2. Identify and analyze engineering problems in automated environment.
CO3. Design the pneumatic and hydraulic circuits for domestic and industrial problems.
CO4. Investigate the issues related to the design and manufacture of pneumatic and hydraulic systems.
CO5. Use modern tools available in automation to enhance the productivity.
CO6. Deploy the best way of implementing the automation to have eco-friendly environment and sustainable development.

DETAILED SYLLABUS:

UNIT - I: FUNDAMENTALS OF HYDRAULIC POWER SYSTEMS. (08 Periods)

Fluid Power Fundamentals, Advantages and Application. Pascal's law, Viscous oils, properties. Components of hydraulic systems- Pumps, Gear pump, Vane pump, and Piston pump; Pumping theory, Actuators –Single acting, Double acting, Tandem, Rod less; Accumulators, Intensifiers.

UNIT - II: HYDRAULIC CONTROL COMPONENTS AND DESIGN OF CIRCUITS (09 Periods)

Directional control valves (DCVs), Pressure control valves, Flow control valves, Shuttle valve, Check valve, Sequence valve, Solenoid valve, and Relay, ISO/ANSI symbols, Simple hydraulic circuits, ladder diagram.

UNIT - III: FUNDAMENTALS OF PNEUMATICS (09 Periods)

Pneumatic system components, Compressors, Filters, Regulator, Lubricator unit (FRL UNIT), Driers, Valves, Pressure control valve, Flow control valve, Quick exhaust valve, direct control valves, Time delay valve, Memory valve, Shuttle valve, Twin pressure valve, Solenoid valves and Pneumatic cylinders, ISO/ANSI symbols.

UNIT - IV: DESIGN OF PNEUMATIC CIRCUITS (10 Periods)

Pneumatic circuits, Speed control circuits, Multi- Cylinder Application by Coordinated and sequential motion control, Motion and control diagrams, Cascading method- principle, and Practical application (up to two cylinders)

UNIT - V: ELECTRO PNEUMATICS AND LOGIC GATES (09 Periods)

Electro- Pneumatic: Principles - Signal input and output, Pilot assisted solenoid control of directional control valves, Use of relay and contactors.

Logic Gates: Introduction and use of Logic gates in pneumatic applications, Practical Examples.

Total Periods: 45

TEXT BOOKS:

1. Srinivasan.R, *Hydraulic and Pneumatic controls*, McGraw Hill Education, 2nd Edition, 2006.
2. Shanmugasundaram. K, *Hydraulic and Pneumatic Controls*, S. Chand & Co, 1st Edition, 2006

REFERENCE BOOKS:

1. Majumdar S.R., *Oil Hydraulics Systems Principles and Maintenance,* McGrawHill Education, 1st Edition, 2000.
2. Majumdar S.R., Pneumatic systems – Principles and Maintenance, McGraw Hill Education, 2nd Edition, 2001.

III B. Tech. – II Semester
(16BT60306) MECHANICAL VIBRATIONS
(Program Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Dynamics of Machinery.

COURSE DESCRIPTION: Basics of vibration; Analysis of two or more degrees of freedom; Multi-body mechanical systems; Undamped free vibrations; Damped free vibration; Forced vibrations; Basic concepts on engineering measurements; Spectrum analysis; signal processing; vibration control.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on Vibration and its practical applications.

CO2. Analyze the mathematical models of the system and provide a qualitative assessment of the vibrations present in the system.

CO3. Design the possible sources of unwanted vibration and suggest means of rectification.

CO4. Investigate the complex system by analyzing the sub-systems and using their models for quicker solutions.

CO5. Use the different tools involved in Vibration Control to enhance productivity.

CO6. Relate the issue of safety in dynamic systems involving moving parts and propose solutions for society.

DETAILED SYLLABUS:

UNIT - I: FUNDAMENTALS OF VIBRATIONS (09 Periods)

Single degree of Freedom Systems – Definition, Classification and terminology; Simple harmonic motion and Mathematical modeling, Natural vibrations – Equilibrium method, Energy method; Equivalent systems –Damped free vibration, Springs in parallel and series.

UNIT - II: FORCED VIBRATIONS (09 Periods)

Constant harmonic excitation - steady state forced vibration, Impressed harmonic force, Impressed force due to unbalance; Motion excitation – amplitude, absolute, relative, Rotating with reciprocating unbalance; Transmissibility and Isolation – Force and Motion transmissibility; Damping – coulomb damping, Viscous damping.

UNIT - III: TWO DEGREE FREEDOM SYSTEMS (09 Periods)

Free vibrations of spring coupled systems - Natural frequencies and modes of vibration by classical method of spring-mass system; Forced vibration - Dynamic vibration absorber, longitudinal vibrations of bars;

UNIT - IV: TORSIONAL SYSTEMS (09 Periods)

Introduction, Torsional system, Damped mass and distributed mass systems, Natural frequencies and mode shapes - Rayleigh's method, Holzer method, Stodola method.

UNIT - V: VIBRATION MEASUREMENTS (09 Periods)

Vibration measurement - process, classification of measuring instruments; Vibrometers- Stylus type, optical type, seismic instrument, simple potentiometer; capacitance pick-up- Active type and passive type pick-ups; Accelerometers- FFT Spectrum analyzer and its applications; Vibration monitoring technique.

Total Periods: 45

TEXT BOOKS:

1. G.K.Groover, S.P. Nigam, *Mechanical Vibrations*, Nemchand & Brother's, 8th Edition 2008
2. V.P.Singh, *Mechanical Vibrations*, Dhanpat Rai & Co. Pvt. Ltd., 4th Edition, 2014.
3. S.S.Rao, *Mechanical Vibrations*, Pearson Publication. 4th Edition, 2003.

REFERENCE BOOKS:

1. W.T. Thompson, *Theory of Vibration with Applications*, Prentice Hall, 5th Edition, 2008.
2. Sadhu Singh, *Mechanical vibrations and Noise control*, 13th Edition, Dhanpat Rai & Sons.
3. Meirovitch, *Elements of Vibration analysis*, McGraw Hill Education (India) Pvt. Ltd., 1st Edition 2013.

4. Timoshenko and Young, *Vibration Problems in Engineering*, Wolfe den Press

III B. Tech. - II Semester
(16BT60307) SUPPLY CHAIN MANAGEMENT

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Industrial Engineering and Management.

COURSE DESCRIPTION: Fundamentals of supply chain management; Supply Chain Decisions; Achieving Strategic fit; Drivers of Supply Chain; Inventory management in a supply chain; Supply chain integration; Distribution Resources Planning; Bullwhip Effect; Role of information technology in SCM; Designing and planning transportation networks through infrastructure and strategies; International and Contemporary issues in SCM; Demand and Supply planning; Mass customization; Global issues and Outsourcing problems; Supply Chain Operations Reference Model; Third party logistics; Retailer-Supplier Partnership; Metrics and Emerging trends in SCM.

COURSE OUTCOMES: On successful completion of this course, the student will be able to:

CO1. Demonstrate the knowledge on the supply chain management concepts including supplier relationships, and optimization approaches.
CO2. Analyze and identify the key drivers and enablers of SCM for a given firm.
CO3. Propose appropriate and customized strategies and policies for managing supply chain of the firm and implement the same.
CO4. Investigate the issues in managing supply chains and give appropriate solutions that cater the needs of a particular organization.
CO5. Use internet technologies to enhance productivity of the firm through better SCM practices.

DETAILED SYLLABUS:

UNIT – I: INTRODUCTION TO SCM (09 Periods)

Supply Chain - Definition, Objectives; Global optimization, Importance of Supply Chain Decisions, Decision Phases in a Supply Chain and Importance of supply chain, SCM and objectives of SCM, Competitive and Supply Chain Strategies, Achieving Strategic fit, Obstacles to achieve strategic fit, Supply Chan Drivers - Inventory, Information, Transportation and Facilities.

UNIT – II: INVENTORY MANAGEMENT IN SCM (09 Periods)

Economic lot size model, Effect of demand uncertainty, Risk pooling, centralized and decentralized system, Managing inventory in the supply chain, Distribution Channel Management, Distribution Resource Planning (DRP).

UNIT – III: VALUE OF INFORMATION (09 Periods)

Bullwhip effect, Information and supply chain technology, Supply chain integration- Push, Pull and push-pull system; Demand driven strategies, Role of Information Technology in SCM - Impact of internet on SCM; Decision support systems for SCM - Goals, Standardization and Infrastructure.

UNIT – IV: DESIGNING AND PLANNING TRANSPORTATION NETWORKS (09 Periods)

The role of transportation in a Supply chain, Modes of transportation and their performance characteristics, Transportation infrastructure and Policies, Design options for a transportation network, Trade-offs in transportation design, Tailored transportation.

UNIT – V: INTERNATIONAL & CONTEMPORARY ISSUES IN SCM (09 Periods)

Demand and Supply planning, Mass customization, Global issues and Outsourcing problems, aligning the Supply Chain with Business Strategy – Supply Chain Operations Reference (SCOR) Model, Third party logistics; Retailer-Supplier Partnership, Distributors integration, Supply Chain Management Metrics, Enterprise Resource Planning, Emerging trends in SCM. **Total Periods: 45**

TEXT BOOKS:

1. Sunil Chopra & Peter Meindl, *Supply Chain Management - Strategy*, Planning & Operation, Pearson Education, 6th Edition, 2016.
2. Janat Shah, *Supply Chain Management: Text and Cases*, Pearson Education, 1st Edition, 2009.

REFERENCE BOOKS:

1. Thomas E Vollman and Clay Whybark D, *Manufacturing Planning and Control for Supply Chain Management*, Tata McGraw Hill, 5th Edition, 2005.
2. Simchi – Levi Davi, Kaminsky Philip and Simchi-Levi Edith, *Designing and Managing the Supply Chain*, Tata McGraw Hill, 3rd Edition, 2008.

III B. Tech. – II Semester

(16BT6HS01) **BANKING AND INSURANCE**

(Common to CE, ME, CSE, IT & CSSE)
(Open Elective)

Int. Marks	**Ext. Marks**	**Total Marks**	**L**	**T**	**P**	**C**
30	70	100	3	1	-	3

PRE-REQUISITE: —

COURSE DESCRIPTION: Functions of Banking; Role & Functions of RBI; Bank-Customer Relationship; Deposit and Loan Services of Banks; Banking Procedures; Electronic Payment Mechanisms; Business Models; Concepts of Risk and Uncertainty; Fundamentals of Insurance; Principles of Insurance; Functions of Insurance; Insurance players in India.

COURSE OUTCOMES: On successful completion of this course, the student will be able to:

CO1. Demonstrate Knowledge in

- Tools and concepts of Banking and Insurance
- Basic Principles and concepts of Insurance and Banking
- E-fund transfers, e-payments and e-business models

CO2. Develop skills in providing solutions for

- Online banking and e – payments...
- Risk Management through insurance benefits the society at large.
- Money management by leveraging on technology, banking and insurance services.

CO3. Designing software and IT solutions based on banking and business models.

CO4. Provide life-long learning for effective utilization of Banking and Insurance facilities.

DETAILED SYLLABUS:

UNIT – I : INTRODUCTION TO BANKING **(09 Periods)**

Meaning and functions of banking, importance of banking, Reserve Bank of India- Functions.

UNIT – II: BANK-CUSTOMER RELATIONSHIP **(09 Periods)**

Debtor-creditor relationship, deposit products or services, payment and collection of cheques. Accounts – Types of accounts, procedure for opening and closing an account. Loans and Advances- Principles of lending, Types of loans.

UNIT – III: BUSINESS MODELS & ELECTRONIC PAYMENT SYSTEM **(09 Periods)**

Features, types of e-payment system, e-cash, NEFT, RTGS, Credit cards, Electronic Wallet and Debit cards. Business models- B2B, B2C, C2C, and B2G.

UNIT – IV: INTRODUCTION TO RISK AND INSURANCE **(09 Periods)**

Concept of risk, risk Vs uncertainty. Insurance definition, Insurance as risk mitigation mechanism, elements of insurance.

UNIT – V: INSURANCE OVERVIEW **(09 Periods)**

Principles of insurance, insurance types, LIC & GIC, insurance -functions, IRDA, Insurance Players in India.

Total Periods: 45

TEXT BOOKS:

1. A.V. Ranganadha Chary, R.R. Paul, *Banking and Financial system*, Kalyani Publisher, New Delhi, 2nd Edition.
2. P.K.Gupta, *Insurance and Risk Management*, Himalaya Publishing House, New Delhi.

REFERENCE BOOKS:

1. Diwan, Praq and Sunil Sharma, *Electronic Commerce- A Manager's Guide to E-Business*, Vanity Books International, Delhi, 2002.
2. Kalakota Ravi and Whinston Andrew B, *Frontiers of Electronic Commerce*, Pearson Education India, 1996 New Delhi.
3. Schneider, Grey P, *Electronic Commerce, Course Technology*, Cengage Learning, 8th Edition, New Delhi, 2008.

III B. Tech. – II Semester
(16BT6HS02) BUSINESS COMMUNICATION AND CAREER SKILLS

(Common to CE, ME, CSE, IT & CSSE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Nature and scope of communication;corporate communication; writihng business documents;careers and resumes; interviews.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge in
- Corporate Communication
- Main Stages of Writing Messages
- Career Building

CO2. Analyze the possibilities and limitations of language in
- Communication Networks
- Crisis Management/Communication

CO3. Design and develop the functional skills for professional practice in
- Business Presentations & Speeches

CO4. Apply written and oral communication techniques in preparing and presenting various documents in technical writing.

CO5. Function effectively as an individual and as a member in diverse teams.

CO6. Communicate effectively with the engineering community and society in formal and informal situations.

DETAILED SYLLABUS:

UNIT – I: NATURE AND SCOPE OF COMMUNICATION (09 Periods)

Introduction: Functions of Communication – Roles of a Manager – Communication Basics – Communication Networks – Informal Communication – Interpersonal Communication –Communication Barriers

UNIT – II: CORPORATE COMMUNICATION (09 Periods)

Introduction: What is Corporate Communication? – Corporate Citizenship and Social Responsibility – Corporate Communication Strategy – Crisis Management/Communication – Cross-Cultural Communication.

UNIT – III: WRITING BUSINESS DOCUMENTS (09 Periods)

Introduction: Importance of Written Business Communication, Types of Business Messages – Five Main Stages of Writing Business Messages – Business Letter Writing – Effective Business Correspondence – Common Components of Business Letters – Strategies for Writing the Body of a Letter

UNIT – IV: CAREERS AND RESUMES (09 Periods)

Introduction – Career Building – Business Presentations and Speeches – Resume Formats – Traditional, Electronic and Video Resumes – Sending Resumes – Follow-up Letters – Online Recruitment Process

UNIT – V: INTERVIEWS (09 Periods)

Introduction – Fundamental Principles of Interviewing – General Preparation for an Interview – Success in an Interview – Types of Interviewing Questions – Important Non-verbal Aspects – Types of Interviews – Styles of Interviewing

Total Periods: 45

TEXT BOOK:

1. Meenakshi Raman and Prakash, *Singh Business Communication*, Oxford University Press, New Delhi, Second Edition, 2012.

REFERENCE BOOKS:

1. Neera Jain and Sharma Mukherji, *Effective Business Communication*, Tata Mc Graw-Hill Education, Pvt. Ltd., New Delhi, 2012.
2. Courtland L.Bovee et al., *Business Communication Today*, Pearson, New Delhi, 2011.
3. Krizan, *Effective Business Communication*, Cengage Learning, New Delhi, 2010.
4. R.K. Madhukar, *Business Communication*, Vikas Publishing House Pvt. Ltd., New Delhi, 2005.

III B. Tech. – II Semester

(16BT6HS03) COST ACCOUNTING AND FINANCIAL MANAGEMENT

(Common to CE, ME, CSE, IT & CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —

COURSE DESCRIPTION: Scope, Objectives and Elements of cost Accounting; Cost Sheet and Tender quotations; Variance Analysis: Material variances, Labor variances; Meaning and Scope, Liquidity, Profitability Ratios: concept of Risk and Return on Investment.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Acquire Knowledge in
- Elements of Costing.
- Basic concepts of Financial Management.
- Risk and Return
- Cost Accountancy
- Capital Budgeting

CO2. Develop skills in
- Material, Labor, Overheads control.
- Cost Control

CO3. Develop effective Communication in Cost Accountancy and Financial Management.

CO4. Design solutions for effective investment decisions.

DETAILED SYLLABUS:

UNIT - I : INTRODUCTION TO COST & COST ACCOUNTING (09 Periods)

Cost and Cost Accounting, Scope, Objectives, Advantages and disadvantages – Cost Accounting Vs Management Accounting – Elements of Costing – Installation of costing system – Material Control, Labour Control, Overhead Control.

UNIT - II: COST SHEET & PREPARATION OF COST SHEET (09 Periods)

Analysis of Cost – Preparation of cost sheet, estimate, tender and quotation (Simple problems) – Importance of Costing while pricing the products.

UNIT - III: STANDARD COSTING & VARIANCE ANALYSIS (09 Periods)

Introduction to Standard Costing & Variances – Variance Analysis: Material variances, Labour variances (Simple Problems).

UNIT - IV : INTRODUCTION TO FINANCIAL MANAGEMENT & RATIO ANALYSIS (09 Periods)

Financial Management-Meaning and Scope, Liquidity, Profitability, Financial Statement Analysis through ratios (Simple Problems).

UNIT - V: INTRODUCTION TO INVESTMENT (09 Periods)

Investment-Meaning and Definition- concept of risk and returns-Investment Alternatives- Capital Budgeting techniques – Security Analysis and Portfolio Management (Basic concepts).

Total Periods: 45

TEXT BOOKS:

1. S.P. Jain and K.L. Narang, *Cost Accounting*, Kalyani Publishers, Ludhiana, 6th Edition, 2002.
2. I.M. Pandey, *Financial Management*, Vikas Publishing House Pvt. Ltd., 10th Edition, 2010, ISBN-13 9788125937142.

REFERENCE BOOKS:

1. The Institute of Company Secretaries of India, *Cost and Management Study Material*, New Delhi.
2. James C Van Horne, *Financial Management and Policy*, Prentice-Hall of India/Pearson, 12th Edition, 2001 ISBN-10: 0130326577.

III B. Tech. – II Semester
(16BT6HS04) ENTREPRENEURSHIP FOR MICRO, SMALL AND MEDIUM ENTERPRISES

(Common to CE, ME, CSE, IT & CSSE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —

COURSE DESCRIPTION: Introduction to Entrepreneur Development; Idea generation and formation of Business Plan; Micro and Small Enterprises; Institutional Finance and Support to Entrepreneur; Woman Entrepreneurship.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Acquire Knowledge in
- Basic Principles and concepts of entrepreneurship.
- Significance of entrepreneurship.
- Schemes and institutions encouraging entrepreneurship.

CO2. Develop skills in providing solutions for
- To start dynamic entrepreneurial ventures and manage them.
- Women entrepreneurship serving as contrivance in societal development

CO3. Develop Critical thinking and evaluation ability.
CO4. Inculcates business acumen and attitude towards trouble shooting
CO5. Design solutions for new start-ups

DETAILED SYLLABUS:

UNIT – I : INTRODUCTION TO ENTREPRENEURSHIP DEVELOPMENT (09 Periods)
Concept of Entrepreneurship – Growth of Entrepreneurship in India - Factors affecting entrepreneurship growth - Characteristics of an Entrepreneur – Functions of Entrepreneur – Need for an Entrepreneur – Entrepreneurial Decision Process – Types of Entrepreneurs – Distinction between an Entrepreneur and a manager.

UNIT – II : IDEA GENERATION AND FORMULATION OF BUSINESS PLANS (09 Periods)
Sources of Ideas – Methods of idea generation – Steps in Setting up of a Small Business Enterprise – Formulation of Business Plan – Contents of Business Plan – Significance – Common Errors in Business Plan Formulation – The role of incubation centers for promoting entrepreneurship and start-ups.

UNIT – III : MICRO AND SMALL ENTERPRISES (09 Periods)
Meaning and Definition – Micro and Macro units – Essentials – Features – Characteristics – Scope of Micro and Small Enterprises – Objectives of Micro Enterprises – relationship between Micro and Macro Enterprises - Problems of Micro and Small Enterprises

UNIT – IV : INSTITUTIONAL FINANCE (09 Periods)
Institutional Finance – Need-Scope-Services - Various Institutions offering Institutional support: – Small Industries Development of Bank of India (SIDBI), State Industrial Development Corporations (SIDCs)– Small Industries Development Organisation (SIDO) – Small Industries Service Institutes (SISIs) – SFCs - National Institute of Entrepreneurship and Small Business Development (NIESBUD) – Micro Units Development and Refinance Agency Bank (MUDRA).

UNIT –V : WOMEN & RURAL ENTREPRENEURSHIP (09 Periods)
Concept of Women entrepreneur - Functions of Women entrepreneurs - Growth of women entrepreneurship in India - Challenges of Women entrepreneurs- Programmes supporting women entrepreneurship – Rural Entrepreneurship – Meaning, Need for Rural entrepreneurship, Problems of rural entrepreneurship, Role of NGOs, Role of Bharatiya Mahila Bank for encouraging Women Entrepreneurs – Micro Finance & Self Help Groups (Basic Concepts).

TEXT BOOKS:
1. Dr.S.S.Khanka, *Entrepreneurial Development*, S. Chand and Company Ltd, Revised Edition, 2012.
2. Madhurima Lall & Shikha Sahai, *Entrepreneurship*, Excel Books India, 2nd Edition 2008.

REFERENCE BOOKS:
1. Nandan, H., *Fundamentals of Entrepreneurship*, PHI Learning Pvt. Ltd., 2013, New Delhi, 3rd edition 2013.
2. Vasanth Desai, *The Dynamics of Entrepreneurial Development and Management*, Himalaya Publishing House, 4th edition 2009.
3. Bholanath Dutta, *Entrepreneurship Management – Text and Cases*, Excel Books, 1st edition 2009.

III B. Tech. – II Semester
(16BT6HS05) FRENCH LANGUAGE
(La Langue Francais)
(Common to CE, ME, CSE, IT & CSSE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Oral communications; Basic grmmar; advancedgrammar;basic writing; Business French (La Francais Commercial)

COURSE OUTCOMES: On successful completion of this course, students will be able to

CO1. Demonstrate knowledge in
a) Process of communication
b) Modes of listening
c) Paralinguistic features
d) Skimming and Scanning
e) Elements of style in writing

CO2. Analyze the possibilities and limitations of language, understanding
a) Barriers to Communication
b) Barriers to Effective Listening
c) Barriers to Speaking
d) Formal and metaphorical language

CO3. Design and develop language skills for professional practice**.**

CO4. Apply basic writing skills in writing Emails and understanding wide range of technical terminologies.

CO5. Understand French culture and civilization.

CO6. Communicate effectively with the native French in day to day situation**.**

DETAILED SYLLABUS:

UNIT I –ORAL COMMUNICATION (09 Periods)

Introduction - Language as a Tool of Communication, French alphabets, Phonetics and pronunciation, making contacts, giving information, Arranging things, Expression of feelings.

UNIT II –BASIC GRAMMAR (09 Periods)

Introduction –Articles, -Er ending Verbs, Nouns, Numbers, Gender, Pronouns, Sentence structure – Case study.

UNIT III –ADVANCED GRAMMAR (09 Periods)

Introduction -Adjectives, Prepositions, Introduction to tenses – Present tense, past tense and future tense, Active and Passive voice.

UNIT IV –BASIC WRITING (09 Periods)

Introduction -Introduction to written communication, Pre-writing, Creating context for writing and Data collection, fill in forms, Write greeting cards, Invitations and Short personal announcements, Short text to describe photos and pictures.

UNIT V –BUSINESS FRENCH (La Francais Commercial) (09 Periods)

Introduction - E-mail writing, Letter writing, Learning technical vocabulary and its application.

Case study of influential French companies, Learning computer/desktop/new age- media vocabulary, Introduction to how to present a topic, Fixing an Appointment

Total Periods: 45

TEXT BOOK:

1. Annie Berther, *Alter Ego* , Hachette Publications, 2012

REFERENCE BOOKS:

1. RegineMerieux, *Yves Loiseau*, Connexions, Goyall Publishers, 2011
2. Delphine Ripaud, *Saison*, French and Euroean Inc., 2015

III B. Tech. – II Semester

(16BT6HS06) **GERMAN LANGUAGE**

(Deutsch alsFremdsprache)

(Common to CE, ME, CSE, IT & CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:—

COURSE DESCRIPTION: Oral communication;Basic grammar; Advanced grammar; Basic writing; Berufsdeutcsch (Business German)

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge in

- Process of communication
- Modes of listening
- Paralinguistic features
- Skimming and Scanning
- Elements of style in writing

CO2. Analyze the possibilities and limitations of language, understanding

- Barriers to Communication
- Barriers to Effective Listening
- Barriers to Speaking
- Formal and metaphorical language

CO3. Design and develop language skills for professional practice**.**

CO4. Apply basic writing skills in writing Emails and understanding wide range of technical terminologies.

CO5. UnderstandGerman culture and civilization.

CO6. Communicate effectively with the native German in day to day situation**.**

DETAILED SYLLABUS:

UNIT I –ORAL COMMUNICATION: **(09 Periods)**

Introduction - Language as a Tool of Communication, German alphabets, Phonetics and pronunciation, making contacts, giving information, Arranging things, Expression of feelings.

UNIT II –BASIC GRAMMAR: **(09 Periods)**

Introduction –Articles, Verbs, Nouns, Numbers, Gender, Pronouns, Sentence structure – Case study.

UNIT III –ADVANCED GRAMMAR: **(09 Periods)**

Introduction -Adjectives, Prepositions, Introduction to tenses – Present tense, past tense and future tense, Active and Passive voice, Introduction to Case- Akkusativ, Nominativ, Dativ&Genetiv Case.

UNIT IV –BASIC WRITING: **(09 Periods)**

Introduction -Introduction to written communication, Pre-writing, Creating context for writing and Data collection, fill in forms, Write greeting cards, Invitations and Short personal announcements, Short text to describe photos and pictures.

UNIT V –BERUFSDEUTCSCH (BUSINESS GERMAN): **(09 Periods)**

Introduction - E-mail writing, Letter writing, Learning technical vocabulary and its application.
Case studies of influential German companies, Learning computer/desktop/new age- media vocabulary, Introduction to how to present a topic, Fixing an Appointment. **Total Periods: 45**

TEXT BOOK:

1. Heuber,*Tangram Aktuelleins*, HeuberVerlagPublications , 2011.

REFERENCE BOOKS:

1. Anta Kursisa, Gerhard Newner,Sara vicenta, *Fir fuer Deutsch 1 und Deutsch 2*, HeuberVerlag Publications, 2005
2. Herman Funk, *Studio D A1*, Cornelsen GOYAL SAAB Publication, 2011.

III B. Tech. – II Semester
(16BT6HS07) INDIAN CONSTITUTION
(Common to CE, ME, CSE, IT & CSSE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Elements, functions and functionaries according to Indian Constitution, understanding for better professional practice and good citizenry

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Gain knowledge in
- parliamentary proceedings, laws, legislature, administration and its philosophy
- federal system and judiciary of India
- socials problems and public services like central civil services and state civil services
- Indian and international political aspects and dynamics

CO2. Develop etiquette and professional behavior in line with the constitution of India for becoming a responsible citizen

DETAILED SYLLABUS:

UNIT - I : PREAMBLE AND ITS PHILOSOPHY (08 Periods)
Introduction and Evolution of Indian Constitution, preamble and its Philosophy.

UNIT - II : UNION GOVERNMENT (08 Periods)
Powers, Functions and Position of President, Vice-President and Council of Ministers, Composition of parliament, Constitution Amendment Procedure, Financial Legislation in Parliament.

UNIT - III : FEDERAL SYSTEM (14 periods)
Centre-State relations, Directive Principles of State Policy, Fundamental Rights and Duties, Centre-State Relations, Features of Federal System, Administrative Relationship between Union and States, Powers, Functions and Position of Governors, Function of Chief Ministers, Council of Ministers, Composition and powers of the State Legislature.

UNIT - IV : JUDICIARY AND PUBLIC SERVICES (10 Periods)
The Union Judiciary - Supreme Court and High Court, All India Services, Central Civil Services, State Services, Local Services and Training of Civil Services.

UNIT - V : INTERNATIONAL POLITICS (05 periods)
Foreign Policy of India, International Institutions like UNO, WTO, SAARC and Environmentalism.

Total periods : 45

TEXT BOOK:

1. Briji Kishore Sharma, *Introduction to the Constitution of India*, Prentice Hall of India, 2005.

REFERENCE BOOKS:

1. Mahendra Pal Singh,V. N. Shukla’s, *Constitution of India*, Eastern Book Company, 2011.
2. Pandey J. N., *Constitutional Law of India* - Central Law Agency, 1998

III B. Tech. – II Semester

(16BT6HS08) **INDIAN ECONOMY**

(Common to CE, ME, CSE, IT & CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Introduction; Time Value of Money; Elementary Economic Analysis; Value Analysis; Value Engineering; Economic Planning.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Acquire the knowledge in
- Micro and Macro Economics.
- Traditional and Modern methods of Capital Budgeting.
- Five year plans and NITI Aayog.

CO2. Analyze
- Capital Budgeting.
- Value Analysis and Value Engineering.
- Economic analysis
- Law of supply and demand

CO3. Understand the nuances of project management and finance

DETAILED SYLLABUS:

UNIT – I: INTRODUCTION (09 Periods)

Economics- Flow in an Economy, Law of Supply and Demand; Micro and Macro Economics; Relationship between Science, Engineering, Technology, and Economic Development;Concept of Engineering Economics-Types of Efficiency, Definition and Scope of Engineering Economics.

UNIT – II: TIME VALUE OF MONEY (12 Periods)

Concepts and Application; Capital Budgeting-Traditional and Modern Methods; Simple and Compound Interest, Cash Flow Diagram, Principle of Economic Equivalence; Evaluation of Engineering Projects – Present Worth Method, Future Worth Method, Annual Worth Method, Internal Rate of Return Method, Cost-benefit Analysis in Public Projects; Depreciation Policy-Depreciation of Capital Assets, Causes of Depreciation, Straight Line Method and Declining Balance Method.

UNIT – III: ELEMENTARY ECONOMIC ANALYSIS (09 Periods)

Economic Analysis – Meaning, Significance, Simple Economic Analysis; Material Selection for a Product, Substitution of Raw Material; Design Selection for a Product;Material Selection-Process Planning, Process Modification.

UNIT - IV: VALUE ENGINEERING (06 Periods)

Introduction- Value Analysis, Value Engineering,Functions, Aims; Value Analysis vs. Value Engineering; Value Engineering Procedure- Advantages, Application Areas.

UNIT - V: ECONOMIC PLANNING (09 Periods)

Introduction- Need For Planningin India,Five year plans(1951-2012), NITI Aayog(from 2014 onwards); Inclusive Growth-Meaning, Significance, Need for inclusive growth in India, Strategy for more inclusive growth, Challenges and Prospects; Employment and Inclusive Growth in India, Role of engineers in sustaining inclusive growth.

Total Periods: 45

TEXT BOOKS:
1. Panneerselvam R., *Engineering Economics*, PHI Learning Private Limited, Delhi , 2/e,2013.
2. Jain T.R., V. K.Ohri, O. P. Khanna, *Economics for Engineers*, VK Publication, 1/e, 2015.

REFERENCE BOOKS:
1. DuttRudar & Sundhram K. P. M, *Indian Economy*,S. Chand, New Delhi, 62 revised edition, 2010.
2. Misra, S.K. & V. K. Puri, *Indian Economy: Its Development Experience*, Himalaya Publishing House, Mumbai 32/e, 2010.

III B. Tech. – II Semester

(16BT6HS09)**INDIAN HERITAGE AND CULTURE**

(Common to CE, ME, CSE, IT & CSSE)

(Open Elective)

Int. Marks	**Ext. Marks**	**Total Marks**	**L**	**T**	**P**	**C**
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Basic traits of Indian Culture; Humanistic Reforms under Jainism and Buddhism; Culture in the medieval period; Socio Religious reforms in Indian Culture; Reform movements for harmonious relations.

COURSE OUTCOMES: On successful completion of this course, students will be able to

CO1. Acquaint knowledge in
- human aspirations and values in Vedic culture.
- cultural aspects of Buddhism and Jainism
- unification of our country under Mourya's and Gupta's administrations
- socio Religious aspects of Indian culture
- reform movements and harmonious relations.

CO2. Apply ethical principles and reforms as models for the upliftment of the societal status in the present cultural contexts

DETAILED SYLLABUS:

UNIT - I: BASIC TRAITS OF INDIAN CULTURE (09 Periods)

Meaning and definition and various interpretations of culture . Culture and its features. The Vedic and Upanishadic culture and society. Human aspirations and values in these societies. Chaturvidha purushardhas, Chaturashrma and Chaturvarna theory.

UNIT II: HUMANISTIC REFORMS UNDER JAINISM AND BUDDHISM (09 Periods)

Salient features of Jainism - contributions of Jainism to Indian culture. Contributions of Aachaarya and Mahaapragya. Buddhism as a humanistic culture. The four noble truths of Buddhism. Contributions of Buddhism to Indian culture.

UNIT - III: CULTURE IN THE MEDIEVAL PERIOD (09 Periods)

Unifications of India under Mouryas and Guptas and their cultural achievements. Cultural conditions under satavahanas. Contributions to pallavas and cholas to art and cultural achievements of vijayanagara rulers.

UNIT - IV : SOCIO RELIGIOUS REFORMS IN INDIAN CULTURE (09 Periods)

Western impact on India, Introductin of western education, social and cultural awakening and social reform movements of Rajaramohan Roy - Dayanandha Saraswathi- Anne Besant. (theosophical society)

UNIT - V : REFORM MOVEMENTS FOR HARMONIOUS RELATIONS (09 Periods)

Vivekananda, Eswarchandra vidyasagar and Veeresalingam- emancipation of women and struggle against caste. Rise of Indian nationalism. Mahatma Gandhi- Non violence and satyagraha and eradication of untouchability

Total Periods: 45

TEXT BOOK:

1. Valluru Prabhakaraiah, *Indian Heritage and Culture*, Neelkamal Publications Pvt. Ltd. Delhi, 1/e , reprint 2015.

REFERENCE BOOKS:

1. L. P. Sharma, *History of Ancient India*, Konark Publishers, Pvt. Ltd. New Delhi, 2010.
2. L. P. Sharma, *History of Medieval India*, Konark Publishers, Pvt. Ltd. New Delhi, 2010.
3. L. P. Sharma, *History of Modern India*, Konark Publishers, Pvt. Ltd. New Delhi, 2010.

4. *The Cultural Heritage of India* Vol-I, II, III, IV, V, The Ramakrishna Mission Institute of Culture, Calcutta.

III B. Tech. – II Semester

(16BT6HS10) **INDIAN HISTORY**

(Common to CE, ME, CSE, IT & CSSE)

(Open Elective)

Int. Marks	**Ext. Marks**	**Total Marks**	**L**	**T**	**P**	**C**
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Introduction; Ancient India; Classical and Medieval era; Modern India; India after independence.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Gain knowledge on evolution and history of India as a nation

CO2. Analyze social and political situations of past and current periods

CO3. Practice in career or at other social institutions morally and ethically

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION (08 Periods)

Elements of Indian History; History Sources: Archaeology, Numismatics, Epigraphy & Archival research; Methods used in History; History & historiography; sociological concepts-structure, system, organization, social institutions, Culture and social stratification (caste, class, gender, power), State& Civil Society.

UNIT - II : ANCIENT INDIA (09 Periods)

Mohenjo-Daro civilization; Harappa civilization; Mauryan Empire.

UNIT - III: CLASSICAL & MEDIEVAL ERA (12 periods)

Classic Era (200 BC - 1200 AD); Hindu - Islamic Era (1200 - 1800 AD).

UNIT - IV: MODERN INDIA (06 periods)

Age of Colonialism (17th - 19th centuries); First war of Indian Independence; Freedom Struggle (1857-1947).

UNIT - V: INDIA AFTER INDEPENDENCE (1947 -) (10 Periods)

The Evolution of the Constitution and Main Provisions; Consolidation of India as a Nation; Politics in the States; Indian economy; Modernization and globalization, Secularism and communalism, Nature of development, Processes of social exclusion and inclusion, Changing Nature of work and organization.

Total periods : 45

TEXT BOOK:

1. K. Krishna Reddy, *Indian History*, Tata McGraw-Hill, 21st reprint,2017

REFERENCE BOOK:

1. Guha, Ramachandra, *India after Gandhi*, Pan Macmillan,2007 Thapar, Romila, *Early India*, Penguin, 2002

III B. Tech. – II Semester
(16BT6HS11) PERSONALITY DEVELOPMENT
(Common to CE, ME, CSE, IT & CSSE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: –

COURSE DESCRIPTION: Self-esteem & Self-Management; Developing Positive Attitudes; Self-Motivation & Self-Management; Getting Along with the Supervisor; Workplace Success.

COURSE OUTCOMES: On successful completion of this course, students will be able to

CO1. Demonstrate knowledge in
- Self-Management
- Planning Career

CO2. Analyze the situations based on
- Attitudes
- Thinking strategies

CO3. Design and develop the functional skills for professional practice in

CO4. Function effectively as an individual and as a member in diverse teams.

CO5. Communicate effectively in public speaking in formal and informal situations.

DETAILED SYLLABUS:

UNIT – I: SELF-ESTEEM & SELF-IMPROVEMENT (09 Periods)

Know Yourself – Accept Yourself; Self-Improvement: Plan to Improve - Actively Working to Improve Yourself.

Case study: 1

UNIT – II: DEVELOPING POSITIVE ATTITUDES (09 Periods)

How Attitudes Develop – Attitudes are Catching – Improve Your Attitudes.

Case study: 2

UNIT – III: SELF-MOTIVATION & SELF-MANAGEMENT (09 Periods)

Show Initiative – Be Responsible Self-Management; Efficient Work Habits – Stress Management – Employers Want People Who can Think – Thinking Strategies.

Case study: 3

UNIT – IV: GETTING ALONG WITH THE SUPERVISOR (09 Periods)

Know your Supervisor – Communicating with Your Supervisor – Special Communications With Your Supervisor – What Should You Expect of Your Supervisor? – What Your Supervisor Expects of You - Moving Ahead Getting Along with Your Supervisor.

Case study: 4

UNIT - V: WORKPLACE SUCCESS (09 Periods)

First Day on the Job – Keeping Your Job – Planning Your Career – Moving ahead.

Case study: 5 **Total Periods: 45**

TEXT BOOK:
1. Harold R. Wallace and L. Ann Masters, *Personality Development*, Cengage Learning, Delhi, Sixth Indian Reprint 2011.

REFERENCE BOOKS:

1. Barun K. Mitra, *Personality Development and Soft Skills*, Oxford University Press, New Delhi, 2011.
2. Stephen R. Covey, *The 7 Habits of Highly Effective People*, Free Press, New York, 1989
3. K. Alex, *Soft Skills*, S. Chand & Company Ltd, New Delhi, Second Revised Edition 2011.

4. Stephen P. Robbins and Timothy A. Judge, *Organizational Behaviour*, Prentice Hall, Delhi, 16th Edition 2014.

III B. Tech. – II Semester

(16BT6HS12) PHILOSOPHY OF EDUCATION

(Common to CE, ME, CSE, IT & CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Introduction to Philosophy and Engineering Education; Philosophical methods and their implications in engineering; Philosophical education in India; Values and Engineering education; Outcome based education.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Acquire knowledge in
- Philosophy of Engineering education.
- Philosophical Methods.
- Knowledge acquiring methods.
- Engineering education and responsibilities.

CO2. Understand the impact of Outcome Based Education for effective educational outcomes.

CO3. Apply reasoning to assess societal issues with the contextual knowledge of engineering education and responsibilities.

DETAILED SYLLABUS :

UNIT - I: INTRODUCTION TOPHILOSOPHY AND ENGINNERING EDUCATION (09 Periods)

Concept , Significance, and Scope of Philosophy in Engineering – Aims of Engineering Education – relationship between philosophy and engineering education – speculative, normative and critical approaches of philosophy in engineering.

UNIT - II: PHILOSOPHICAL METHODS AND THEIR IMPLICATIONS IN ENGINEERING (09 Periods)

Introduction to Philosophical approaches: Idealism, Naturalism, Pragmatism, Realism and Existentialism; Significance and Scope in Engineering Education.

UNIT - III: PHILOSOPHICAL EDUCATION IN INDIA (09 Periods)

Different branches of philosophy- meaning, Epistemology: nature and scope; Knowledge acquiring methods; Kinds and instruments of knowledge; Re-shapingof educational thoughts by Indian thinkers: Rabindranath Tagore, Sri Aurobindo Gosh, Mahatma Gandhi,Jiddu Krishnamurthy and Swamy Vivekananda.

UNIT - IV: VALUES AND ENGINEERING EDUCATION (09 Periods)

Introduction; Engineering educationand responsibilities: health,social, moral, ethics aesthetic;Value: crisis and strategies forinculcation;

Case study: Engineering Solutions given by Mokshagundam Visvesvaraya

UNIT - V: OUTCOME - BASED EDUCATION (09 Periods)

Institutional visioning ;educational objectives ; programme outcomes , curriculum, stakeholders, infrastructure and learning resources ; governance and management, quality in education.

Total periods: 45

TEXT BOOKS:

1. Ganta Ramesh, *Philosophical Foundations of Education*, Neelkamal Publications, 1/e,2013
2. CarlMicham,*Thinking through technology*(The Paths between Engineering and Philosophy).University of Chicago Press, 1/e,1994.
3. Louis L Bucciarelli, *Engineering Philosophy*,Delft University Press,1/e, 2003.
4. NBA/ABET Manuals.

REFERENCE BOOKS :

1. Louis L Bucciarelli, *Philosophy of Technology and Engineering Sciences*, North Holland, 1/e, 2009(e-book).
2. Samuel Florman, *Existential pleasures of education,* Martins's Griffin S.T. publication, 1/e 1992.

III B. Tech. – II Semester

(16BT6HS13) **PUBLIC ADMINISTRATION**

(Common to CE, ME, CSE, IT & CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Introduction; Public Policy; Good Governance; E-Governance; Development Administration.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Acquireknowledge in
- Public Policy.
- Good Governance.
- E-governance.
- Development Administration.

CO2. Analyze the possibilities and limitations ofexisting policies through Good Governance perspective.

CO3. Design and develop solutions in e-governance modelsto find and provide opportunities in e-governance.

CO4. Adopt principles ofe-governance in addressing the existing issues and challenges in e-governance sector.

CO5. Understand the significance of Administrative Development in finding professional engineering solutions by probing Bureaucracy. Role of civil society.

DETAILED SYLLABUS:

UNIT – I: INTRODUCTION (09 Periods)

Public and Private Administration- Differences and Similarities, Meaning, Scope; Importance of Public Administration in Modern Era; Public Administration and its implications in the field of Engineering.

Case Study: Unique Identification Authority of India (UIDAI):Aadhaar Project: Challenges Ahead

UNIT – II: PUBLIC POLICY (09 Periods)

Meaning and Scope; Policy Formulation in India; Policy making process; Policy Implementation Engineering and Public Policy**,**Social, ethical, Monetary and fiscal policies; policy implications of engineering;The engineer's role in Public Policy.

Case Study:NITI Aayog: Demonetization and Aftermath of Demonetization – Cashless transactions.

UNIT – III: GOOD GOVERNANCE (09 Periods)

Significance; Objectives;Concepts;Reforms;Organization and its basic problems Administrative and Governance reforms in India; Sustainable and Inclusive growth in India;Engineering and Sustainable Environment-Role of Engineers; Right to information Act

Case Study: Strategies in Good Governance: A Case Study of Karnataka, Kerala and Orissa.

UNIT – IV: E-GOVERNANCE (09 Periods)

Meaning, Significance, Issues in E-governance; E-governance Models, Problems and Opportunities; Application of DataWarehousing and Data Mining in Governance; Engineers role in re-engineering E-governance.

Case Study: e-Housing System for Bhavana Nirman Dhanasahayam Online disbursement of housing assistance in Kerala.

UNIT-V: DEVELOPMENT ADMINISTRATION (09 Periods)

Introduction; Development Administration-Administrative Development- Sustainable Development - Significance- Objectives; Bureaucracy - Personnel administration and human resources development; Role of civil society-Citizens and administration;Development and Engineering: Issues Challenges and Opportunities.

Case Study: Neeru-Chettu (Water-Tree) of Andhra Pradesh.

Case Study: TPDDL of Delhi and Odisha. **Total Periods: 45**

TEXT BOOKS:

1. M.P. Sharma, B.L. Sadana, HarpreetKaur, *Public Administration in Theory and Practice*, KitabMahal, Mumbai, 1/e,2014.
2. CSR Prabhu, *E. Governance – concepts and case studies*, PHI, New Delhi,2/e 2012.

REFERENCE BOOKS:

1. SurendraMunshi, Bijupaul Abraham, *Good Governance, Democratic societies and Globalization*, Sage publications, New Delhi,1/e ,2004.
2. R.K.Sapru, *Public Policy*,Sterling Publishers Pvt Ltd., New Delhi, 1/e, 2001.

III B. Tech. – II Semester
(16BT60112) BUILDING MAINTENANCE AND REPAIR
(Common to CE, ME, CSE, IT & CSSE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: –
COURSE DESCRIPTION: Durability of buildings, Failure and repair of buildings, MaterialTechniques for repair, Maintenance of buildings, Conservation and recycling.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Acquire basic knowledge on durability and serviceability, failures, repair and rehabilitation of buildings.
CO2. Analyze failures, repair and rehabilitation techniques.
CO3. Solve complex building maintenance problems through proper investigations and interpretation.
CO4. Use modern tools and techniques for various repairs and rehabilitation of structures.
CO5. Provide solutions for building maintenance and repair problems considering health and safety.
CO6. Consider environmental sustainability in building maintenance and repair.
CO7. Maintain ethical standards for quality in repairs and rehabilitation of structures.
CO8. Evaluate specifications and perform cost analysis of building components while repair and rehabilitation.

DETAILED SYLLABUS:
UNIT – I: DURABILITY AND SERVICEABILITY OF BUILDINGS (10 Periods)
Life expectancy of different types of buildings; Effect of environmental elements such as heat, dampness, frost and precipitation on buildings; Effect of chemical agents on building materials, Effect of pollution on buildings, Effect of fire on building; Damage by biological agents like plants, trees, algae, fungus, moss, insects, etc.; Preventive measures on various aspects, Inspection, Assessment procedure for evaluating for damaged structures, Causes of deterioration, Testing techniques.
UNIT – II: FAILURE AND REPAIR OF BUILDINGS (10 Periods)
Building failure – Types, Methodology for investigation; Diagnostic testing methods and equipment, Repair of cracks in concrete and masonry, Materials for Repair, Methods of repair, Repair and strengthening of concrete buildings, Foundation repair and strengthening, Underpinning, Leakage of roofs and repair methods.
UNIT – III: TECHNIQUES FOR REPAIR (08 Periods)
Rust eliminators and polymers coating for rebars during repair, Foamed concrete, Mortar and dry pack, Vacuum concrete, Gunite and shotcrete, Epoxy injection, Mortar repairs for cracks, Shoring and underpinning.
UNIT – IV: MAINTENANCE OF BUILDINGS (09 Periods)
Reliability principles and its applications in selection of systems for building, Routine maintenance of building, Maintenance cost, Specifications for maintenance works, Dampness - Damp proof courses, Construction details for prevention of dampness; Termite proofing, Fire protection, Corrosion protection.
UNIT – V: CONSERVATION AND RECYCLING (08 Periods)
Performance of construction materials and components in service, Rehabilitation of constructed facilities, Conservation movement, Materials and methods for conservation work, Recycling of old buildings and its advantages, Examples.

Total Periods: 45

TEXT BOOKS:
1. Dennison Campbell, Allen and Harold Roper, *Concrete Structures – Materials, Maintenance and Repair*, Longman Scientific and Technical, UK, 1991.
2. Allen, R. T. L., Edwards, S. C. and J. D. N. Shaw, *The Repair of Concrete Structures*, Blackie Academic & Professional, UK, 1993.

REFERENCE BOOKS:
1. Peter H. Emmons, *Concrete Repair and Maintenance*, John Wiley and Sons Publications, 2002.
2. *Building Construction under Seismic Conditions in the Balkan Region*, UNDP/UNIDO Project Rer/79/015, Volume 5, Repair and Strengthening of Reinforced Concrete, Stone and Brick Masonry Buildings, United Nations Industrial Development Organisation, Vienna.
3. Shetty, M. S., *Concrete Technology*, S. Chand and Company.
4. Smith, P. and Julian, W., *Building Services*, Applied Science Publications, London, 1976.
5. SP: 25, BIS; Causes and Prevention of Cracks in Buildings.
6. Champion, S., *Failure and Repair of Concrete Structures*, John Wiley and Sons Publications, 1961.
Perkins, P. H., Repair, *Protection and Water Proofing of Concrete Structures*, E& FN Spon, UK,

3rd Edition, 1997.

III B.Tech. – II Semester

(16BT60113) CONTRACT LAWS AND REGULATIONS

(Common to CE, ME, CSE, IT & CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Construction contracts; Tenders; Arbitration; Legal requirements; Labour regulations.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate basic Knowledge on construction contracts, tenders, arbitration, legal requirements and labour regulations.

CO2. Analyze contracts and tenders.

CO3. Address the legal issues in contracts and tenders.

CO4. Follow laws and regulations in the preparation of contracts and tenders.

CO5. Prepare contract and tender documents as per the standards.

CO6. Consider project schedule, cost, quality and risk in the preparation of contracts and tenders.

DETAILED SYLLABUS:

UNIT – I: CONSTRUCTION CONTRACTS (09 Periods)

Indian contracts act, Elements of contracts, Types of contracts, Features, Suitability, Design of contract documents, International contract document and laws, Standard contract document, Law of torts.

UNIT – II: TENDERS (09 Periods)

Prequalification, Bidding, Accepting; Evaluation of tender from technical, contractual and financial points of view; Two cover system, Preparation of the documentation, Contract formation and interpretation, Potential contractual problems, Price variation clause, Comparison of actions and laws, Subject matter, Violations.

UNIT–III: ARBITRATION (09 Periods)

Arbitration, Comparison of actions and laws, Agreements, Appointment of arbitrators, Conditions of arbitration, Powers and duties of arbitrator, Rules of evidence, Enforcement of award, Arbitration disputes, Dispute review board.

UNIT – IV: LEGAL REQUIREMENTS (09 Periods)

Legal requirements for planning, Property law, Agency law, Tax laws – Income tax, Sales tax, Excise and custom duties, Local government approval, Statutory regulations, Insurance and bonding, Laws governing purchase and sale, Use of urban and rural land, Land revenue codes, EMD, Security deposits, Liquidated damages.

UNIT – V: LABOUR REGULATIONS (09 Periods)

Social security, Welfare legislation; Laws relating to wages, bonus and industrial disputes; Labour administration, Insurance and safety regulations, Workmen's compensation act, Maternity benefit act, Child labour act, Other labour laws. **Total Periods: 45**

TEXT BOOKS:

1. Subba Rao, G. C. V., *Law of Contracts I & II, S. Gogia & Co*., 11th Edition, 2011.
2. Jimmie Hinze, *Construction Contracts*, McGraw Hill, 3nd Edition, 2011.

REFERENCE BOOKS:

1. Kishore Gajaria, GT Gajaria's, *Law Relating to Building and Engineering Contracts in India*, Lexis Nexis Butterworths India, 4th Edition, 2000.
2. Patil, B. S., *Civil Engineering Contracts and Estimates*, University Press (India) Private Ltd., 4th Edition, 2015.

3. Joseph T. Bockrath, *Contracts and the Legal Environment for Engineers and Architects*, McGraw Hill Education, 7th Edition, 2010.

Akhileshwar Pathak, *Contract Law*, Oxford University Press, 2011.

III B.Tech. - II Semester

(16BT60114) DISASTER MITIGATION AND MANAGEMENT

(Common to CE, ME, CSE, IT & CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Disasters; Earthquakes; Floods; Cyclones; Droughts; Landslides; Disaster management.

COURSE OUTCOMES: On successful completion of course, students will be able to:

CO1. Demonstrate knowledge on disasters, their vulnerability and mitigation measures.

CO2. Analyze disasters and their vulnerability.

CO3. Design strategies for effective disaster mitigation.

CO4. Address pre and post disaster issues for better preparedness and mitigation measures, through proper analysis and interpretation.

CO5. Use appropriate methods in disaster mitigation and management.

CO6. Use historical data of disasters to inform the people over preparedness and mitigation measures.

CO7. Solve disaster related issues considering environment.

CO8. Consider economical issues in disaster management.

DETAILED SYLLABUS:

UNIT- I: DISASTERS **(09 Periods)**

Types of disasters - Natural disasters; Impact of disasters on environment, infrastructure and development; Concepts of hazards and vulnerability analysis, Hazard Assessment, Guidelines for hazard assessment and vulnerability analysis, Basic principles and elements of disaster mitigation.

UNIT- II: EARTHQUAKES **(09 Periods)**

Introduction to earthquake, Intensity scale (MSK–64), Seismic activity in India, Seismic zones of India, Earthquakes in A.P., Action plan for earthquake disaster preparedness, Elements at risk, Recovery and rehabilitation after earthquake, Earthquake resistant design and construction of buildings; Tsunami – Onset, Types and causes, Warning, Elements at risk, Typical effects, Specific preparedness and mitigation strategies.

UNIT- III: FLOODS, CYCLONES AND DROUGHTS **(11 Periods)**

Floods and Cyclones: Onset, Types, Warnings; Elements at risk, Typical effects, Indian floods and cyclones, Hazard zones, Potential for reducing hazards, Mitigation strategies and community based mitigation.

Droughts: Onset, Types and warning; Causes, Impact, Early warning and response mechanisms, Mitigation strategies, Droughts in India.

UNIT- IV: LANDSLIDES **(08 Periods)**

Onset, Types and warning; Causes, Elements at risk, Indian landslides, Hazards zones, Typical effects, Mitigation strategies and community based mitigation.

UNIT- V: DISASTER MANAGEMENT **(08 Periods)**

Disaster management organization and methodology, Disaster management cycle, Disaster management in India – Typical cases; Cost–benefit analysis with respect to various disaster management programs implemented by NGOs and Government of India.

Total Periods: 45

TEXT BOOKS:

1. V. K. Sharma, *Disaster Management*, Medtech Publishing, 2nd Edition, 2013.
2. Anand S. Arya, Anup Karanth, and Ankush Agarwal, Hazards, *Disasters and Your Community: A Primer for Parliamentarians, GOI–UNDP Disaster Risk Management Programme, Government of India, National Disaster Management Division, Ministry of Home Affairs*, New Delhi, Version 1.0, 2005.

REFERENCE BOOKS:

1. Donald Hyndman and David Hyndman, *Natural Hazards and Disasters*, Cengage Learning, 3rd Edition, 2011.
2. *Disaster Management in India, A Status Report, Ministry of Home Affairs, Govt. of India*, May 2011.

3. Rajendra Kumar Bhandari, *Disaster Education and Management: A Joyride for Students, Teachers, and Disaster Managers*, Springer India, 2014.
4. R. B. Singh, *Natural Hazards and Disaster Management*, Rawat Publications, 2009.

III B.Tech. - II Semester

(16BT60115) ENVIRONMENTAL POLLUTION AND CONTROL

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:

COURSE DESCRIPTION: Fundamentals of air pollution; Dispersion of pollutants; Effects and control of air pollution; Water pollution; Soil pollution and control; Municipal solid waste management.ement.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on air, water, soil pollution and their control and solid waste management.

CO2. Analyze causes and effects of air, water and soil pollution and their remedial measures.

CO3. Recommend suitable solutions to complex environmental pollution problems.

CO4. Use appropriate remedial technique to solve environmental pollution problems.

CO5. Understand the effects of environmental pollutionon human health and vegetation.

DETAILED SYLLABUS:

UNIT – I: AIR AND NOISE POLLUTION (08 Periods)

Air Pollution: Scope, Significance, Classification, Sources – Line, Area, Stationary, Mobile; Effects of air pollutants on man, material and vegetation; Global effects of air pollution; Air pollution meteorology - Lapse rate, Inversion, Plume pattern; Dispersion of air pollutants - Dispersion models and applications; Ambient air quality standards.

Noise Pollution: Sound pressure, Power and intensity, Impacts of noise, permissible limits of noise pollution, measurement of noise.

UNIT – II: AIR AND NOISE POLLUTION CONTROL (10 Periods)

Self cleansing properties of the environment, Dilution method, Control at source, Process changes and equipment modifications, Control of particulates – Types of equipment, Design and operation - Settling chambers, Centrifugal separators, Bag house filters, Wet scrubbers, Electrostatic precipitators; Control of gaseous pollutants – Adsorption, Absorption, Condensation, Combustion; Control of air pollution from automobiles, Control of noise pollution.

UNIT – III: WATER POLLUTION AND CONTROL (10 Periods)

Water pollution – Sources, Causes, Effects; Surface and groundwater quality – Physical, Chemical, Biological; Drinking water quality standards, Water purification – Processes, Engineered systems – Aeration, Solids separation, Settling operations, Coagulation, Softening, Filtration, Disinfection; Wastewater – Sources, Causes, Effects, Treatment and disposal – Primary, Secondary, Tertiary; Case studies.

UNIT – IV: SOIL POLLUTION AND CONTROL (08 Periods)

Soil pollutants, Sources of soil pollution, Causes, Effects and control of soil pollution, Diseases caused by soil pollution, Methods to minimize soil pollution, Effective measures to control soil pollution, Case studies.

UNIT – V: MUNICIPAL SOLID WASTE MANAGEMENT (09 Periods)

Types of solid waste, Composition of solid waste, Collection and transportation of solid waste, Methods of disposal – Open dumping, Sanitary landfill, Composting, Incineration, Utilization - Recovery and recycling, Energy Recovery.

Total Periods: 45

TEXT BOOKS:

1. Peavy, H. S, Rowe, D. R., and Tchobanoglous, G., *Environmental Engineering*, McGraw Hill Inc., 1985.
2. C. S. Rao, *Environmental Pollution Control Engineering*, New Age International Pvt. Ltd., 2nd Edition, 2007.
3. Ibrahim A. Mirsa, *Soil Pollution: Origin, Monitoring & Remediation*, Springer, UK, 2nd Edition, 2008.

REFERENCE BOOKS:

1. M. N. Rao and H. V. N. Rao, *Air Pollution*, Tata McGraw–Hill Education Pvt. Ltd., 19th Edition, 2010.

2. Daniel Vallero, *Fundamentals of Air Pollution*, Academic Press (Elsevier), 5th Edition, 2014.
3. S. M. Khopkar, *Environmental Pollution Monitoring and Control*, New Age International Pvt. Ltd., 2nd Edition, 2007.
4. V. M. Domkundwar, *Environmental Engineering*, Dhanpat Rai & Co. Pvt. Ltd., New Delhi, 2014.

III B.Tech. - II Semester

(16BT60116) PLANNING FOR SUSTAINABLE DEVELOPMENT

(Common to CE, ME, CSE, IT & CSSE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:—

COURSE DESCRIPTION: Sustainable development; Environmental impact; Sustainable Policies; Governance; Theories and strategies; Media and education for sustainability.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on sustainable development, environmental impact, sustainable policies, governance, systems and strategies, media and education for sustainability.
CO2. Analyze theories, environmental impact, policies, systems and strategies for sustainable development.
CO3. Develop suitable methods and systems for sustainable development.
CO4. Use appropriate techniques in solving issues related to sustainable development.
CO5. Provide solutions to problems associated with sustainable development considering society.
CO6. Consider environment while planning sustainable development.
CO7. Communicate effectively on sustainable development issues through media and education.
CO8. Consider economical issues while planning for sustainable development.

DETAILED SYLLABUS:

UNIT – I: SUSTAINABLE DEVELOPMENT (09 Periods)

Definition and concepts of sustainable development, Capitalization of sustainability - National and global context; Millennium development goals, Emergence and evolution of sustainability and sustainable development, Theories of sustainability, Case studies.

UNIT – II: ENVIRONMENTAL IMPACT (09 Periods)

Climate change – Science, Knowledge and sustainability; Unforeseen environmental impacts on development, Challenges of sustainable development, Centrality of resources in sustainable development, Case studies.

UNIT – III: SUSTAINABLE POLICIES AND GOVERNANCE (09 Periods)

Governance - Democracy and Eco–welfare; Global civil society and world civil politics, Civic environmentalism, Policy responses to sustainable development, Economics of sustainability, Social responsibility in sustainability, National action, ISO 14001: Environmental management system.

UNIT – IV: SUSTAINABLE SYSTEMS AND STRATAGIES (09 Periods)

Need for system innovation, Transition and co–evolution, Theories and methods for sustainable development, Strategies for eco–innovation, Ecological foot print analysis, Socio ecological indicators – Eco labels; Policy programmes for system innovation, Case studies.

UNIT – V: MEDIA AND EDUCATION FOR SUSTAINABILITY (09 Periods)

Role of emerging media, Remarkable design and communication art, Activism and the public interest, Education for sustainability, Participation in decision making, Critical thinking and reflection, Case studies.

Total Periods: 45

TEXT BOOKS:

1. John Blewitt, *Understanding Sustainable Development*, Earth Scan Publications Ltd., 2nd Edition, 2008.
2. Jennifer A. Elliot, *An Introduction to Sustainable Development*, Earth Scan Publications Ltd., 4th Edition, 2006.

REFERENCE BOOKS:

1. Peter Rogers, Kazi F Jalal and John A Boyd, *An Introduction to Sustainable Development*, Earth Scan Publications Ltd., 2006.
2. Simon Dresner, *The Principles of Sustainability*, Earth Scan Publications Ltd., 2nd Edition, 2008.

3. Peter Bartelmus, *Environment Growth and Development: The Concepts and Strategies of Sustainability*, Routledge, 3rd Edition, 2003.
4. Gabriel Moser, Enric Pol, Yvonne Bernard, Mirilia Bonnes, Jose Antonio Corraliza and Maria Vittoria Giuliani, *People Places and Sustainability*, Hogrefe & Huber Publishers, 2nd Edition, 2003.

III B.Tech. – II Semester

(16BT60117) PROFESSIONAL ETHICS

(Common to CE, ME, CSE, IT & CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Engineering ethics; Professional ideals and virtues; Engineering as social experimentation; Responsibilities and rights; Global issues.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the principles of ethics, importance of professional values and social responsibility.
CO2. Analyze the problems in the implementation of moral autonomy and use ethical theories in resolving moral dilemmas.
CO3. Develop suitable strategies to resolve problems arise in practicing professional ethics.
CO4. Provide solutions to complex problems associated with professional ethics by proper analysis and interpretation.
CO5. Use appropriate theories in resolving issues pertain to professional ethics.
CO6. Understand the impact of professional ethics on society and address the limitations of codes of ethics.
CO7. Practice engineering with professionalism, accountability and ethics.
CO8. Function as a member, consultant, manager, advisor and leader in multi-disciplinary teams.
CO9. Write reports without bias and give instructions to follow ethics.

DETAILED SYLLABUS:

UNIT - I: ENGINEERING ETHICS (09 periods)

Scope and aim of engineering ethics, Senses of engineering ethics, Variety of moral issues, Types of inquiry, Moral dilemmas, Moral autonomy-Kohlberg's theory, Gilligan's theory, Consensus and controversy.

UNIT - II: PROFESSIONAL IDEALS AND VIRTUES (08 periods)

Theories about virtues, Professions, Professionalism, Characteristics, Expectations, Professional responsibility, Integrity, Self-respect, Sense of responsibility, Self-interest, Customs and religion, Self-interest and ethical egoism, Customs and ethical relativism, Religion and divine command ethics, Use of ethical theories, Resolving moral dilemmas and moral leadership.

UNIT - III: ENGINEERING AS SOCIAL EXPERIMENTATION (10 periods)

Engineering as experimentation, Similarities to standard experiments, Learning from the past and knowledge gained, Engineers as responsible experimenters, Conscientiousness, Moral autonomy and accountability, The challenger case, Codes of ethics and limitations, Industrial standards, Problems with the law of engineering.

UNIT - IV: RESPONSIBILITIES AND RIGHTS (09 periods)

Collegiality and loyalty, Respect for authority, Collective bargaining, Confidentiality, Conflict of interests, Occupational crime, Rights of engineers, Professional rights, Whistle-blowing, The BART case, Employee rights and discrimination.

UNIT - V: GLOBAL ISSUES (09 periods)

Multinational corporations, Professional ethics, Environmental ethics, Computer ethics, Engineers as consultants, Witnesses, Advisors and Leaders, Engineers as Managers, Managerial ethics applied to Engineering Profession, moral leadership.

Total Periods: 45

TEXT BOOKS:

1. Mike W. Martin and Roland Schinzinger, *Ethics in Engineering*, Tata McGraw-Hill, 3rd Edition, 2007.
2. Govindarajan, M., Nata Govindarajan, M., Natarajan, S. and Senthilkumar, V. S., *Engineering Ethics*, Prentice Hall of India, 2004.

REFERENCE BOOKS:

1. S. Kannan and K. Srilakshmi, *Human Values and Professional Ethics*, Taxmann Allied Services Pvt Ltd., 2009.
2. Edmund G. Seebauer and Robert L. Barry, *Fundamental of Ethics for Scientists and Engineers*, Oxford University Press, 2001.

3. Charles F. Fledderman, *Engineering Ethics*, Pearson Education, 2nd Edition, 2004.
4. R. Subramanaian, *Professional Ethics*, Oxford Higher Education, 2013.

III B.Tech. - II Semester

(16BT60118) **RURAL TECHNOLOGY**

(Common to CE, ME, CSE, IT & CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Rural technology; Non conventional energy; Community development; IT in rural development.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on technologies for rural development.

CO2. Analyze various technologies available which are appropriate for rural development.

CO3. Carryout feasibility study on the public and private partnership for rural development.

CO4. Develop and use latest technologies for rural development.

CO5. Address health and safety issues while choosing technologies for rural development.

CO6. Educate the rural populace on the positive impacts of biofertilisers and usage of agromachinery in agriculture.

DETAILED SYLLABUS:

UNIT – I: RURAL TECHNOLOGY **(09 Periods)**

India - Technology and rural development, Pre and post independence period, Rural India Life, Indian farmer, Role of science and technology in rural development, Rural technology and poverty eradication, Rural business hubs, Technology in improving rural infrastructure, Various organizations related to innovation, Issues of technology transfer - CAPART, NABARD, CSIR, NIF.

UNIT – II: NON CONVENTIONAL ENERGY **(09 Periods)**

Definition of energy, Types of alternative sources of energy, Sources of non conventional energy – Solar energy: Solar cooker, Solar heater; Biogas, Recycling and management, Wastes conservation, Assessment and production of biomass products and their utilization.

UNIT – III: TECHNOLOGIES FOR RURAL DEVELOPMENT **(09 Periods)**

Food and agro based technologies, Tissue culture, Nursery, Building and construction technologies, Cultivation and processing of economic plants, Cottage and social industries.

UNIT – IV: COMMUNITY DEVELOPMENT **(09 Periods)**

Water conservation, Rain water Harvesting, Drinking water, Environment and Sanitation, Bio fertilizers, Medical and aromatic plants, Employment generating technologies – Apiculture, Pisciculture, Aquaculture.

UNIT – V: IT IN RURAL DEVELOPMENT **(09 Periods)**

Role of information technology (IT) in rural areas, Impact of IT in rural development, Need and necessity of technology, Corporate social responsibilities, Private sector participation (Activities in different spheres: Employment, Education, Health, Agriculture and service sectors) and Saansad Adarsh Gram Yojana (SAGY), Village adoption schemes. **Total Periods: 45**

TEXT BOOKS:

1. M. S. Virdi, *Sustainable Rural Technologies*, Daya Publishing House, 2009.
2. S. V. Prabhath and P. Ch. Sita Devi, *Technology and Rural India*, Serials Publications, 2012.

REFERENCE BOOKS

1. R. Chakravarthy and P. R. S. Murthy, *Information Technology and Rural Development*, Pacific Book International, 2012.
2. Shivakanth Singh, *Rural Development Policies and Programmes*, Northern Book Centre, 2002.
3. L. M. Prasad, *Principles and Practice of Management*, S. Chand & Sons, 8th Edition, 2014.

4. Venkata Reddy, K., *Agriculture and Rural Development - Gandhian Perspective*, Himalaya Publishing House, 2001.

III B.Tech. - II Semester

(16BT60308) GLOBAL STRATEGY AND TECHNOLOGY

(Common to CE, ME, CSE, IT & CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:—

COURSE DESCRIPTION: Introduction to strategic management; Strategic management process; Principles of good strategy; Globalization strategies; Research and Development strategies; Technology Management and Transfer; Elements of Transfer Process; Corporate Governance in the Indian scenario.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on Strategic management, Research & development strategies, Technology management and transfer, Globalization and Corporate governance.

CO2. Indentify and analyze crucial problems in strategic management to improve performance of the organizations.

CO3. Develop the products and production process by using research and development strategies.

CO4. Conduct investigations on the impact of globalization in current scenario in the context of corporate governance.

CO5. Appraise the resources and capabilities of the firm in terms of their ability to confer sustainable development.

CO6. Apply ethics in strategic decision making.

DETAILED SYLLABUS:

UNIT - I: STRATEGIC MANAGEMENT (09 Periods)

Introduction, Classes of decisions, Levels of strategy, Core competence, Strategic intent and stretch, Approaches to strategy making, Roles of different strategists, Strategic management- Process, Benefits, Limitations; Ethics in strategic decision making, Principles of good strategy, Strategic Management in India.

UNIT - II: RESEARCH & DEVELOPMENT STRATEGIES (09 Periods)

Concept, Evolution of R&D Management, R&D as a business, R&D as competitive advantage, Elements of R & D strategies, Integration of R & D, Selection and implementation of R & D strategies, R & D trends.

UNIT - III: TECHNOLOGY MANAGEMENT AND TRANSFER (09 Periods)

Technology Management: Introduction, Technology - Definition, Components, Classification Features; Technology Management- Concept, Nature; Drivers of Management of Technology- Significance, Scope, Responding to technology challenges.

Technology Transfer: Introduction, Definition, Classification, Significance, Elements of process, Types of Technology Transfer, Package, Modes of Transfer, Routes, Channels and Effectiveness of Technology Transfer.

UNIT - IV: GLOBALISATION (09 Periods)

Definition, Stages, Essential conditions for globalization, Globalization strategies, Competitive advantage of Nations, Factors affecting Globalization, Globalization of Indian business.

UNIT – V: CORPORATE GOVERNANCE: THE INDIAN SCENARIO (09 Periods)

Emergence of corporate governance in India- Landmarks, Models, Codes and status in India, Role and Responsibilities of Regulators, The Board of Directors; Corporate Governance- Specific issues in India, Family owned Business, Corporate Governance and the Indian ethos. **Total periods: 45**

TEXT BOOKS:

1. Francis Cherunilam, *Strategic Management*, Himalaya Publishing House, 3rd Edition, 2002.
2. C.S.G.Krishnamacharyulu and Lalitha Ramakrishnan, *Management of Technology*, Himalaya Publishing House, Second Edition, 2012.

REFERENCE BOOKS:

1. White and Bruton, *The Management of Technology and Innovation: A Strategic Approach*, Cengage Learning, 1st Edition, 2007.
2. S.K.Mandak, *Ethics in Business and Corporate Governance*, TMH, 2nd Edition, 2012.

III B.Tech. - II Semester

(16BT60309) INTELLECTUAL PROPERTY RIGHTS AND MANAGEMENT

(Common to CE, ME, CSE, IT & CSSE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Protection of ideas; innovation and artistic endeavors; Acts and procedure related to patents, trademarks, copy right, design registration, trade secrets and cyber laws; Infringement; Commercialization of intellectual property rights; Case studies in each.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on intellectual property rights, patents, trademarks, copyrights, trade secrets and commercialization of intellectual property.
CO2. Analyse the commercial significance of discoveries and developments and to assist in bringing these into public use.
CO3. Investigate and ensure smooth transition from concept to final product by following National & International Laws of Intellectual Property.
CO4. Utilize the various policies and procedures related to patents, trademarks and copyrights relating to IPR.
CO5. Safeguard, review and manage the intellectual property so that it may receive adequate and appropriate legal protection against unauthorized use.
CO6. Follow ethical standards in capacity building and work as a platform for development, promotion, protection, compliance, and enforcement of intellectual property and knowledge.
CO7. Prepare documents and fill applications needed for filing a patent, design, copyright and trade mark.

DETAILED SYLLABUS:

UNIT – I: OVERVIEW OF INTELLECTUAL PROPERTY RIGHTS (09 Periods)
Introduction, Intellectual Property vs Conventional Property, and importance of intellectual property rights (IPRs), types of intellectual property, International Treaties for protection of IPR-Paris Convention, World Intellectual Property Organization (WIPO), World Trade Organization (WTO), Trade Related Aspects of Intellectual Property Rights (TRIP) Agreement, General Agreement on Tariffs and Trade(GATT).

UNIT – II: TRADEMARKS (09 Periods)
Introduction, Functions and kinds of trademarks, Trade Mark Registration Process, Post registration procedures, Trade Mark maintenance, Transfer of rights, Inter parties Proceedings, Infringement and Dilution of Ownership of Trade Mark, Trade Mark claims, International Trade Mark Law.

UNIT – III: PATENTS (09 Periods)
Introduction, Rights under Patent Law, Patent Application Process, Terms and Maintenance of Patents Requirements, Patent Ownership and Transfer, Licensing of Patent Rights, Sole and Joint Inventors, Disputes over Inventorship, Patent Infringement, International Patent Law, Patent Cooperation Treaty (PCT), Patent Law Treaty (PLT), Substantive Patent Law Treaty (SPLT).

UNIT - IV: COPY RIGHTS, TRADE SECRETS, CYBER LAWS (09 Periods)
Copy Rights: Introduction, nature and scope, subject matter, Rights afforded by copyright law, Copyrights ownership, transfers and duration, Copyright registration process.
Trade Secrets: Introduction, Determination of Trade Secret Status, Emploer-Employee Relationships, Protection of submissions.
Cyber laws: E-commerce and cyber laws, cyber crime and legislation- need, objective and scope; IT Act 2000, Information Technology and Information Security.

UNIT - V: INDUSTRIAL DESIGN AND COMMERCIALIZATION OF INTELLECTUAL PROPERTY RIGHTS (09 Periods)
Industrial Design: Intoduction, Indian Law related to registration of Industrial Designs, Essential requirements for registration of a design in India, International Agreements – Hague System; Conflicts related to registration of design.
Commercialization of Intellectual Property Rights: Competition and Confidentiality Issues, Antitrust Laws, Assignment of Intellectual Property Rights, Technology, Transfer Agreements, Intellectual Property Issues in the Sale of Business, Legal Auditing of Intellectual Property, Due diligence of Intellectual Property Rights in a Corporate Transaction. **Total Periods: 45**

TEXT BOOKS:

1. Deborah E. Bouchoux, *Intellectual Property: The Law of Trademarks*, Copyrights, Patents and Trade Secrets, Cengage Learning, 4th edition, 2016.
2. Kompal Bansal and Parikshit Bansal, *Fundamentals of Intellectual Property for Engineers*, BS Publications, 1st Edition, 2013.

REFERENCE BOOKS:

1. Prabuddha Ganguli, *Intellectual Property Rights-Unleashing the Knowledge Economy*, McGraw Hill Education, 6th reprint, 2015.
2. P. Narayanan, *Intellectual Property Law, Eastern Book Company*, 3rd Edition, 2013.

3. R. Radha Krishnan, S. Balasubramanian, *Intellectual Property Rights: Text and Cases*, Excel Books, 1st Edition, 2008.

III B. Tech. – II Semester
(16BT60310) MANAGING INNOVATION AND ENTREPRENEURSHIP
(Common to CE, ME, CSE, IT & CSSE)
(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Evolution of entrepreneurship from economic theory Managerial and entrepreneurial competencies; Concepts of Shifting Composition of the Economy Purposeful Innovation & Sources of Innovative Opportunity; The Innovation Process; Innovative Strategies; Entrepreneurial Motivation; Entrepreneurs versus inventors; Ethics and International Entrepreneurship; Strategic Issues in International Entrepreneurship; Problem solving Innovation and Diversification.

COURSE OUTCOMES: On successful completion of this course, the student will be able to:

CO1. Demonstrate the principles of business innovation and entrepreneurship for establishing industrial ventures.
CO2. Analyze business plans for potential investors and stakeholders and effectively answer probabilistic questions on the substance of plan.
CO3. Develop a comprehensive and well planned business structure for a new venture.
CO4. Conduct investigation on complex problems, towards the development of Project.
CO5. Apply modern statistical and mathematical tools to design projects and subsequent work procedures.
CO6. Apply ethics in constructive innovation framework.
CO7. Exhibit professionalism by employing modern project management and financial tools.

DETAILED SYLLABUS:

UNIT - I: Creativity and Innovation **(07 Periods)**

Introduction, Levels of innovation, Purposeful innovation and the sources of innovative opportunity, The innovation process, Innovative strategies, Strategies that aim at introducing and innovation, Dynamics of ideation and creativity – Inbound, Outbound; Context and process of new product development, Theories of outsourcing.

UNIT - II: Paradigms of Innovation **(11 Periods)**

Systems approach to innovation, Innovation in the context of developed economies and Emerging economies, Examining reverse innovation and its application, Performance gap, Infrastructure gap, Sustainability gap, Regulatory gap, Preference gap, organizational factors effecting innovation at firm level.

UNIT - III: Sources of finance and venture capital **(07 Periods)**

Importance of finance, Comparison of venture capital with conventional development capital, Strategies of venture funding, Investment phases, Investment process, Advantages and disadvantages of venture capital, Venture capital developments in India.

UNIT - IV: Intellectual property innovation and Entrepreneurship **(11 Periods)**

Introduction to Entrepreneurship, Evolution of entrepreneurship from economic theory, Managerial and entrepreneurial competencies, Entrepreneurial growth and development, Concepts, Ethics and Nature of International Entrepreneurship, Intellectual property – forms of IP, Patents, Trademarks, Design registration, Copy rights, Geographical indications, Patent process in India.

UNIT - V: Open Innovation framework & Problem solving **(09 Periods)**

Concept of open innovation approach, Difference between open innovations and Cloud innovation approaches, Limitations and Opportunities of open innovation framework, Global context of strategic alliance, Role of strategic alliance, Problem Identification and Problem Solving, Innovation and Diversification.

Total Periods: 45

TEXT BOOKS:

1. Vinnie Jauhari, Sudhanshu Bhushan, *Innovation Management*, Oxford University Press, 1st Edition, 2014.
2. Drucker, P. F., *Innovation and Entrepreneurship*, Taylor & Francis, 2nd Edition, 2007.

REFERENCE BOOKS:

1. Robert D Hisrich, Claudine Kearney, *Managing Innovation and Entrepreneurship*, Sage Publications, 1st Edition, 2014.

2. V.K.Narayanan, *Managing Technology and Innovation for Competitive Advantage*, Pearson India, 1st Edition, 2002.

III B. Tech. – II Semester

(16BT60311) MATERIALS SCIENCE

(Common to CE, ME, CSE, IT & CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Structure and Bonding in metals; Steels, Cast Irons and Non Ferrous alloys; Material Selection for conductors, Insulators and semi conductors; Strengthening mechanisms of metals; Plastics and Ceramics as Insulators; AC and DC properties of Insulators; Semiconductors and Magnetic materials; Composite materials in Electrical and Electronics engineering; Material Selection and manufacturing of Optical fibers.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on concepts of fundamental science and engineering principles relevant to materials.

CO2. Analyze the structures of various types of Ferrous, Non ferrous alloys influencing various engineering applications.

CO3. Conduct investigations to select suitable materials with desired properties for engineering applications.

CO4. Use phase diagrams to interpret the data regarding microstructure of materials.

CO5. Consider health and safety issues while providing materials to real time applications.

CO6. Use composite materials that reduce material waste in design and manufacturing for sustainability.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO MATERIAL SCIENCE (07 periods)

Structure of metals: Bonds in Solids, Crystallization of metals, Grain and grain boundaries, Effect of grain boundaries on the properties of metals / alloys, Determination of grain size measurement.

Constitution of alloys: Necessity of alloying, Types of solid solutions, Hume rothery rules, Intermediate alloy phases.

UNIT - II: CAST IRONS, STEELS & NON-FERROUS METALS (12 periods)

Structure and properties of Grey cast iron, Spheroidal cast iron, White Cast iron, Malleable Cast iron, Alloy cast irons, Classification of steels, structure and properties of plain carbon steels, Structure and properties of Copper and its alloys, Aluminum and its alloys.

UNIT - III: ELECTRIC CONDUCTORS & INSULATORS (12 periods)

Type of materials selected for conductors, Insulators and semi conductors, Introduction to ceramics - Bonding and microstructure, DC properties of ceramic materials, AC properties of ceramic materials, mechanical properties, Ceramics as Conductors, Insulators and capacitors; Introduction to Plastics - DC properties, AC properties, Mechanical properties.

UNIT - IV: SEMICONDUCTORS AND MAGNETIC MATERIALS (09 Periods)

Fabrication of Semiconductors, Producing a silicon wafer-Lithography and Deposition packaging of semiconductors materials; Types of magnetic materials, Measuring magnetic properties, Application of soft magnetic materials in Electromagnets and relays, AC transformers, Generators and motors.

UNIT - V: ADVANCED MATERIALS AND APPLICATIONS (05 periods)

Composites - Fiber reinforced metal matrix, Ceramic matrix, Polymer matrix, Properties and applications of composites; Ceramics - Alumina, Zirconia, Silicon Carbide, SiAlONs, Reaction Bonded Silicon Nitride (RBSN); Glasses- properties and applications, manufacturing of optical fibers.

Total Periods: 45

TEXT BOOKS:

1. Kodgire V D, *Material Science and Metallurgy*, Everest Publishing House, Pune, 31st edition, 2011.
2. Ian. P.Jones, *Material Science for Electrical and Electronic Engineers*, Oxford University Press, 1st Edition, 2000

REFERENCE BOOKS:

1. V. Raghavan, *Physical Metallurgy: Principles and Practices*, PHI, New Delhi, 2nd edition, 2006.
2. William. D. Callister, *Materials Science & Engineering-An Introduction*, John Wiley and Sons, New Delhi, 6th edition, 2002.

III B. Tech. - II Semester

(16BT70412) GREEN TECHNOLOGIES

(Common to CE, ME, CSE, IT & CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Principles of green engineering; Green communications; Green energy; Green computing; Green construction; Green manufacturing.

COURSE OUTCOMES: On successful completion of this course, students will be able to

CO1. Deploy conceptual knowledge in green technologies pertaining to engineering practice.
CO2. Analyze various green technologies for engineering practice.
CO3. Provide green solutions to engineering problems.
CO4. Apply various green techniques in the engineering practice.
CO5. Consider health and safety issues while providing green solutions to the society.
CO6. Understand issues related to environment sustainability.
CO7. Apply ethical standards for environmental sustainability in the engineering practice.

DETAILED SYLLABUS:

UNIT-I: PRINCIPLES OF GREEN ENGINEERING AND GREEN COMMUNICATIONS (11 Periods)

Principles of Green Engineering:

Introduction, Definition of green engineering, Principles of green engineering.

Green Communications:

Introduction, Origin of Green Communications, Energy Efficiency in Telecommunication systems, Telecommunication system model and energy Efficiency, Energy saving concepts, Quantifying energy efficiency in ICT, Energy efficiency metrics of green wireless networks, Embodied energy of communication devices- Introduction, The extended energy model, Embodied/Operating Energy of a BS in Cellular network- A Case study; Energy efficient standards for wireline communications.

UNIT-II: GREEN ENERGY (09 Periods)

Introduction, adverse impacts of carbon emission, control of carbon emission– methods, greenhouse gas reduction – methods, Energy sources and their availability, Green energy for sustainable development. Green energy sources – Solar energy, Wind energy, Fuel cells, Biofuels, Wave and Geothermal energy (Principle of generation only).

UNIT-III: GREEN IT (09 Periods)

The importance of Green Information technologies, Strategizing Green Initiatives, Implementation of Green IT, Information Assurance, Communication and Social Media, Regulating Green IT- Laws, Standards and Protocols; RoHS, REACh, WEEE, Legislating for GHG Emissions and Energy Use of IT Equipment, Non-regulatory Government Initiatives, Industry Associations and Standard Bodies, Green Building Standards, Green Data Centres, Social Movements and Greenpeace, Conclusions.

UNIT-IV: GREEN CONSTRUCTION (09 Periods)

Green Building: Definition, Typical features, Benefits, Requisites for green building construction, Sustainability, Concept of REDUCE, REUSE, RECYCLE, RETHINK, REPLENISH AND REFUSE (6 R's), Sustainable construction focus point – Site selection, Planning, Water, Energy, Material, Indoor air quality, Construction procedures.

Indian Green Building Council: Introduction to IGBC green homes, Benefits of IGBC, IGBC green home rating system, Introduction to USGBC, LEED rating system, Procedure to get IGBC certification, GRIHA Rating.

UNIT-V: GREEN MANUFACTURING (09 Periods)

Introduction, background, definition, motivation and barriers to green manufacturing, Impact of manufacturing in environmental ecology, Need for green manufacturing, Advantages and Limitations, green manufacturing strategies, Green manufacturing and sustainability, Sustainability tools; Waste stream mapping and application, Green manufacturing through clean energy supply, green lean manufacturing, green packaging and supply chain.

Total Periods: 47

TEXT BOOKS:

1. Konstantinos Samdanis, *Peter Rost, Andreas Maeder, Michela Meo, Christos Verikoukis, Green Communications: Principles, Concepts and Practice*, John Wiley & Sons, 2015.
2. Soli J. Arceivala, *Green Technologies for a better future*, McGraw Hill Education (India) Pvt Ltd, 2014.
3. San Murugesan, G.R. Gangadharan, *Harnessing Green IT – Principles and Practices*, John Wiley & Sons Ltd., 2008.
4. Tom Woolley, Sam Kimmins, *Paul Harrison and Rob Harrison, Green Building Handbook*, Volume 1, E & FN Spon, an imprint of Thomson Science & Professional.
5. IGBC Green Homes Rating System Version 1.0 – A bridged reference guide.
6. J Paulo Davim, *Green Manufacturing: Processes and Systems*, Springer, 2012
7. David A Dornfeld, *Green Manufacturing: Fundamentals and Applications*, Springer, 2013

REFERENCE BOOKS:

1. Athanasios V Alavanidis, Thomais Vlachogianni, *Green Chemistry and Green Engineering*, Synchrona Themata, 2012.
2. G.D. Rai, *Non-conventional Energy Sources*, Khanna Publishers, Delhi, 5th edition, 2011.
3. Marty Poniatowski, *Foundation of Green Information Technology*, Prentice Hall, 2009.
4. R. K. Gautham, *Green Homes*, BS publications, 2009.

III B. Tech. - II Semester

(16BT70413) **INTRODUCTION TO NANOSCIENCE AND NANOTECHNOLOGY**

(Common to CE, ME, CSE, IT & CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Introduction to the concept of nano; Description of nanomaterial; Nanostructure characterization tools; Classification of nanomaterials; Fabrication of nanomaterial; Different applications of nanostructures and nanomaterials.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge in
- Nanoscale technology.
- Difference between micro and nanotechnology
- Classification of Nanostructure and Nanomaterial
- Fabrication of various nanomaterials and nano-structures.

CO2. Analyze numerical and analytical problems in
- Nanomaterial size by using Scanning Electron Microscope and X-Ray diffraction

CO3. Design and fabricate devices based on nanostructures like
- Nano solar cell
- Nano cantilever
- Nano bio-sensor

CO4. Synthesize nano particle of different materials to solve the problems related to fabrication of nanostructures.

CO5. Select appropriate technique for fabrication of nanostructures and nanocomposites.

CO6. Apply ethical standards and legal issues while using chemical substances in fabrication of new nanostructures.

DETAILED SYLLABUS:

UNIT-I: FUNDAMENTALS OF NANOTECHNOLOGY (08 Periods)

Introduction – Scientific revolutions, Time and length scale in structures, Definition of a nanosystem; Dimensionality and size dependent phenomena - Surface to volume ratio Fraction of surface atoms, Surface energy and surface stress, surface defects, Properties at nanoscale (optical, mechanical, electronic, and magnetic).

UNIT-II: IDENTIFICATION AND CHARACTERIZATION TOOLS FOR NANOMATERIALS AND NANOSTRUCTURE (10 Periods)

Field Emission Scanning Electron Microscopy (FESEM), Environmental Scanning Electron Microscopy (ESEM) High Resolution, Transmission Electron Microscope (HRTEM), Scanning Tunneling Microscope(STM), Surface enhanced Raman spectroscopy (SERS), Secondary Ion Mass Spectroscopy, Focused Ion Beam Photoelectron Spectroscopy, X-ray Photoelectron Spectroscopy (XPS), Auger electron spectroscopy (AES), Rutherford backscattering spectroscopy (RBS), X-Ray Diffraction, Intensities in X-Ray Scattering Particle Size Effect.

UNIT-III: CLASSIFICATION OF NANOMATERIALS (10 Periods)

Classification based on dimensionality, Quantum Dots, Wells and Wires-III-V Nanoparticles, Electronic Structure of Nanosemiconductor, Carbon based nanomaterials (buckyballs, nanotubes, graphene), Metal based nano materials (nanogold, nanosilver and metal oxides), Nanocomposites, Nanopolymers, Nanoglasses, Nano ceramics, Biological nanomaterials, Fulrene-discovery and early years,.

UNIT-IV: SOME FABRICATION TECHNIQUES OF NANO-MATERIALS AND NANOSTRUCTURES (09 Periods)

Chemical Methods: Metal Nanocrystals by Reduction, Solvothermal Synthesis, Photochemical Synthesis, Sonochemical Routes, Chemical Vapor Deposition (CVD), Metal Oxide Chemical Vapor Deposition (MOCVD), Plasma Enhanced Chemical Vapour Deposition Technique (PECVD), Hydrothermal Method, Sol-Gel.

Physical Methods: Ball Milling, Electrodeposition, Spray Pyrolysis, Flame Pyrolysis, DC/RF Magnetron Sputtering, Molecular Beam Epitaxy (MBE) Thermal Evaporation Method.

UNIT-V: APPLICATIONS (08 Periods)

Solar energy harvesting, Catalysis, Molecular electronics and printed electronics Nanoelectronics, Polymers with a special architecture, Liquid crystalline systems, Linear and nonlinear optical and electro-optical properties, Applications in displays and other devices, Nanomaterials for data storage, Photonics, Plasmonics, Chemical and biosensors, Nanomedicine and Nanobiotechnology, MESFET.

Total Periods: 45

TEXT BOOKS:

1. Pradeep T., *A Textbook of Nanoscience and Nanotechnology*, Tata McGraw Hill Education Pvt. Ltd., 2012.
2. Hari Singh Nalwa, *Nanostructured Materials and Nanotechnology*, Academic Press, 2002.

REFERENCE BOOKS:

1. Nabok A., *Organic and Inorganic Nanostructures*, Artech House, 2005.
2. Dupas C., Houdy P., *Lahmani M., Nanoscience: Nanotechnologies and Nanophysics*, Springer - Verlag Berlin Heidelberg, 2007.
3. S.M. Sze, *Physics of Semiconductor Devices*, 2nd Edition 2001.

III B. Tech. – II Semester

(16BT60505) ENGINEERING SYSTEM ANALYSIS AND DESIGN

(Common to CE, ME, CSE, IT & CSSE)

(Open Elective)

Int. Marks	**Ext. Marks**	**Total Marks**	**L**	**T**	**P**	**C**
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Systems Process; Technologies for Systems; System Development Life Cycle; System Analysis and Modeling; Levels of Management; Project Management; Systems Implementation and Importance of UML Prototyping; Maintaining and Managing the Systems Output Process.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge in

- Systems Process and System Design
- Systems Analysis and Modeling
- System Development Life Cycle
- Design Management and Maintenance Tools.

CO2. Analyze System Process and estimate the given models by using case tools.

CO3. Design and Develop a model to the organizational systems.

CO4. Solve complex problems related to engineering systems and produce accurate results.

CO5. Apply object oriented techniques for modeling dynamic systems.

CO6. Contribute towards societal issues and responsibilities in designing, modeling and developing of organizational systems.

DETAILED SYLLABUS:

UNIT–I: INTRODUCTION **(09 periods)**

Systems, Types of systems, Integrating technologies for systems, Need for system analysis and design, Role of the systems analyst, System development life cycle, CASE tools for analysis and design.

UNIT–II: ANALYSIS AND MODELING ORGANIZATIONAL SYSTEM **(09 periods)**

Organization as system, System analysis, Depicting systems graphically, Use case modeling, Levels of management, Organizational culture.

UNIT–III: PROJECT MANAGEMENT **(10 periods)**

Project initiation, Problem in organization, Determining feasibilities, Ascertaining hardware and software needs, Identifying, Forecasting, Comparing costs and benefits, Activity planning and control, Managing the project.

UNIT-IV: OBJECT ORIENTED ANALYSIS AND DESIGN USING UML **(08 periods)**

Introduction, Object modeling, Dynamic modeling, functional modeling, packages and other UML artifacts, the importance of using UML for modeling.

UNIT-V: DESIGNING EFFECTIVE OUTPUT **(09 periods)**

Output design objectives, Relating output content to output method, Realizing how output bias affects users, Designing output for display, Case studies-Designing a web site management, Online exam management, Online portal design. **Total Periods: 45**

TEXT BOOK:

1. Kenneth E. Kendall and Julie E. Kendall, *System Analysis and Design*, Pearson Education, Ninth Edition, 2011.

REFERENCE BOOKS:

1. Dennis, Wixom and Roth, *Systems Analysis and Design*, John Wiley, Fifth Edition, 2012.
2. Shelly and Rosenblatt, *Systems Analysis and Design*, Cengage Learning, Ninth Edition, 2012.

III B.Tech. – II Semester
(16BT71011) MICRO-ELECTRO-MECHANICAL SYSTEMS
(Common to CE, ME, CSE, IT & CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Overview of Micro Electro Mechanical Systems (MEMS); scaling laws; working principles of microsensors and microactuators; materials; microfabrication processes; packaging of Microsystems.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on MEMS devices, scaling laws, microsensors and microactuators

CO2. Analyze the properties of materials and identify its suitability for MEMS devices.

CO3. Design MEMS devices that meet desired specifications and requirements.

CO4. Analyze and synthesize the information to provide effective solution to engineering problems with MEMS devices.

CO5. Use modern techniques in micro manufacturing process.

CO6. Develop efficient and cost effective MEMS based products for society.

DETAILED SYLLABUS:

UNIT-I: OVERVIEW OF MEMS AND SCALING LAWS (09 Periods)

MEMS and Microsystems, Microsystems and microelectronics, miniaturization, applications of MEMS in the automotive industry and in other industries.

Scaling laws of miniaturization: Introduction to scaling, scaling in: geometry, rigid- body dynamics, electrostatic forces, electromagnetic forces, Electricity, Fluid mechanics, Heat transfer.

UNIT -II: WORKING PRINCIPLES OF MICROSYSTEMS (09 Periods)

Microsensors, acoustic wave sensors, biomedical and biosensors, chemical sensors, pressure sensors, thermal sensors. Microactuation: actuation using thermal forces, shape-memory alloys, piezoelectric crystals, electrostatic forces. MEMS with microactuators, microgrippers, micromotors, microvalves, micropumps. Microaccelerometers, microfludics.

UNIT-III: MATERIALS FOR MEMS AND MICROSYSTEMS (09 Periods)

Substrate and wafers, silicon as a substrate material, silicon compounds, silicon piezoresistors, gallium arsenide, quartz, piezoelectric crystals, polymers, carbon nano tube (CNT), development of CNTs, application of CNTs.

UNIT-IV: MEMS FABRICATION PROCESS AND MICROMANUFACTURING (09 Periods)

Photolithography, ion implantation, diffusion, oxidation, chemical vapor deposition, physical vapor deposition, deposition by epitaxy, etching, bulk micromanufacturing, surface micromanufacturing, LIGA process.

UNIT-V: MEMS PACKAGING (09 Periods)

Introduction to microsystem packaging, objectives and general considerations in packaging design, three levels of microsystem packaging, interfaces in microsystem packaging, packaging technologies, three-dimensional packaging, selection of packaging materials, signal mapping and transduction, Design case: Pressure sensor packaging.

Total Periods: 45

TEXT BOOK:

1. Tai-Ran Hsu, *MEMS & Microsystems, Design and Manufacture*, McGraw Hill Education (India) Pvt. Ltd., 2002.

REFERENCES BOOKS:

1. G.K.Ananthasuresh, K.J.Vinoy, *Micro and Smart Systems*, Wiley India, 2010.

2. Nitaigour Premchand Mahalik, *MEMS,* McGraw Hill Education (India) Pvt. Ltd., 2007.

III B. Tech. – II Semester

(16BT61205) **CYBER SECURITY AND LAWS**

(Common to CE, ME, CSE, IT & CSSE)
(Open Elective)

Int. Marks	**Ext. Marks**	**Total Marks**	**L**	**T**	**P**	**C**
30	70	100	3	1	-	3

PRE-REQUISITES: –

COURSE DESCRIPTION: Cyber Crimes and Indian IT Act; Cyber Offenses; Tools and Methods used in Cyber Crime; Phishing ad Identity Theft; Indian and Global Perspective on Cyber Crimes and Cyber Security; Organizational Implications on Cyber Security; IPR Issues; Cyber Crime and Terrorism; Cyber Crime Illustrations.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge in Cyber security, Cyber crimes and its related laws in Indian and Global Act.
CO2. Analyze the legal perspectives and laws related to cyber crimes in Indian context.
CO3. Apply security and privacy methods in development of modern applications and in organizations to protect people and to prevent cyber crimes.
CO4. Solve Cyber security issues using privacy policies.
CO5. Use antivirus tools to minimize the impact of cyber threats.
CO6. Follow security standards for the implementation of Cyber Security and laws.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO CYBER CRIMES AND OFFENSES (09 Periods)

Cyber Crimes: Introduction, Definition, Origin, Cyber crime and information security, Cyber criminals, Classifications of cyber crimes, The legal perspectives and Indian perspective, Cyber crime and Indian ITA 2000, Global perspective on cyber crimes.

Cyber Offenses: Introduction, Criminals planning on attacks, Social engineering, Cyber stalking, Cyber cafe and crimes, Botnets.

UNIT-II: TOOLS AND METHODS USED IN CYBER CRIME & PHISHING AND IDENTITY THEFT (09 Periods)

Introduction, Proxy servers and Anonymizers, Phishing, Password cracking, Key loggers and Spywares, Virus, Worms and Ransomware, Trojan horses and Backdoors, Steganography, DoS and DDoS attacks.

Phishing and Identity Theft: Introduction, Phishing, Identity Theft (ID Theft).

UNIT-III: CYBER CRIMES AND CYBER SECURITY-LEGAL PERSPECTIVES (08 Periods)

Introduction, Cyber laws in Indian context, The Indian IT act, Challenges to Indian law and Cyber crime scenario in India, Consequences of not addressing the weakness in IT act, Digital signatures and the Indian IT Act, Cyber Crime and Punishment, Cyberlaw, Technology and Students in India scenario.

UNIT-IV: CYBER SECURITY-ORGANIZATIONAL IMPLICATIONS (10 Periods)

Introduction, Web threats for organizations – evils and perils, Security and privacy implications from cloud computing, Social Media Marketing-Security risks and Perils for organizations, Social computing and associated challenges for organizations, Protecting people's privacy in organization, Organizational guidelines for internet usage, Safe computing and Usage policy, Incident handling and Best practices.

UNIT-V: CYBER CRIME & TERRORISM AND ILLUSTRATIONS (09 Periods)

Cyber Crime & Terrorism: Introduction, Intellectual property in the cyber space, The ethical dimension of cyber crimes, The psychology, Mindset and skills of hackers and cyber criminals, Sociology of cyber criminals, Information warfare.

Cyber Crime Illustrations: Indian banks lose millions of rupees, Justice vs. Justice, Parliament attack, The Indian case of online gambling, Bank and credit card related frauds, Purchasing goods and services scam, Nigerian 419 scam.

Total Periods: 45

TEXT BOOK:

1. Nina Gobole and Sunit Belapure, *Cyber Security: Understanding Cyber Crimes*, Computer Forensics and Legal Perspectives, Wiley India, 2011.

REFERENCE BOOK:

1. Prashant Mali, *Cyber Law and Cyber Crimes***,** Snow White Publications Pvt. Ltd., 2013.

III B.Tech. – II Semester

(16BT61505) BIOINFORMATICS

(Common to CE, ME, CSE, IT & CSSE)

(Open Elective)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —

COURSE DESCRIPTION: Introduction to Bioinformatics; Biology and Information; Sequence alignment and dynamic programming; Biological Database; Homology Modeling; Structure Prediction; Molecular Dynamics

COURSE OUTCOMES: On successful completion of this course, student will be able to:

CO1. Demonstrate knowledge on concepts of biological databases, Genome and proteome.

CO2. Analyze biological sequences for Homology Modeling.

CO3. Apply clustering methods for Phylogenetic trees.

CO4. Solve bio sequencing problems using dynamic programming.

CO5. Select and apply appropriate techniques and tools to structure Prediction

DETAILED SYLLABUS:

UNIT-I: NUCLEIC ACIDS, PROTEINS AND AMINO ACIDS (08 periods)

Bioinformatics-Definition, Nucleic acid structure, Protein structure, the central dogma, Physico-chemical properties of the amino acids and their importance in protein folding, Polymerase chain reaction (PCR)

UNIT-II: INFORMATION RESOURCES FOR GENES AND PROTEIN (10 periods)

Database file formats, Nucleic acid sequence databases, Protein sequence databases

Sequence Alignment Algorithm

Pair wise sequence alignment – The problem, Pair wise sequence alignment – Dynamic programming methods, The effect of scoring parameters on the alignment, Multiple sequence alignment

UNIT-III: PREDICTION OF THE THREE-DIMENSIONAL STRUCTURE OF A PROTEIN AND HOMOLOGY MODELING (09 Periods)

Secondary Structure Prediction, Basic Principles, The Steps of Comparative Modeling, Accuracy of Homology Models, Manual versus Automatic Models, SNPs, Motifs**.**

UNIT-IV: PHYLOGENETIC METHODS (10 periods)

Phylogenetic trees, choosing sequences, Distance matrices and clustering methods, Calculation of distances in the neighbor-joining method, Bootstrapping, Tree optimization criteria and tree search methods, The maximum-likelihood criterion, Calculating the likelihood of the data on a given tree, The parsimony criterion.

UNIT-V: NEW FOLD MODELING (08 periods)

Estimating the Energy of a Protein Conformation, Energy Minimization, Molecular Dynamics,

The "Omics" Universe-Transcriptomics, Proteomics, Interactomics, Structural Genomics, Pharmacogenomics.

Total Periods:45

TEXT BOOKS:

1. Paul G. Higgs and Teresa K. Attwood, *Bioinformatics and Molecular Evolution*, Blackwell Publishing 2005.
2. Anna Tramontano, *Introduction to Bioinformatics*, Chapman and Hall/CRC, 2006.

REFERENCE BOOKS:

1. Hooman H. Rashidi and Lukas K. Buehler, *Bioinformatics Basics, Applications in Biological Science and Medicine*, CRC Press, Taylor & Francis Group, 2nd Edition, 2005.
2. Rastogi S. C., Namita Mendiratta and Parag Rastogi, *Bioinformatics: Methods and Applications: Genomics*, Proteomics and Drug Discoveryn, PHI Learning Pvt. Ltd., Third Edition, 2011.

III B. Tech. - II Semester

(16BT60331) **CAD AND SIMULATION LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Course on Computer Aided Machine Drawing Lab.

COURSE DESCRIPTION: Fundamental Concepts of CAD and Simulation; 2D and 3D Part Modeling; Analysis of Simple Structural, Thermal and CFD problems.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate basic knowledge to use software package CREO to generate 3D models of parts and assemblies, and choose appropriate module of ANSYS to perform stress, thermal and CFD analysis.

CO2. Analyze any part or machine component in a standardized manner suitable for industrial scenarios.

CO3. Design components and analyze for various required parameters.

CO4. Conduct investigation on complex subsystem and employ bottom- up approach to build the model of the entire system and generate drawings or models.

CO5. Apply appropriate hardware and software for CAD and Simulation thereby enhancing productivity in design.

CO6. Contribute to the society and engineering profession based on standard engineering norms and practices in design.

CO7. Function effectively as an individual and as a member of team to combine various part components into a single assembly.

CO8. Communicate effectively about any mechanical components or system.

LIST OF EXPERIMENTS

ANY **TWELVE** EXPERIMENTS ARE TO BE CONDUCTED.

1. Exercises (2-D & 3-D) using design packages:

   a) Drafting: Development of part drawings for various components in the form of orthographic and isometric, Representation of dimensioning and tolerances scanning and plotting.

   b) Part Modeling: Generation of various 3D models through protrusion, revolve, shell sweep, Creation of various features, Study of parent child relation, Feature based and Boolean based modeling surface and assembly modeling, Study of various standard translators, Design simple components.

2. Exercises using Analysis software:

   a) Structural Analysis:
   - Determination of deflection and stresses in 2D trusses and beams.
   - Determination of deflections component and principal and Von-Mises stresses in simple 3D plane and axisymmetric components.

   b) Thermal Analysis:
   - Steady state heat transfer Analysis of plane and axisymmetric components.
   - 2D problem with conduction and convection boundary conditions.

   c) Computational Fluid Dynamics(CFD) Analysis:
   - Simple fluid flow and heat transfer problems.
   - Modeling Periodic flow and heat transfer.
   - Modeling external compressible flows.
   - Modeling transient compressible flows.
   - Modeling radiation and natural convection.

Note: Any Two Software Packages from each of the module
CAD Packages: SOLIDWORKS, CATIA, Unigraphics, Solid Edge, CREO.
Analysis Packages: HyperMesh, ANSYS, Openfoam, STAR CCM+.

III B. Tech. – II Semester

(16BT60332) HEAT TRANSFER LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Course on Heat Transfer.

COURSE DESCRIPTION: Experimental studies on mechanisms of heat transfer; Film wise and drop wise condensation; Steady and unsteady flow; Effectiveness of heat exchanger; thermal conductivity; emissivity; Stefan - Boltzmann constant.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge of heat transfer phenomenon in objects of different geometries.

CO2. Identify, formulate and analyze various heat transfer problems.

CO3. Design various thermal systems and conduct experiments to increase/decrease heat transfer rates.

CO4. Investigate the results obtained in the various experiments and provide suitable conclusions.

CO5. Apply dimensional analysis to evaluate the performance of heat transfer equipment.

CO6. Work and contribute to team to accomplish common goals.

CO7. Communicate effectively about laboratory work reports and presentations.

Any TWELVE Experiments should be conducted

LIST OF EXPERIMENTS:

1. Determination of Thermal conductivity of metal rod using thermal conductivity Apparatus.
2. Determination of Overall heat transfer co-efficient through Composite Slab Apparatus.
3. Determination of Thermal conductivity of insulating powder material through concentric sphere apparatus.
4. Determination of Thermal conductivity of insulating material by lagged pipe apparatus.
5. Determination of Temperature distribution and heat transfer rate in Transient heat conduction mode using Transient heat conduction apparatus.
6. Determination of Convective Heat transfer coefficient in natural convection using natural convection apparatus.
7. Determination of Convective Heat transfer coefficient in forced convection using forced convection apparatus.
8. Determination of Critical heat flux using Critical Heat flux apparatus.
9. Determination of Heat transfer in drop and film wise condensation using drop and film wise condensation apparatus.
10. Determination of overall heat transfer coefficient of Parallel and counter flow heat exchanger using Parallel and counter flow heat exchanger Apparatus.
11. Determination of Temperature distribution, efficiency and effectiveness of Pin- Fin using pin-fin Apparatus.
12. Determination of Emissivity of a gray body using Emissivity apparatus.
13. Determination of Stefan Boltzmann constant using Stefan Boltzmann Apparatus.
14. Study of two phase heat flow.
15. Study of heat pipe and its demonstration.

NOTE: Heat Transfer data books are permitted in the examinations.

III B. Tech – II Semester
(16BT60333) **SEMINAR**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	100	100	-	-	-	2

PRE-REQUISITES: —

COURSE DESCRIPTION: Identification of topic for the seminar; Literature survey; Performing critical study and analysis of the topic identified; Preparation of report and presentation.

COURSE OUTCOMES: Completion of the seminar work enables a successful student to demonstrate:

CO1. Knowledge on the seminar topic.

CO2. Analytical ability exercised during the seminar work.

CO3. Ability to investigate and solve complex engineering problems faced during the seminar work.

CO4. Ability to apply techniques to complex engineering activities with an understanding of limitations as applied in the seminar work.

CO5. Ability to function effectively as an individual as experienced during the seminar work.

CO6. Ability to present views cogently and precisely on the seminar topic.

CO7. Ability to engage in life-long leaning as experience during the seminar work.

IV B. Tech – I Semester
(16BT70301) **AUTOMOBILE ENGINEERING**

Int. Marks	**Ext. Marks**	**Total Marks**	**L**	**T**	**P**	**C**
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Thermal Engineering-I.

COURSE DESCRIPTION: Basic components and classification of automobiles; Fuel Supply System; Cooling System; Ignition System; Emissions from automobiles; Pollution control Techniques; Transmission System; Steering System; Suspension and Braking System.

COURSE OUTCOMES: On successful completion of this course, students will be able to:
- CO1. Demonstrate the knowledge on working of various components of an automobile.
- CO2. Identify and analyze the various systems and sub systems suitable for an automobile.
- CO3. Present the probable solution in the design of fuel systems, cooling and ignition systems, transmission systems, steering systems, suspension and braking systems of an automobile.
- CO4. Investigate the complex issues in automobile engineering and provide valid conclusions.
- CO5. Use the techniques to estimate pollution from the emissions of automobiles.
- CO6. Use the national and international standards to assess the emissions from automobiles considering health and safety.

DETAILED SYLLABUS:

UNIT - I: BASICS OF AN AUTOMOBILE (12 periods)

Classification of automobiles, Components of a four wheeler automobile, Chassis and body, Rear wheel drive, Front wheel drive, Four wheel drive, Turbo charging, Super charging, Oil filters, Oil pumps.

Fuel system: S.I. Engine - Fuel supply system, Mechanical and electrical fuel pump, Air and fuel filters, Carburetor types; C.I. Engine - Requirements of diesel injection systems, Types of injection systems, Fuel pump, Types of nozzles, Nozzle spray formation, Injection timing.

UNIT - II: COOLING & IGNITION SYSTEMS (10 Periods)

Cooling systems: Necessity of cooling system, Requirements of cooling systems, Types, Natural and Forced Circulation System, Thermostat, Types of radiators, Cooling Fan, Water pump, Antifreeze solutions.

Ignition systems: Function of an ignition system, Battery ignition system, Magneto coil ignition system, Electronic ignition system using contact breaker, Capacitive discharge ignition system.

UNIT - III: EMISSIONS FROM AUTOMOBILES (06 periods)

National and international Pollution standards, Pollution Control Techniques for SI engines and CI engines, Comparison of electronic catalytic converter and conventional catalytic converter, Alternative energy sources for automobiles, Emissions from alternative energy sources - Hydrogen, Biomass, Alcohols, LPG, CNG, Bio-diesel - Their merits and demerits.

UNIT - IV: TRANSMISSION & STEERING SYSTEMS (11 periods)

Transmission systems: Types of clutches - Cone clutch, Single and multi plate clutch, Centrifugal clutch; Types of Gear box - Constant mesh, Sliding mesh, Synchromesh gear box; Gear shifting mechanism, Automatic transmission, Propeller shaft, Universal joint, Differential, Real axle arrangement.

Steering systems: Requirements and functions of steering system, Layout of steering system, Steering gears, Steering linkages; Under steering, Over steering, Steering ratio, Steering geometry - Camber, Caster, Toe-in, Toe out; Power steering, Wheel alignment and Balancing.

UNIT - V: SUSPENSION & BRAKE ACTUATING SYSTEMS (06 periods)

Suspension systems: Requirements and functions of suspension system, Elements of suspension systems, Rigid axle suspension system, Torsion bar, Shock absorber, Telescopic damper, Independent suspension system.

Brake actuating systems: Need and functions of braking system, Classification of brakes, Mechanical, Hydraulic, Pneumatic, Vacuum brake systems.

Total Periods: 45

TEXT BOOKS:
1. Dr. Kirpal Singh, *Automobile Engineering*, Vol.1&Vol.2, Standard Publishers distributor, 12th edition, 2011.
2. R.K.Rajput, *Automobile Engineering*, Lakshmi Publication, 2nd Edition, 2014.

REFERENCE BOOKS:
1. V.M.Domkundwar, *Automobile Engineering*, Dhanpat Rai & Co, 1st Edition, 2013.
2. V.Ganesan, *IC Engines*, Tata McGraw-Hill, 3rd Edition, 2007.

IV B. Tech. – I Semester

(16BT70302) FINITE ELEMENT METHOD

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Design of Machine Elements-II and Heat Transfer.

COURSE DESCRIPTION: Discretization; Formulation of finite element expression; Finite Element approach to solve 1-D problems; beams; trusses; CST problems; Heat transfer problems and Dynamic analysis problems.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate principles and approaches for solving FEM problems in different fields.

CO2. Formulate and analyze element stiffness matrices and shape functions to find stresses in trusses and beams.

CO3. Develop solutions for CST element and axi-symmetric element.

CO4. Conduct investigation on heat transfer problems using FEM.

CO5. Apply finite element technique to solve vibration analysis problems.

CO6. Apply practical constraints to find solutions for structural and thermal problems.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION (09 Periods)

Introduction to Finite Element Method for solving field problems, Stress and Equilibrium, Strain - Displacement relations, Stress - strain relations,

One-dimensional finite element methods: Bar elements, Finite element modeling, coordinates and shape functions, Element matrices, assembling of global stiffness matrix and load vector, Principle of minimum potential energy, Application of boundary conditions, Elimination and penalty approaches, solution for displacements, reaction, stresses, temperature effects, Quadratic Element.

UNIT - II: TRUSSES & BEAMS (09 Periods)

Trusses: Plane trusses, local and global coordinate systems, formulation for direction cosines, Element matrices, assembling of global stiffness matrix, solution for displacements, reaction, stresses, and temperature effects.

Beams: Element matrices, assembling of global stiffness matrix, solution for displacements, reaction, stresses.

UNIT - III: TWO-DIMENSIONAL & AXI-SYMMETRIC MODELS (09 Periods)

Two dimensional problems: Basic concepts of plane stress and plane strain, stiffness matrix of Constant Strain Triangle (CST) element, finite element solution of plane stress problems.

Axi-symmetric model: Finite element modelling of axi-symmetric solids subjected to axi-symmetric loading with triangular elements.

UNIT - IV: ISO-PARAMETRIC FORMULATION & HEAT TRANSFER ANALYSIS (11 periods)

Iso-parametric formulation: Sub parametric, super parametric and iso-parametric elements, 2 dimensional 4 noded iso-parametric elements, numerical integration.

Heat transfer problems: One-dimensional finite element formulation of heat transfer with conduction, convection and Heat transfer through fins, Two-dimensional finite element formulation.

UNIT - V: DYNAMIC ANALYSIS (07 periods)

Introduction to dynamic considerations, Hamilton's principle, Dynamics of spring mass system, consistent mass matrix, Formulation of FEM model, element matrices, One-dimensional bar, truss, CST elements, Lumped mass matrices, Evaluation of Eigen values and Eigen vectors for a stepped bar and beam element.

Total Periods: 45

TEXT BOOKS:

1. Tirupati R. Chandrupatla & Ashok D. Belegundu, *Introduction to Finite Elements in Engineering*, PHI learning, 3rd Edition, 2011
2. Daryl L. Logan, *First course in the Finite Element Method*, Cengage Learning, 4th Edition 2007

REFERENCE BOOKS:

1. S. S. Rao, *Finite Element Methods in Engineering*, Elsevier, 5th Edition, 2012.
2. J. N. Reddy, *An Introduction to Finite Element Method*, Tata Mc Graw-Hill, 3rd Edition, 2005.

IV B. Tech. – I Semester
(16BT70303) OPERATIONS RESEARCH

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Industrial Engineering and Management

COURSE DESCRIPTION: Quantitative methods and techniques for effective decision making; model formulation and applications pertinent to business decision problems; mathematical tools for solving deterministic problems, linear programming formulation and optimization; transportation models; queuing models and simulation; Replacement models; Game theory.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on preparation of mathematical model for optimization in a given application.

CO2. Analyze a practical situation and apply appropriate methodology to solve the problem.

CO3. Design a system with optimum parameters to maximize the efficiency and minimize the wastage in selected situations.

CO4. Investigate alternate solutions for complex decision making problems.

CO5. Apply simulation tool to model the industrial systems.

CO6. Consider societal issues in solving industrial decision making problems for optimum benefits.

DETAILED SYLLABUS:

UNIT - I: LINEAR PROGRAMMING PROBLEM (10 Periods)

Requirements of Linear Programming Problem, Formulation, Graphical solution, Simplex method, Two–phase method, Big-M method, Dual formulation, Dual simplex method, Linear Programming special cases- Infeasible solution, Unboundedness, Redundancy, alternate optimal solutions.

UNIT - II: TRANSPORTATION AND ASSIGNMENT MODELS (10 Periods)

Transportation model: Methods to find basic feasible solution- North-West corner rule, Least cost method, Vogel'sapproximation method; Modified distribution (MODI) method to find optimal solution, Special cases of transportation problems, Transshipment problem.

Assignment model: Hungarian method, Variants of assignment problem, Travelling salesmen problem.

UNIT - III: GAME THEORY AND REPLACEMENT MODELS (09 Periods)

Game theory: Two person zero sum games, Minimax (maximin) Criterion and optimal strategy, Solution of games with saddle points, Rectangular games without saddle points- 2 x 2 games (Algebraic method), m x 2 and 2 x n games (Graphical method) and m x n games (Dominance principle).

Replacement models: Replacement of single item that deteriorate with time: With change in value of money, Without change in value of money; Group replacement.

UNIT - IV: NETWORK MODELS (08 Periods)

Minimal spanning tree, maximal flow and shortest route techniques, Project management through network analysis- CPM, PERT, cost analysis and crashing.

UNIT - V: WAITING LINES AND SIMULATION (08 Periods)

Waiting Lines: Infinite queue length model with single Channel, Poisson arrivals, Exponential service times, Infinite queue length model with multi-Channel, Poisson arrivals and exponential service times.

Simulation: Monte Carlo simulation, Simulation of a waiting line problem, Simulation of inventory model, Simulation model for a maintenance policy, Verification and validation. **Total Periods: 45**

TEXT BOOKS:

1. Hamdy A Taha, *Introduction to Operations Research*, Pearson India, 9th Edition, 2014
2. Kanti Swarup, P.K. Gupta, Manmohan, *Operations Research*, Sultan Chand & Sons, 2014.
3. J.K. Sharma, *Operations Research: Theory and Applications*, Macmillan, New Delhi, 5th Edition, 2013.

REFERENCE BOOKS:

1. Hillier, Libermann, *Introduction to Operations Research*, McGraw Hill Education (India) Private Limited, 9th Edition, 2011.
2. R Panneerselvam, *Operations Research*, PHI Learning Pvt. Ltd., 2nd Edition, 2012.

IV B. Tech. – I Semester

(16BT70304) **CRYOGENICS**

(Program Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Refrigeration & Air-conditioning

COURSE DESCRIPTION: Necessity of low temperature, Multi stage refrigeration, Cascade system, Properties of cryogenic fluids, Liquefication of air, hydrogen and helium, Applications of low temperature, Low temperature insulation, Storage systems.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the principles of cryogenics in various low temperature refrigeration applications.

CO2. Analyze the various refrigeration cycles in solving cryogenic problems.

CO3. Present the probable solution in the design of insulation to the various systems in handling the cryogenic fluids.

CO4. Conduct investigations cryogenic fluids suitable for low temperature applications in real time situations.

CO5. Apply the suitable storage and handling systems for various cryogenic fluids.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION **(09 Periods)**

Necessity of low temperature, Limitations of vapour compression system for the production of low temperature, Multi-stage refrigeration system - Cascade system.

UNIT - II: PROPERTIES OF CRYOGENIC FLUIDS **(08 Periods)**

Cryogenics - Definition, T-S diagram of a cryogen; Properties of cryogenic fluids - Liquid Methane, Liquid Neon, Liquid Nitrogen, Liquid Oxygen, Liquid Argon, Liquid Air.

UNIT - III: REFRIGERATION AND LIQUEFICATION **(09 Periods)**

Manufacture of Dry ice, Joule's Thomson effect, Liquefication of air - Linde system, Claude system, Liquefication of Hydrogen and Helium.

UNIT - IV: APPLICATIONS OF LOW TEMPERATURE **(09 Periods)**

Effects on the properties of metals - Strength, Thermal properties, Super conductivity and Super fluidity; Applications of low temperature - Expansion fitting, Cryobiology, Cryosurgery, Space research, Computers and Underground power lines.

UNIT - V: LOW TEMPERATURE INSULATION **(10 Periods)**

Types of Insulation - Reflective insulation, Evacuated powders, Rigid foams; Super insulation; Dewar vessels; Hazards in cryogenic engineering.

Total Periods: 45

TEXT BOOKS:

1. Domkundwar Arora Domkundwar, *A course in Refrigeration and Air-conditioning*, Dhanpat Rai Co., 7th Edition, 2002.
2. P L Ballany, *Refrigeration and Air-conditioning*, Khanna Publishers, 15th Edition 2009.

REFERENCE BOOKS:

1. Traugott H.K. Frederking and S.W.K. Yuan, *Cryogenics - Low Temperature Engineering and Applied Sciences*, Yutopian Enterprises, 2005.
2. A. R. Jha, *Cryogenic Technology and Applications*, Butterworth-Heinemann, 2005

IV B. Tech. – I Semester
(16BT70305) **GEOMETRIC MODELLING**
(Program Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on CAD/CAM.

COURSE DESCRIPTION: Basic concepts of coordinate systems; Bezier curves and surfaces, geometric continuity, curvature, subdivision, curve and surface fitting; Output primitives; 2-D and 3-D geometrical transformations and viewing; Surface detection methods and Computer Animation.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on the Concepts of coordinate systems and Design Parameters involved in computer aided drawings.

CO2. Analyze higher degree curves using algorithms in geometric modeling.

CO3. Propose solutions which indulge with multiple 2-D and 3-D geometrical transformations to represent and solve real engineering problems.

CO4. Conduct investigations on intricate and non linear design projects involving geometric modeling.

CO5. Apply the visual surface detection methods such as solid works, Unigraghics, Ansys, Hyper mesh for new product design.

CO6. Consider societal issues while providing designs to real time applications.

DETAILED SYLLABUS:

UNIT - I: GRAPHICS CONCEPTS (2D and 3D) (08 Periods)

Introduction to CAD process, Application area of Computer graphics, Output primitives-Points, Lines and Circles; Drawing algorithms, Transformations in Graphics – Coordinate systems, 2-D Transformations, Homogeneous and combination Transformations; 3-D Transformations-Projections, Techniques of Scan Conversion, Rendering, Hidden surface removal.

UNIT –II: MATHEMATICAL REPRESENTATION OF CURVES (09 Periods)

Types and Parametric Representations of Analytic Curves, Wire frame models, Wire frame entities, Parametric representation of synthetic curves - Hermite cubic splines, Bezier curves, B-splines rational curves; Curve Manipulations – Displaying, Evaluating points on Curves, Blending, Segmentation, Trimming, Intersection, Transformation.

UNIT –III: SURFACE MODELING (10 Periods)

Mathematical representation surfaces, Surface model, Surface entities surface representation, Parametric representation of surfaces- plane surface, rule surface, surface of revolution; Tabulated Cylinder, Parametric Representation of Synthetic Surfaces- Hermite Bicubic surface, Bezier surface, B-Spline surface, Coons surface, Blending surface , Sculptured surface, Surface manipulation- Displaying, Segmentation, Trimming, Intersection.

UNIT –IV: SOLID MODELING (10 Periods)

Solid models, solid entities, Solid Representation, Fundamentals of Solid Modeling, Set Theory, Regularized Set Operations, Set Membership Classification; Boundary Representation (B-rep), Constructive Solid Geometry (CSG), Solid Manipulations, Displaying, Evaluating points, Curves and Surfaces on solids, Segmentation, Trimming, Intersection, Editing.

UNIT –V: ADVANCED MODELING CONCEPTS (08 Periods)

Feature Based Modeling, Assembling Modeling, Behavioral Modeling, and Conceptual Design & Top down Design, Capabilities of Modeling & Analysis Packages such as solid works, Unigraghics, Ansys, Hyper mesh, Computer Aided Design of mechanical parts and Interference detection by motion analysis.

Total Periods: 45

TEXT BOOKS:

1. David F Rogers, *Mathematical Elements for Computer Graphics*, TMH, 2nd Edition, 2002.
2. M.C. Trivedi, *Computer Graphics and Animation*, Jaico Publications, 2009.

REFERENCE BOOKS:

1. Donald Hearn and M.Pauline Baker, *Computer Graphics C version*, Pearson publication, Ist Edition, 2014.

2. Ibrahim Zeid, *CAD/CAM Theory and Practice*, TMH, 2009.
3. Zhigand Xiang, Roy Plastock, *Computer Graphics*, TMH, 2nd Edition, 2006.

IV B. Tech. – I Semester

(16BT70306) QUALITY MANAGEMENT AND RELIABILITY ENGINEERING

(Program Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Industrial Engineering and Management.

COURSE DESCRIPTION: Introduction to Quality, Quality Costs, Quality Circles, QC Tools, Statistical Quality Control, Control Charts, Acceptance Sampling Evaluation, Reliability, Types of Failures, Reliability Improvement.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on the concepts of standardization and bodies of standardization for improvement of quality.

CO2. Analyze sampling plans for continuous quality in production.

CO3. Develop failure hazard models to improve reliability.

CO4. Conduct investigations to identify active and standby redundancies for reliability optimization.

CO5. Use control charts and quality tools for inspection of quality.

CO6. Improve products and processes in accordance with the requirements for building and sustaining performance excellence.

CO7. Use the quality control codes and standards in the quality control processes.

DETAILED SYLLABUS:

UNIT - I: QUALITY AND QUALITY COSTS (09 Periods)

Definition of Quality, Product Quality, Quality Control, Factors Affecting Quality, Stages of Evaluation, Continuous Improvement, Quality Management System, Quality Standards, Need for Standardization, Bodies of Standardization- ISO-9000 Series, ISO-14000 Series; ISO Certification Process, Quality Costs- Prevention, Appraisal, Internal Failure and External Failure costs, Quality Function Deployment (QFD), Tools for Continuous Improvement- Deming cycle, Poka-Yoke, and Kaizen; Quality Circles- Concepts, Objectives and advantage, Introduction to Six Sigma Concept, Advantages; QC Tools.

UNIT - II: STATISTICAL QUALITY CONTROL (09 Periods)

Introduction to SQC, Causes of Variation, Control Charts for Variables- X and R Charts; Interpretation of Control Charts, Control Charts for Attributes- P chart, C chart, U chart; Quality Rating System.

UNIT - III: ACCEPTANCE SAMPLING (09 Periods)

Acceptance Sampling Plans for Attributes- Types of Sampling Plans, Advantages and Disadvantages of Sampling Plans; Evaluation of Sampling Plans, OC Curve- Characteristics of OC Curve, Producer Risk and Consumer Risk, AOQ, AQL, ATI, ASN; Brief Introduction to Acceptance Sampling Plans for Continuous Production and Acceptance Sampling Plan for Variables.

UNIT - IV: CONCEPTS OF RELIABILITY (09 Periods)

Quality and Reliability, Importance of Reliability, Reliability Data Collection, Failure Data Analysis- MTTF, MTBF, Failure Rate, Hazard Rate, Failure Rate Curve; Types of Failures-Hazard Models (Exponential and Weibull); System Reliability with Components in Series, in Parallel and Mixed configurations.

UNIT - V: RELIABILITY IMPROVEMENT (09 Periods)

Active and Standby Redundancies, Fault Tree Analysis, Reliability Optimization, Maintainability and Availability, Application of Reliability in Maintenance Strategies.

Total Periods: 45

TEXT BOOKS:

1. Dale H Besterfield et al, *Total Quality Management, Pearson Education*, 3rd edition, 2011.
2. 2. L S Srinath, *Reliability Engineering*, East west press, 4th edition, 2005.

REFERENCE BOOKS:

1. Howard Giltow, *Quality Management*, Tata McGrawhill, 3rd edition, 2008.
2. Amitava Mitra, *Fundamentals of Quality Control and Improvement*, Wiley, 3rd edition, 2013.

3. Grant E.L, *Statistical Quality Control*, McGraw Hill education (India) Pvt. Limited, 7th edition, 2005.

IV B.Tech. - I Semester
(16BT70307) TOOL DESIGN
(Program Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Machine Tools and Modern Machining Processes.

COURSE DESCRIPTION: Basic cutting parameters; Determination of cutting forces; Stresses and Strains; Importance of heat treatment in tool design; design of dies; design of single and multi-point cutting tools.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on the impact of cutting tool angles for various operations.

CO2. Analyse the cutting tool requirement and specify the material and geometry required for a given tool in a given machining situation.

CO3. Design single/multipoint cutting tools and jigs/fixtures for selected applications.

CO4. Interpret tolerances applicable to dies, jigs, fixtures and moulds.

CO5. Select the tool and other requirements for machining an object with complex geometry.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO CUTTING TOOLS (12 periods)

Introduction, Different types of cutting tools used for machining, Designation of cutting tools, Types of systems used for designating cutting tools, Selection and Desirable properties of tool material, Characteristics of tool Material, Principal tool materials - Ferrous and Non-ferrous tool materials, Non-metallic tool materials, Calculation of Forces and Design for Cutting Forces, Tool wear, Tool life criteria, variables affecting tool life and Machinability.

UNIT - II: DESIGN OF SINGLE POINT CUTTING TOOLS (07 periods)

Introduction, Basic Elements, Design of Tool Shank, Geometry of single point cutting tool, Nomenclature of single point cutting tool, Influence of Various Angles on Tool Design, Mechanics of orthogonal cutting, Merchants force diagram, Geometry and their interrelation, Theories of formation of chip and their effect, Taylor's tool life equation.

UNIT - III: DESIGN OF MULTI POINT CUTTING TOOLS (07 periods)

Introduction, Classification of multi point cutting tools, Drill geometry, Design of Drills, Rake & Relief angles of twist drill, Speed, Feed and depth of cut, Machining time, Forces, Milling cutters, Cutting speeds and Feed machining times-design-form cutters, combination tools, Reamers.

UNIT - IV: DESIGN OF DIES FOR SHEET METAL OPERATIONS (10 Periods)

Design of sheet metal blanking and piercing: Fundamentals of die cutting operations, Power press- types, Material handling equipment, Cutting action in punch and die operation. Die clearance, Die design fundamentals-blanking and Piercing die construction.

Design of sheet metal bending, forming and drawings die:

Bending dies, drawing dies, Forming dies, Drawing operations, Determination of blank size, Drawing force, Single and Double action draw dies.

UNIT - V: DESIGN OF JIGS AND FIXTURES (09 Periods)

Introduction, Concept of degrees of freedom, 3-2-1 principle of location, Principles of location and clamping for jig and fixtures design, Different types of locators and clamps, Jig bushes, Its types, Different types of jigs and its design, Essential features of different types of fixtures, Design of fixtures, Indexing jigs and fixtures, Automatic clamping devices. **Total periods: 45**

TEXT BOOKS:

1. Donaldson, Lecain and Goold, *Tool Design*, Tata McGraw Hill, 4th edition, 2012.
2. A Bhattacharya, *Principles of Metal cutting*, New Central BookAgency, Calcutta, 2nd revised edition 2009.

REFERENCE BOOKS:

1. Surendra Kenav and Umesh Chandra, Satyaprakashan, *Production Engineering Design (Tool Design)*, New Delhi.

2. Amitabha Battacharya and Inyong Ham, *Design of Cutting Toolsuse of Metal Cutting Theory*, ASTME Publication, Michigan USA.
3. V.Arshinov, G.Alekseev, *Metal Cutting Theory and CuttingTool Design*, MIR Publications.

IV B. Tech. - I Semester

(16BT70308) COMPUTATIONAL FLUID DYNAMICS

(Program Elective-3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Heat Transfer.

COURSE DESCRIPTION: Introduction to Computational Fluid Dynamics(CFD); Various Numerical methods; Solution methods for governing equations; Finite difference method and its application to heat transfer problems; Errors and stability analysis; Study flow analysis; Simple CFD techniques.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge of CFD techniques, basic aspects of discretization and grid generation in solving partial differential equations.

CO2. Analyze CFD problems and offer probable solutions using Finite Differential approach.

CO3. Develop mathematical models and flow simulations for CFD problems.

CO4. Conduct investigations on complex CFD problems using different techniques.

CO5. Apply modern flow simulation codes for solving governing equations of computational fluid dynamics.

CO6. Use CFD techniques for critical decision making in various applications in the society to eliminate the need for expensive and complex prototypes.

DETAILED SYLLABUS:

UNIT – I: GOVERNING EQUATIONS (09 Periods)

Introduction, applications of CFD in diverse fields, Governing equations of fluid dynamics – Continuity, Momentum and energy equations; Generic differential and integral form for governing equations, Initial and Boundary conditions, Differences between Finite element method, Finite difference method and Finite volume method, Classification of partial differential equations – Hyperbolic, Parabolic, Elliptic and Mixed types; Applications and relevance.

UNIT – II: DISCRETIZATION TECHNIQUES (09 Periods)

Basic Aspects of Discretization: Introduction to finite differences, Finite difference equations using Taylor series expansion and polynomials, Explicit and implicit approaches, Uniform and unequally spaced grid points.

Grids With Appropriate Transformation: General transformation of the equations, Metrics and Jacobians, The transformed governing equations of the CFD, Boundary fitted coordinate systems, Algebraic and elliptic grid generation techniques, Adaptive grids.

UNIT – III:FINITE DIFFERENCE FORMULATIONS (09 Periods)

Parabolic Partial Differential Equations: Finite difference formulations, Explicit methods – FTCS, Richardson and DuFort-Frankel methods, Implicit methods – Laasonen, Crank-Nicolson and Beta formulation methods, Approximate factorization, Fractional step methods, Consistency analysis, Linearization.

Stability Analysis: Discrete Perturbation Stability analysis, von Neumann Stability analysis, Error analysis, Modified equations, Artificial dissipation and dispersion.

UNIT – IV: ELLIPTIC AND HYPERBOLIC EQUATIONS (09 Periods)

Elliptic Equations: Finite difference formulation, solution algorithms: Jacobi-iteration method, Gauss-Siedel iteration method, point- and line-successive over-relaxation methods, alternative direction implicit methods.

Hyperbolic Equations: Explicit and implicit finite difference formulations, splitting methods, multi-step methods, applications to linear and nonlinear problems, linear damping, flux corrected transport, monotone and total variation diminishing schemes, tvd formulations, entropy condition, first-order and second-order TVD schemes.

UNIT – V: FINITE VOLUME METHOD (09 Periods)

Introduction, Finding the flux at interface, Central schemes - Lax-Friedrichs Method, Lax-Wendroff Method, Two-Step Lax-Wendroff Method and MacCormack Method; Upwind Method in Finite Volume methods - Flux Splitting Method Steger and Warming, Vanleer, Roe's Method and finding Roe's Averages; Numerical procedure for SIMPLE algorithm, Boundary conditions for the pressure correction method; Stream function, Vorticity method. **Total Periods: 45**

TEXT BOOKS:

1. John. D. Anderson, *Computational Fluid Dynamics, the Basics with Applications*, Mc Graw Hill.6th Edition, 1995.
2. Hoffman, K.A., and Chiang, S.T., *Computational Fluid Dynamics*, Vol. I, II and III, Engineering Education System, Kansas, USA, 2000.

REFERENCE BOOKS:

1. Tapan K. Sengupta, *Fundamentals of Computational Fluid Dynamics*, 1st Edition, Universities Press, 2004.
2. Suhas V. Patankar, *Numerical Heat Transfer and Fluid Flow*, 1st Edition, CRC, 1980.

IV B. Tech. – I Semester
(16BT70309) INDUSTRIAL ROBOTICS
(Program Elective-3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Matrices and Numerical Methods and Dynamics of Machinery.

COURSE DESCRIPTION: Introduction of Robots classifications; Components; Robot drive mechanisms; Mechanical transmission methods aided in functioning of robots; Forward kinematics; inverse kinematics; Manipulator dynamics; Trajectory planning and avoidance of obstacles; Robot programming; Robot Application in Industry; Future Application and Challenges and Case Studies.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on concepts of robot, Kinematics and dynamics, Trajectory planning and programming of robot.
CO2. Identify, analyze and interpret various methods and review the contemporary problems of robotics.
CO3. Optimize various robotic configuration parameters to analyze the reverse and forward kinematics.
CO4. Investigate the performance parameters on the complex robotic designs.
CO5. Apply appropriate functional techniques, resources, and programming tools to robotic engineering activities.
CO6. Consider safety issues in designing robots for societal applications.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION (09 Periods)
Robot, Brief History, Classifications, Joint notation schemes, Work volume, Degrees of freedom, Components, End effectors - Classification of End effectors, Tools as end effectors; Drive system for grippers - Mechanical, Adhesive, Vacuum, Magnetic; Hooks & scoops, Gripper force analysis and gripper design, Active and Passive grippers.

UNIT - II: ROBOT DRIVES AND POWER TRANSMISSION SYSTEMS (08 Periods)
Robot Drive Mechanisms - Hydraulic, Electric-Servomotor, Stepper Motor; Pneumatic drives, Mechanical transmission method - Gear transmission, Belt drives; Cables, Roller chains, Link Rod systems, Rotary-to-Rotary motion conversion, Rotary-to-Linear motion conversion, Rack and Pinion drives, Lead screws, Ball Bearing screws.

UNIT - III: MANIPULATOR KINEMATICS & DYNAMICS (10 Periods)
Manipulator kinematics: Mathematical Preliminaries on Vectors & Matrices, Homogeneous transformations as applicable to rotation and translation, (D-H) notation, Forward kinematics, Inverse kinematics, Manipulators with two, Three degrees of freedom.

Manipulator dynamics: Introduction, Inertia of a Link, Lagrangian formulation for a planar 2R manipulator.

UNIT - IV: TRAJECTORY PLANNING & SENSORS (10 Periods)
Trajectory planning: Trajectory planning and avoidance of obstacles, Path planning, Skew motion, Joint integrated motion, straight line motion.

Sensors: Position sensors, Velocity sensors, Tactile sensors, Proximity sensors, Machine vision sensors, Fail safe hazard sensor systems and Compliance mechanism.

UNIT - V: ROBOT PROGRAMMING AND APPLICATIONS (08 Periods)
Robot programming: Types, Features of languages and Software packages.

Robot application: Robot Application in Industry, Task programming, Goals of AI Research, AI Techniques, Robot Intelligence and Task Planning, Modern Robots, Future Application and Challenges, and Case Studies. **Total Periods: 45**

TEXT BOOKS:
1. M.P.Groover, *Industrial Robotics: Technology, Programming, and Applications*, Tata McGraw-Hill, 2008.
2. John. J. Craig, *Introduction to Robotics: Mechanics and Control*, Pearson/Prentice Hall, 3rd Edition, 2005.

REFERENCE BOOKS:
1. Richard. D.Klafter, *Robotics Engineering: an integrated approach*, Prentice-Hall publisher, 1st Edition, 1988.

2. K. S. Fu., R. C. Gonzalez, C. S. G. Lee, *Robotics: Control Sensing*, Vision and Intelligence, International Edition, Tata McGraw Hill, 2008.
3. Ashitav Ghosal, *Robotics*, *Fundamental Concepts and Analysis*, Oxford Press, 2006.
4. Mittal R.K & Nagrath IJ, *Robotics and Control*, Tata McGraw Hill, 6th Edition, 2007.

IV B. Tech. – I Semester
(16BT70310) PRODUCT DESIGN
(Program Elective-3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Design of Machine Elements-I, CAD/CAM, Manufacturing Technology and Industrial Engineering and Management.

COURSE DESCRIPTION: Introduction to Design process; Identifying customer needs; Product development and design processes and methods; Product specifications; Concept development; Theory of Inventive Problem solving (TRIZ); Conception selection; Conception testing; Introduction to Embodiment design; Product architecture; Industrial design; Design for prototyping; and manufacturing; Ethical issues considered during Engineering Design Process.

COURSE OUTCOMES: On successful completion of this course, students will be able to

CO1. Demonstrate the knowledge on general design principles, material selection, theories of failure, factor of safety and manufacturing considerations.
CO2. Analyze and interpret the given product by modeling and simulation techniques by using the design specifications.
CO3. Design the complex engineering models and solution for the product.
CO4. Investigate and improve the process by using the tools like Failure mode effect analysis and Taguchi Methods.
CO5. Consider societal and safety issues in the designing of the products.
CO6. Follow the Ethical principles during engineering design process.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO DESIGN (08 Periods)

The design process, Morphology of Design, Design drawings, Computer Aided Engineering, Designing of standards, Concurrent Engineering, Product life cycle, Technological Forecasting, Market Identification, Competition Bench marking, Systems Engineering, Life Cycle Engineering, Human Factors in Design, Industrial Design.

UNIT - II: DESIGN METHODS AND EVALUATION (10 Periods)

Creativity and Problem Solving, Product Design Specifications, Conceptual design - Pugti's chart, Decision theory, Theory of Inventive Problem solving; Embodiment Design - Detail Design, Evaluating Customer requirements and Bench marking, Quality Function Development; House of Quality (HOQ), Information sources, Copyright, Expert systems - Structural and Shape Optimization.

UNIT - III: EMBODIMENT DESIGN (10Periods)

Introduction to Product Architecture, Configuration and Parametric design Concepts, Industrial Design, Ergonomics and Design for Environment, Modeling and Simulation for engineering design process, Total Quality Concept - Quality Assurance, Statistics Process Control, Taguchi Methods; Robust Design, Failure Model Effect Analysis

UNIT - IV: MATERIAL SELECTION PROCESSING AND DESIGN (10periods)

Material selection Process, Economics - Cost Vs Performance; Weighted Property Index, Value Analysis, Role of Processing and Design, Classification of Manufacturing Process - Design for Manufacture, Design for Assembly, Design for castings, Forging, Metal Forming, Machining and Welding; Residual stresses - Fatigue, Fracture and Failure.

UNIT - V: TEAM WORK AND ETHICS IN ENGINEERING DESIGN (07 periods)

Team formation, functioning, discharge, team dynamics, Ethical issues considered during engineering design process, Project execution.

Total Periods: 45

TEXT BOOKS:

1. George E Dieter, Linda C. Schmidt, *Engineering Design*, McGraw Hill, 4th Edition, 2013.
2. Karl T Ulrich, Steven Eppinger, Anita Goyal, *Product Design Development*, McGraw Hill, 4th Edition, 2009.

REFERENCE BOOKS:

1. A. K. Chitale; R.C. Gupta, *Product Design and Manufacturing*, Prentice - Hall India, 5th Edition, 2011.
2. Dieter Kevin Otto and Kristin Wood, *Product Design: Techniques in Reverse Engineering and New Product Development*, Pearson Education Inc, 1st Edition, 2003.

IV B. Tech. - I Semester

(16BT70311) PRODUCTION AND OPERATIONS MANAGEMENT

(Program Elective-3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Industrial Engineering and Management.

COURSE DESCRIPTION: Overview of production and operations management concepts and issues from both strategic and operational perspective; relationships between operations and environment; analysis of strategic issues relating to competitiveness in production and operations management, and application of tools to improve productivity in production and operations; concepts/principles related to management of operations – forecasting demand; production, material and capacity requirements planning; scheduling; inventory planning and control; lean and supply chain management systems.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge of Aggregate Planning, Scheduling, Forecasting, and Supply Chain Management to various operations of industry.

CO2. Analyze the operations of an industry and incorporate principles and concepts of operations management to asses and improve operational performance.

CO3. Design a process by optimizing the use of resources that meet the specified needs with appropriate consideration for industrial operations.

CO4. Apply the techniques of forecasting, aggregate planning, Just-In-Time, Enterprise Resource Planning, Kaizen to establish methods for maximizing productivity.

CO5. Use the concepts of operations management and specialized knowledge in Operations Management to solve business processes steering to meet societal needs.

CO6. Manage the industrial projects from forecasting of demand, identification of Material requirements, scheduling on machines and dispatching it to customer

DETAILED SYLLABUS:

UNIT - I: OPERATIONS MANAGEMENT CONCEPTS (09 Periods)

Introduction, Historical development, Information and Nonmanufacturing systems, Operations management, Factors affecting productivity, International dimensions of productivity, environment of operations, Production systems decisions.

UNIT - II: FORECASTING DEMAND (09 Periods)

Forecasting: objectives and uses, Forecasting variables, Opinion and judgmental methods, Time Series Methods: Moving Average Method, Weighted Moving Average Method, Exponential smoothing, Regression and correlation methods; Application and control of forecasts.

UNIT - III: AGGREGATE PRODUCTION PLANNING (09 Periods)

Planning hierarchies in operations, Need for aggregate production Planning, Alternatives for managing supply and demand, Basic strategies for aggregate production planning - level, Chase and mixed, Aggregate Production Planning Methods, Master production scheduling. Introduction to aggregate capacity planning.

UNIT - IV: MATERIAL REQUIREMENTS PLANNING & LEAN SYSTEMS (09 Periods)

MRP-underlying concepts, Bill of Material, System parameters, MRP logic, System refinements. Manufacturing Resource Planning, Enterprise Resource Planning. Just-in-Time, Pull method of materials flow, Consistently high quality, Small lot sizes, Uniform workstation loads, Standardized components and work methods, Close supplier ties, Flexible workforce, Line flows, Automated production, Preventive maintenance, continuous improvement, Kaizen.

UNIT - V: MACHINE SCHEDULING & SUPPLY CHAIN MANAGEMENT (09 Periods)

Flow shop scheduling- Introduction, Johnson's rule for 'n' jobs on 2 and 3 machines, CDS heuristic, Palmer's Heuristic; Job scheduling- Types of schedules, Heuristic procedure, scheduling 2 jobs on 'm' machines, Supply chain components, Supply chain structures, Bullwhip effect, Role of information technology in Supply Chain Management. **Total Periods: 45**

TEXT BOOKS:

1. B.Mahadevan, *Operations Management*, Pearson education, 2nd edition, 2010.
2. Everett E. Adams and Ronald J. Ebert, *Production and Operations Management*, PHI Learning, 5th edition, 2009.
3. Lee J Krajewski, Larry P Ritzman and M K Malhotra, *Operations Management – Processes and Value Chains*, 8th edition, 2008.

REFERENCE BOOKS:

1. S N Chary, *Production and Operations Management*, Tata-McGraw-Hill education (India), Pvt limited, 2013.
2. Monks J.G., *Operations Management*, Schaums outline series, McGraw-Hill International Edition, 5th edition, 1996.
3. R Pannerselvam, *Production and Operations Management*, PHI learning, 2nd edition, 2009.

IV B. Tech. – I Semester

(16BT70312) POWER PLANT ENGINEERING

(Program Elective-4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Thermal Engineering-II and Heat transfer.

COURSE DESCRIPTION: Energy sources; Types of Power Plants; Thermal power plant; Study of various systems of thermal power plant; Combustion and Firing Methods; Diesel Power plant; Gas Turbine Power Plants; Hydroelectric power plants and Nuclear power plants; Power generation and recovery systems; Various conventional and nonconventional sources of energy with power plant economics.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on various power plants and its sub systems.
CO2. Identify, analyze and formulate the various systems and components in power plants.
CO3. Propose probable designs of power plants for a particular geographic region.
CO4. Conduct investigation on the components of power plants using thermodynamic analysis to predict the performance of the power plants.
CO5. Consider health and safety issues in selecting a suitable type of power plant in a given location.
CO6. Provide preliminary estimates of the capital cost and operating costs of a power plant.

DETAILED SYLLABUS:

UNIT - I: THERMAL POWER PLANT (09 Periods)

Introduction to the sources of energy, Plant layout, selection of site for power plant, Coal handling systems, Overfeed and underfeed stoker principles, Traveling grate stokers, Spreader stokers, Multi retort stokers, Pulverized fuel firing - Pulverized fuel handling, Pulverizing mills, Pulverized fuel burners; Ash handling systems, Dust collectors.

UNIT - II: DIESEL ENGINE AND GAS TURBINE POWER PLANTS (07 periods)

Diesel Power Plant: Essential components of diesel power plant, Operation of diesel power plant, Plant layout with auxiliaries.

Gas Turbine Plant: Requirements, Functions, Classification, Construction, and Layout with auxiliaries.

UNIT - III: HYDRO ELECTRIC AND NUCLEAR POWER PLANTS (11 periods)

Hydro Electric Power Plant: Selection of site for power plant, Typical layouts, Elements of plant, Classification of dams, Spill ways, Surge tank, Draft tube, Classification of Hydroelectric power plants, Hydrology, Hydrological cycle, Hydrographs; **Nuclear Power Plants:** Requirements, Functions, Nuclear fuel, Breeding and Fertile materials, Nuclear reactor, Reactor operation, Types Of Reactors - Pressurized water reactor, Boiling water reactor, Sodium-Graphite reactor, Fast breeder reactor, Homogeneous reactor, Gas cooled reactor.

UNIT - IV: NON CONVENTIONAL POWER GENERATION AND DIRECT ENERGY CONVERSION SYSTEMS (09 Periods)

Non-Conventional Power Generation: Solar, Wind, Tidal, Ocean energy conversion, Geothermal, and biogas power plants.

Direct energy conversion systems: Thermoelectric conversion system, Thermionic conversion system, Photovoltaic power systems, Magneto Hydrodynamic systems, Electrostatic mechanical generators, Electro gas-dynamic generators, and Fuel cells.

UNIT - V: POWER PLANT ECONOMICS AND POLLUTIONS (09 Periods)

Load curves, Load duration curve, Definitions of connected load, Maximum demand, Demand factor, Load factor, Plant capacity factor, Plant use factor, Diversity factor, Cost Analysis, Power plant pollution- Pollutions from Thermal and Nuclear Power plants. **Total Periods: 45**

TEXT BOOKS:

1. R.K.Rajput, *A Text Book of Power Plant Engineering*, Laxmi Publications, 3rd edition, 2014.

2. Arora and S. Domkundwar, *A Course in Power Plant Engineering*, Dhanpat Rai and Co, 3rd Edition, 2012.

REFERENCE BOOKS:

1. P.K.Nag, *Power Plant Engineering*, TMH, 2nd edition, 2006.
2. K.K Ramalingam, *Power Plant Engineering*, Scitech Publishers, 2nd edition, 2010.
3. Dr.P.C Sharma, *Power Plant Engineering*, Sk Kataria and sons publishers, 8th Edition, 2011.

IV B. Tech – I Semester

(16BT70313) PROJECT MANAGEMENT

(Program Elective-4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Industrial Engineering and Management.

COURSE DESCRIPTION: Project Characteristics; Project Selection; Economics; Feasibility Assessment and Evaluation; Project integration; Project scope management; Project time and cost management; Organizational and Work Breakdown; Scheduling; Budgeting; Project Control; Project Auditing; Financing for projects; Project investment evaluation.

EXPECTED OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the process of project management and practice it in the execution of projects.

CO2. Analyze the key performance metrics, audit report and project closure activities to obtain formal project acceptance.

CO3. Develop the resources required for a project to produce effective work plan and resource schedule.

CO4. Apply project management tools and techniques for project communications, risk analysis, and quality control.

CO5. Steer the projects for maximizing societal benefit.

CO6. Provide accurate project cost estimates and to plan various activities accordingly.

DETAILED SYLLABUS:

UNIT –I: PROJECT SELECTION AND PLANNING (09 Periods)

Project identification and formulation; Needs analysis - Resource surveys, Market research; Identification of investment opportunities; Feasibility analysis - Technical feasibility; Technology forecasting - Choice of technology, Techno economic analysis, Appropriate technology; Project environment - Nature, and Characteristics of projects; Projects screening - Project selection, Project portfolio process; Project life cycle; Work content - Work breakdown structure, Time Estimation Method; Systems integration; Interface coordination; Social Cost Benefit Analysis.

UNIT –II: PROJECT IMPLEMENTATION (09 Periods)

Estimating Project Budgets; Process of cost estimation; Project Scheduling tools; Developing Project Plan (Baseline); Project cash flow analysis; Project scheduling with resource constraints - Resource Leveling and Resource Allocation; Project Execution and Administration; Project contracting - Contract pricing, Project time monitoring and Cost monitoring, Project over run.

UNIT –III: MONITORING AND INFORMATION SYSTEMS (09 Periods)

Information needs and the reporting process; Computerized project management information system; Earned value analysis; Planning-Monitoring-Controlling cycle; Project control - Types of control processes, Design of control systems, Control of change and scope.

UNIT –IV: PROJECT APPRAISAL AND PROJECT AUDITING (09 Periods)

Project Appraisal - Objectives, Essentials of a project methodology, Market appraisal, Technical appraisal, Financial appraisal, Socio-economic appraisal, Management appraisal; Post-Project analysis - Construction and use of audit report, Project audit life cycle, Essentials of audit and evaluation, Varieties of project termination, The termination process.

UNIT –V: PROJECT FINANCING (09 Periods)

Rationale of Project Financing; Essential elements of project financing; Analysis of project viability and risk management; Ownership and Financial Structuring; Legal Documentation; Investment evaluation using capital budgeting techniques - Net present value, Payback period, Discounted cash flow, Internal rate of return.

Total Periods: 45

TEXT BOOKS:

1. Prasanna Chandra, *Projects: Planning, Analysis, Selection, Financing, Implementation and Review*, McGraw Hill Education (India) Private Limited, 8th edition, 2014.

2. Jack R. Meredith, and Samuel J. Mantel Jr., *Project Management – A Managerial Approach*, Wiley India Pvt. Ltd., New Delhi, 8th Edition, 2012.

REFERENCE BOOKS:

1. Harold Kerzner, *Project Management – A Systems Approach to Planning, Scheduling and Controlling*, Wiley India Pvt. Ltd., 10th Edition, 2013.
2. Larry Richman, *Project Management: Step-by-Step*, PHI Learning Private Limited, 2011.

IV B. Tech. – I Semester

(16BT70314) **RAPID PROTOTYPE TECHNOLOGY**

(Program Elective-4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on CAD/CAM and Manufacturing Technology.

COURSE DESCRIPTION: History of RP systems; Stereo; Data files and machine details; Type of machines; Solid Ground Curing; Principle of operation, Machine details; Applications; Thermal jet printer; 3-D printer; GenisysXs printer HP system 5; Indirect Rapid tooling, Silicone rubber tooling; Aluminum filled epoxy tooling; Tooling; Quick cast process; Copper polyamide; Rapid Tool; DMILS; Software For RP; STL files; Overview of Solid view; Collaboration tools; Rapid manufacturing process optimization; Vacuum; Casting, Surface digitizing; data transfer to solid models.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge to identify the tools needed to produce a prototype of the product using RPT techniques.
CO2. Analyze the various simulations /proto typings and select an RPT system.
CO3. Develop the steps to acquire the desired products in any RPT system using the knowledge of process parameters of the machine.
CO4. Investigate the viability of various rapid tooling for specific applications.
CO5. Apply tools to develop manufacturing data which will be essential to produce products conforming to industrial standards.

DETAILED SYLLABUS:

UNIT - I: FUNDAMENTALS OF RAPID PROTOTYPING (09 Periods)

Definition, Types of prototypes, Classification of RP Systems, Need for the compression in product Development, History of RP systems, Applications survey, Development of RP industry.

UNIT - II: STEREO LITHOGRAPHY SYSTEMS (09 Periods)

Principle; Process parameters; Process details; Data preparation; Data files and machine details; Application. Selective laser sintering: Machine types, Operating principle, Process parameters, Data preparation for SLS, Applications, and Fusion deposition modeling: Principle, Process parameters, Path generation, Applications.

UNIT - III: SOLID GROUND CURING (09 Periods)

Principle, Machine details, Applications, Laminated Object Manufacturing: Principle, LOM materials, Process details, Application. Concepts modelers: Principle, Thermal jet printer, Sander’s model market, 3-D printer, GenisysXs printer HP system – 5, Object Quadra systems.

UNIT - IV: RAPID TOOLING (09 Periods)

Indirect Rapid tooling, Silicon rubber tolling, Aluminium filled epoxy tooling, Spray metal tooling, Cast kirksite, 3D Keltool, Direct Rapid Tooling - Direct, AIM, Quick cast process, Copper polyamide, Rapid Tool, DMILS, Prometal, Sand casting tooling, Laminate tooling- soft Tooling and Hard tooling.

UNIT - V: SOFTWARE FOR RAPID PROTOTYPING (09 Periods)

STL files, Overview of Solid view, Magics, Magic communicator, Internet based software, Collaboration tools, Rapid Manufacturing Process Optimization - Factors influencing accuracy, Data preparation errors, Part building errors, Error in finishing, Influence of build orientation.

Allied processes: Vacuum casting, Surface digitizing, Surface generation from point cloud, Surface modification, Data transfer to solid models. **Total Periods: 45**

TEXT BOOKS:

1. Paul F. Jacobs, *Stereo lithography and other RP and M Technologies*, SME, New York, 3rd edition, 1996.
2. Frank W. Liou, *Rapid Prototyping and Engineering Applications*, CRC Press Taylor and Francis Group, New York, Special Indian Edition, 2011.

REFERENCE BOOKS:

1. C. K. Chua, K. F. Leong, C. S. Lim, *Rapid Prototyping - Principles and Applications*, Yesdee publications Pvt. Ltd., Mumbai, India, 2^{nd} edition, 2010.
2. Hari Prasad, K.S. Badarinarayan, *Rapid Prototyping and Tooling*, SIP PageTuners, Bangalore, 1^{st} Edition, 2013.
3. Fiham D.T, Dinjoy S. S, *Rapid Manufacturing*, Verlog, London, 4^{th} edition, 2002.

IV B. Tech. - I Semester

(16BT70315) TRIBOLOGY

(Program Elective-4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Fluid Mechanics and Design of Machine Elements-II.

COURSE DESCRIPTION: Surface friction; characteristic, sources, wear of various metals; lubricants, types, lubrication necessity; film lubrication theory; loads on bearing; surface modification; surface coatings; fusion processes; material for bearings.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on effect of friction, wear phenomenon and lubrication in any system of mechanism.

CO2. Analyze complex problems in tribological system of mechanical engineering.

CO3. Design the journal bearing and provide suitable lubrication to minimize the stresses.

CO4. Conduct investigations on complex problems tribology and provide valid Solutions

CO5. Deploy the contextual knowledge on friction/lubrication mechanisms to the professional Engineering practices.

CO6. Implement the design pattern to have eco-friendly environment and sustainable development.

DETAILED SYLLABUS:

UNIT - I: SURFACES AND FRICTION (09 Periods)

Topography of Engineering surfaces, Contact between surfaces, Sources of sliding Friction, Adhesion Ploughing - Energy dissipation mechanisms; Friction Characteristics of metals, Friction of non metals, Friction of lamellar solids, friction of Ceramic materials and polymers, Rolling Friction, Source of Rolling Friction, Stick slip motion, Measurement of Friction.

UNIT - II: WEAR (09 Periods)

Types of wear, Simple theory of Sliding Wear, Mechanism of sliding wear of metals, Abrasive wear, Materials for Adhesive, Abrasive wear situations, Corrosive wear, Surface Fatigue wear situations, Brittle Fracture wear, Wear of Ceramics and Polymers, Wear Measurements.

UNIT - III: LUBRICANTS AND LUBRICATION TYPES (09 Periods)

Lubrication types, properties, Requirements of Lubricants, Testing methods, Hydrodynamic Lubrication, Elasto-hydrodynamic lubrication, Boundary Lubrication, Mist lubrication, Necessity of lubrication, Solid Lubrication, Hydrostatic Lubrication.

UNIT - IV: FILM LUBRICATION THEORY (09 Periods)

Fluid film in simple shear, Viscous flow between very close parallel plates, Shear stress variation, Reynolds Equation for film Lubrication, High speed unloaded journal bearings, Loaded journal bearings, Reaction torque on the bearings, Virtual Co-efficient of friction, The Somerfield diagram.

UNIT - V: SURFACE ENGINEERING AND BEARING MATERIALS (09 Periods)

Surface modifications, Transformation Hardening, Surface fusion, Thermo chemical processes, Surface coatings, Plating and anodizing, Fusion Processes, Vapour Phase processes, Materials for rolling Element bearings, Materials for fluid film bearings, Materials for marginally lubricated and dry bearings.

Total no. of periods: 45

TEXT BOOKS:

1. I.M. Hutchings, Tribology, Friction and Wear of Engineering Material, Edward Arnold, London, 1992.
2. A.Harnoy, *Bearing Design in Machinery*, Marcel Dekker Inc, New York, 2003

REFERENCE BOOKS:

1. Kenneth C Ludema, *Friction, Wear, Lubrication: A Textbook in Tribology*, CRC Press,1996.
2. A.Cameron, *Basic Lubrication Theory*, Longman, U.K.., 1981.
3. M.J.Neale (Editor), *Tribology Handbook* , Newnes. Butter worth, Heinemann, U.K.,1995.
4. T.A. Stolarski, *Tribology in Machine Design*, Industrial Press Inc., 1990.

IV B. Tech. - I Semester
(16BT70331) COMPUTER AIDED MANUFACTURING AND AUTOMATION LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: --

COURSE DESCRIPTION: CNC Programming; Pressure control valve; flow control valve; Directional control valve; Logic controls; Timers; PLC; Ladder diagram; Robotics.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the practical usage of automation and robotics.
CO2. Analyse the hydraulic, pneumatic circuits for the appropriateness to real time applications.
CO3. Design and model different components using automation and develop codes for part programming in CNC
CO4. Conduct investigations to suit the automation and robotics for practical applications.
CO5. Using computer numerical control techniques in computer aided manufacturing of components.
CO6. Formulate the team to attain multidisciplinary settings in achieving automation.
CO7. Communicate effectively on sequence of manufacturing operations for the given component or machine.

Any TWELVE Experiments Should Be Coducted and Six Experiments in Each section.

LIST OF EXPERIMENTS:

CAM:

1. Exercise in Basic manual part program and simulation practice in CNC TURN
   a) Step turning.
   b) Step turning and Taper turning, Profile turning.
2. Exercise in manual part program using canned cycle and simulation practice in CNC TURN
   a) Step turning using canned cycle.
   b) Grooving using canned cycle.
   c) Thread cutting using canned cycle.
   d) Drilling using canned cycle.
3. Exercise in Basic manual part program and simulation practice in CNC MILL
   a) Profile Milling.
   b) Circular pocket milling.
   c) Rectangular pocket milling.
4. Component making practice in CNC TURN
   a) Step turning.
5. Component making practice in CNC TURN
   a) Step turning and Taper turning, Profile turning.
6. Component making practice in CNC TURN
   a) Thread cutting using canned cycle.
7. Component making practice in CNC Mill
   a) Profile Milling.
8. Component making practice in CNC Mill
   a) Rectangular pocket milling
9. Die Making practice using CNC Mill

AUTOMATION:

1. Design and testing of hydraulic circuits for Single acting cylinder using pressure control Valves, flow control valves, DCVs (Mechanical, Pilot, Solenoid)
2. Design and testing of hydraulic circuits for double acting cylinder using pressure control Valves, flow control valves, DCVs (Mechanical, Pilot, Solenoid)
3. Design and testing of hydraulic circuits for single/double acting cylinder using Gate valves Pressure control valves, flow control valves, DCVs(Mechanical, Pilot, Solenoid)

4. Design of circuit with programmed logic sequence, using PLC in hydraulic Electro hydraulic Trainer
5. Programming of PLC using ladder logic diagram
6. Circuits with multiple cylinder sequences in Electro pneumatic Trainer using PLC
7. Simulation of basic hydraulic, pneumatic and electrical circuits using Automation studio Soft ware.
8. Modeling and analysis of basic electrical, hydraulic, and pneumatic systems using MATLAB/LABVIEW software
9. Programming exercise for robot

IV B. Tech. - I Semester

(16BT70332) INDUSTRIAL ENGINEERING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Course on Operations Research.

COURSE DESCRIPTION: Work study; Method Study; Preparation of Process Charts; Work Measurement; Time Study; Productivity; Sampling; Quality control for attributes; Ergonomics; Supply Chain Management, Simulation of Inventory.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the concepts and use of IE techniques in providing solutions to complex productivity related Problems.

CO2. Analyze the process parameters required for conducting the experiments related to industrial engineering problems.

CO3. Prepare (Design) and conduct the exercises on Process chart, Method study and Work Measurement for effective utilization of Man- power resources.

CO4. Investigate the results obtained in the various experiments anovide suitable conclusions.

CO5. Apply IE techniques to achieve Effective work place environment.

CO6. Work and contribute to team to accomplish common goals.

CO7. Communicate effectively about laboratory work reports and presentation.

Any TWELVE Experiments Should Be Coducted

LIST OF EXPERIMENTS

1. Preparation of Process Charts for Method Study
2. String diagram
3. Work Measurement - Time study by Stop watch
4. Bolt & Nut assembly, Productivity enhancement experiment
5. Hand-tool dexterity test –Fatigue Mesurment
6. Minnesota dexterity test
7. Pyramid Puzzle Burmese test
8. O’Connor Finger Dexterity Test
9. Purdue Peg Board test
10. Simple Assembly Process experiment
11. Segregation/Sorting test using different size bolts, washers (rubber & metal), nuts, screws with one hand and with both hands
12. Jebsen Taylor Hand function test
13. Study of Control charts for variables
14. Quality Control of Attributes - Sampling experiments
15. Bull-whip effect /Beer Game/

IV B. Tech – I Semester
(16BT70333) COMPREHENSIVE ASSESSMENT

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	100	100	-	-	-	2

PRE-REQUISITES: All the courses of the program.

COURSE DESCRIPTION: Assessment of student learning outcomes in the courses of the program.

COURSE OUTCOMES: Comprehensive Assessment enables a successful student to demonstrate:

CO1. Knowledge in the courses of the program.

CO2. Analytical ability in the courses of the program.

CO3. Design skills in the courses of the program.

CO4. Ability to investigate and solve complex engineering problems in the courses of the program.

CO5. Ability to apply tools and techniques to complex engineering activities with an understanding of limitations in the courses of the program.

CO6. Ability to provide solutions as per societal needs with consideration to health, safety, legal and cultural issues in the courses of the program.

CO7. Understanding of the impact of the professional engineering solutions in environmental context and need for sustainable development in the courses of the program.

CO8. Ability to apply ethics and norms of the engineering practice in the courses of the program.

CO9. Ability to function effectively as an individual in the courses of the program.

CO10. Ability to present views cogently and precisely in the courses of the program.

CO11. Ability to engage in life-long leaning in the courses of the program.

IV B. Tech – II Semester
(16BT80331) **PROJECT WORK**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
100	100	200	-	-	-	12

PRE-REQUISITES: All the courses of the program.

COURSE DESCRIPTION: Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Preparation of thesis and presentation.

COURSE OUTCOMES: Completion of the project work enables a successful student to demonstrate:

CO1. Knowledge on the project topic.

CO2. Analytical ability exercised in the project work.

CO3. Design skills applied on the project topic.

CO4. Ability to investigate and solve complex engineering problems faced during the project work.

CO5. Ability to apply tools and techniques to complex engineering activities with an understanding of limitations in the project work.

CO6. Ability to provide solutions as per societal needs with consideration to health, safety, legal and cultural issues considered in the project work.

CO7. Understanding of the impact of the professional engineering solutions in environmental context and need for sustainable development experienced during the project work.

CO8. Ability to apply ethics and norms of the engineering practice as applied in the project work.

CO9. Ability to function effectively as an individual as experienced during the project work.

CO10. Ability to present views cogently and precisely on the project work.

CO11. Project management skills as applied in the project work.

CO12. Ability to engage in life-long leaning as experience during the project work.

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(AUTONOMOUS)

Sree Sainath Nagar, A.Rangampet, Near Tirupati - 517 102. A.P.

Salient Features of Prohibition of Ragging in Educational Institutions Act 26 of 1997

- Ragging within or outside the College is prohibited.
- Ragging means doing an act which causes or is likely to cause insult or annoyance or fear or apprehension or threat or intimidation or outrage of modesty or injury to a student

Nature of Ragging	Punishment
Teasing, Embarrassing and humiliating	Imprisonment up to 6 months or fine up to Rs. 1,000/- or Both
Assaulting or using criminal force or criminal intimidation	Imprisonment up to 1 year or fine up to Rs. 2,000/- or Both
Wrongfully restraining or confining or causing hurt	Imprisonment up to 2 years or fine up to Rs. 5,000/- or Both
Causing grievous hurt, Kidnapping or rape or committing unnatural offence	Imprisonment up to 5 years or fine up to Rs. 10,000/-
Causing death or abetting suicide	Imprisonment up to 10 years or fine up to Rs. 50,000/-

Note:

1. A student convicted of any of the above offences, will be expelled from the College.
2. A student imprisoned for more than six months for any of the above offences will not be admitted in any other College.
3. A student against whom there is prima facie evidence of ragging in any form will be suspended from the College immediately.
4. The full text of Act 26 of 1997 **and** UGC Regulations on Curbing the Menace of Ragging in Higher Educational Institutions, 2009 **(Dated 17th June, 2009) are placed in the College library for reference.**

ACADEMIC REGULATIONS
CHOICE BASED CREDIT SYSTEM

M. Tech. Regular Two Year Degree Program
(for the batches admitted from the academic year 2016–17)

For pursuing Two year degree program of study in Master of Technology (M.Tech) offered by Sree Vidyanikethan Engineering College under Autonomous status and herein after referred to as SVEC (Autonomous):

1. **Applicability** : All the rules specified herein, approved by the Academic Council, shall be in force and applicable to students admitted from the academic year 2016-2017 onwards. Any reference to "College" in these rules and regulations stands for SVEC (Autonomous).

2. **Extent:** All the rules and regulations, specified hereinafter shall be read as a whole for the purpose of interpretation and as and when a doubt arises, the interpretation of the Chairman, Academic Council is final. It shall be ratified by Academic Council in the forth coming meeting. As per the requirements of statutory bodies, Principal, SVEC (Autonomous) shall be the Chairman, Academic Council.

3. **Admission** :

3.1. Admission into the Two Year M. Tech. Degree Program of study in Engineering:

3.1.1. Eligibility:

- A candidate seeking admission into the two year M. Tech Degree Program should have

  (i) Passed B.Tech / B.E or equivalent Program recognized by JNTUA, Anantapuramu, for admission as per the guidelines of Andhra Pradesh State Council of Higher Education (APSCHE).

  (ii) A minimum percentage of marks in the qualifying degree as prescribed by the AICTE / UGC or Government at the time of admission.

  (iii) Rank / score secured in the PGECET / GATE examination conducted by APSCHE/ MHRD for allotment of a seat by the convener PGECET, for admission.

3.1.2. Admission Procedure:

Admissions are made into the two year M.Tech. Degree Program as per the stipulations of APSCHE, Government of Andhra Pradesh:

(a) By the Convener, PGECET (for Category–A Seats)

(b) By the Management (for Category-B Seats).

4. **Programs of study offered leading to the award of M.Tech. Degree and Eligibility:**

Following are the two year postgraduate degree Programs of study offered in various branches at in SVEC (Autonomous) leading to the award of M.Tech. degree and eligibility to get admission into the Programs:

Name of the specialization	Offered by the Department	Name of the Degree / Branch eligible for Admission
Electrical Power Systems	EEE	BE/ B.Tech / AMIE in Electrical & Electronics Engineering / Electrical Engineering or equivalent
Digital Electronics and Communication Systems	ECE	BE / B.Tech in ECE / AMIE in ECE, AMIE (Electronics & Telecommunication Engineering) / AMIETE (Electronics & Telematics Engineering)/ Electronics & Computer Engineering/ Electronics/ Electronics & Telematics or equivalent
Communication Systems		
VLSI		BE / B.Tech / AMIE in ECE, / EEE / CSE / Electronics & Computer Engineering / ETE / IT / CSIT / Electronics and Control Engineering / Instrumentation Engineering / Instrumentation Technology / EIE / Electronics Engineering / Bio-Medical Engineering / AMIETE (Electronics & Telematics Engineering)/ Electronics or equivalent
Computer Science	CSE	BE / B.Tech / AMIE in CSE / CSIT / IT / CSSE , M. Sc. (Computer Science), M. Sc. (Information Systems), M. Sc. (Information Technology), MCA or equivalent.
Computer Networks and Information Security		
Software Engineering	IT	

5. Duration of the Program:

5.1 Minimum Duration: The program will extend over a period of two years leading to the Degree of Master of Technology (M.Tech) of the JNTUA, Ananthapuramu. The two academic years will be divided into four semesters with two semesters per year. In first year, each semester shall normally consist of 22 weeks (≥90 working days) having – 'Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)'. In second year, each semester shall consists of 18 weeks and the entire year is for project work. Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as suggested by UGC, and Curriculum/ Course Structure as suggested by AICTE are followed.

5.2 Maximum Duration: The student shall complete all the passing requirements of the M.Tech degree program within a maximum duration of 4 years including Gap year, this duration reckoned from the commencement of the semester to which the student was first admitted to the program.

I SEMESTER (22 weeks)	**INSTRUCTION PERIOD**: I Spell : 7 Weeks II Spell : 9 Weeks	16 Weeks
	Internal Examinations : I Mid : 1 week II Mid : 1 week	2 Weeks
	Preparation & Practical Examinations	2 Week
	External Examinations	2 Weeks
	Semester Break	2 Weeks
II SEMESTER (22 weeks)	**INSTRUCTION PERIOD**: I Spell : 7 Weeks II Spell : 9 Weeks	16 weeks
	Internal Examinations : I Mid : 1 week II Mid : 1 week	2 Weeks
	Preparation & Practical Examinations	2 Week
	External Examinations	2 Weeks
	Summer Vacation	4 Weeks
III SEMESTER	Project Work Phase – I	19 Weeks
IV SEMESTER	Project Work Phase – II	19 Weeks
	Project Work Viva-Voce examinations	2 Weeks

6. **Course Structure:** Each Program of study shall consist of:

- Professional core courses:

  The list of professional core courses are chosen as per the suggestions of the experts, to impart knowledge and skills needed in the concerned specialization of study.

- Professional elective courses:

  Professional elective courses shall be offered to the students to diversify their spectrum of knowledge and skills. The elective courses can be chosen based on the interest of the student to broaden his individual knowledge and skills.

- Audit Courses: Audit courses shall be offered to the students to diversify their knowledge.

Contact periods: Depending on the complexity and volume of the course the number of contact periods per week shall be assigned.

7. **Credit System:** All Courses are to be registered by a student in a Semester to earn Credits. Credits are assigned based on the following norms given in Table 1.

Table 1

Course	Periods/Week	Credits
Theory	01	01
Practical	04	02
Seminar	--	02
Project Work Phase-I	--	--
Project Work Phase-II	--	28

i. As a norm, for the theory courses, **one credit** for one contact period per week is assigned.

ii. As a norm, for practical courses **two credits** will be assigned for four contact periods per week.

iii. For courses like Project/Seminar, where formal contact periods are not specified, credits are assigned based on the complexity of the work to be carried out.

iv. There are no credits for audit courses.

Other student activities like NCC, NSS, Sports, Study Tour, Guest Lecture etc. will not carry Credits.

The two year curriculum of any M. Tech Degree Program of study shall have total of **86** credits (28 credits in I Semester, 30 credits in II Semester and 28 credits in IV Semester).

8. **Choice Based Credit System (CBCS):**

Choice Based Credit System (CBCS) is introduced based on UGC guidelines in order to promote:

- Student centered learning
- Cafeteria approach
- Students to learn courses of their choice
- Learning at their own pace
- Interdisciplinary learning

➢ A student is introduced to “Choice Based Credit System (CBCS)”

➢ The total credits for the Programme is 86.

- A student has choice of registering for credits from the theory courses offered in the program ensuring the total credits in a semester are between 24 and 34.
- In I Semester, the student has the option of registering for one additional theory course from the latter semester or dropping one existing theory course from the current semester within the course structure of the program. In II Semester also, the student has the option of registering for one additional theory course from the previous semester if dropped earlier within the course structure of the program. However the maximum number of credits the student can register in a particular semester cannot exceed 33 credits.
- Grade points, based on percentage of marks awarded for each course will form the basis for calculation of SGPA (Semester Grade Point Average) and CGPA (Cumulative Grade Point Average).
- All the registered credits will be considered for the calculation of final CGPA.

9. Course Enrollment and Registration

9.1 Each student, on admission shall be assigned to a Faculty Advisor (Mentor) who shall advice and counsel the student about the details of the academic programme and the choice of courses considering the student's academic background and career objectives.

9.2 The enrollment of courses in I Semester will commence on the day of admission. If the student wishes, the student may drop or add courses (vide clause 8) within **three** days before commencement of I semester class work and complete the registration process. The student shall enroll for the courses with the help of the student's Faculty Advisor (Mentor). The enrollment of courses in II Semester will commence 10 days prior to the last instructional day of the I semester and complete the registration process for all the remaining theory courses as per program course structure, duly authorized by the Chairman, Board of studies of concern department.

9.3 If any student fails to register the courses in a semester, he shall undergo the courses as per the program structure.

9.4 After registering for a course, a student shall attend the classes, satisfy the attendance requirements, earn Continuous Assessment marks and appear for the Semester-end Examinations.

9.5 No elective course shall be offered by a Department unless a minimum of 8 students register for the course.

10. Massive Open Online Course (MOOC)

A Massive Open Online Course (MOOC) is an online course aimed at unlimited participation and open access via the web. MOOC is a model for delivering learning content online to any person who takes a course, with no limit on attendance.

- A student shall undergo a "Massive Open Online Course (MOOC)" for award of the degree besides other requirements.
- A student is offered this Online Course at the beginning of his II Semester of study and the course has to be completed by the end of III Semester. If the student fails to complete the course by the end of III Semester, it shall be treated as a backlog and needs to be completed before completion of the program for the award of the degree.
- The student shall confirm registration by enrolling the course within 10 days prior to the last instructional day of the I semester like other courses.
- The courses will be approved by the Chairman, Academic Council, SVEC based on the recommendations of the Chairman, Board of Studies of concerned program considering current needs.
- A student has a choice of registering for only one MOOC with the recommendation of Chairman, Board of studies of concerned program and duly approved by the Chairman, Academic Council, SVEC.

- The student shall undergo MOOC without disturbing the normal schedule of regular class work.
- One faculty member assigned by the Head of the Department shall be responsible for the periodic monitoring of the course implementation.
- No formal lectures need be delivered by the faculty member assigned to the students.
- If any student wants to change the MOOC course already registered, he will be given choice to register a new MOOC course in M. Tech. II / III Semester only, with the recommendation of Chairman, Board of studies of concerned program and duly approved by the Chairman, Academic Council, SVEC.
- Finally, the performance of the student in the course will be evaluated as stipulated by the course provider. A certificate will be issued on successful completion of the course by the course provider.
- The performance in the MOOC will not be considered for the calculation of SGPA and CGPA of the student.
- The MOOC course will be listed in the grade sheets of the student.

11. Break of Study from a Programme (Gap Year)

11.1 A student is permitted to go on break of study for a maximum period of one year.

11.2 The student shall apply for break of study in advance, in any case, not later than the last date of the first assessment period in a semester. The application downloaded from website and duly filled by the student shall be submitted to the Head of the Department. In the case of start-up for incubation of idea only, the application for break of study shall be forwarded by the Head of the Department to the Principal, SVEC. A sub-committee appointed by the principal shall give recommendations for approval.

11.3 The students permitted to rejoin the programme after break of study shall be governed by the Curriculum and Regulations in force at the time of rejoining. The students rejoining in new regulations shall apply to the Principal, SVEC in the prescribed format through Head of the Department at the beginning of the readmitted semester itself for prescribing additional/equivalent courses, if any, from any semester of the regulations in-force, so as to bridge the curriculum in-force and the old curriculum.

11.4 The total period for completion of the programme reckoned from the commencement of the I Semester to which the student was admitted shall not exceed the maximum period specified in clause 5.2 irrespective of the period of break of study in order that the student may be eligible for the award of the degree (vide clause 19).

11.5 If a student has not reported to the department after approved period of break of study without any intimation, the student is treated as detained in that semester. Such students are eligible for readmission for the semester when offered next.

12. Examination System: All components in any Program of study shall be evaluated through internal evaluation and / or an external evaluation conducted as semester-end examination.

12.1. Distribution of Marks:

<table>
<tr><th>Sl. No.</th><th>Course</th><th>Marks</th><th colspan="2">Examination and Evaluation</th><th>Scheme of examination</th></tr>
<tr><td rowspan="3">1.</td><td rowspan="3">Theory</td><td>60</td><td colspan="2">Semester-end examination of
3 hours duration
(External evaluation)</td><td>The examination question paper in theory courses shall be for a maximum of 60 marks. The question paper shall be of descriptive type with 5 questions, taken one from each unit of syllabus, having internal choice and all 5 questions shall be answered. All questions carry equal marks.</td></tr>
<tr><td rowspan="2">40</td><td colspan="2" rowspan="2">Mid-term Examination of
2 hours duration
(Internal evaluation).</td><td>The question paper shall be of descriptive type with 5 essay type questions out of which 4 are to be answered and evaluated for 40 marks.</td></tr>
<tr><td>Two mid-term examinations each for 40 marks are to be conducted. For a total of 40 marks, 75% of better one of the two and 25% of the other one are added and finalized.
Mid-I: After first spell of instruction (I to II Units).
Mid-II: After second spell of instruction (III to V Units).</td></tr>
<tr><td rowspan="3">2</td><td rowspan="3">Laboratory</td><td>50</td><td colspan="2">Semester-end Lab Examination for
3 hours duration
(External evaluation)</td><td>50 marks are allotted for laboratory examination during semester-end.</td></tr>
<tr><td rowspan="2">50</td><td>30</td><td>Day-to-Day evaluation for Performance in laboratory experiments and Record.
(Internal evaluation).</td><td rowspan="2">Two laboratory examinations, which includes Day-to-Day evaluation and Practical test, each for 50 marks are to be evaluated. For a total of 50 marks 75% of better one of the two and 25% of the other one are added and finalized.

Laboratory examination-I: Shall be conducted just before I mid-term examinations.
Laboratory examination-II: Shall be conducted just before II mid-term examinations.</td></tr>
<tr><td>20</td><td>Practical test
(Internal evaluation).</td></tr>
<tr><td>3</td><td>Audit Course</td><td>-</td><td colspan="2">-</td><td>Audit course will be conducted as given in 12.2.1</td></tr>
<tr><td>4</td><td>Seminar</td><td>100</td><td colspan="2">Semester-end Examination</td><td>100 marks are allotted for Seminar during semester-end evaluation by the Departmental Committee (DC) as given in 12.2.2.</td></tr>
<tr><td rowspan="2">5</td><td rowspan="2">Project Work</td><td rowspan="2">400</td><td>200</td><td>External evaluation</td><td>Semester-end Project Viva-Voce Examination by Committee as detailed in 12.2.3.</td></tr>
<tr><td>200</td><td>Internal evaluation</td><td>Continuous evaluation by the DC as detailed in 12.2.3. In each of Phase-I and Phase-II, 75% marks of better one of the two oral presentations and 25% marks of the other one are added and internal marks finalized.</td></tr>
</table>

12.2 Audit Course/ Seminar/Project Work Evaluation:

12.2.1. Audit Course: For audit course, attendance shall be maintained like in case of any regular course. Students may be encouraged to submit assignments and give presentations on the course topics. There won't be any examinations for audit courses. However, the courses shall be listed in the grade sheet of the student.

12.2.2. **Seminar:** For the seminar, the student shall collect information through literature survey on a specialized topic and prepare a technical report, showing his understanding over the topic, and submit to the Department a week before presentation. The report and the presentation shall be evaluated at the end of the semester during the period of preparation and practicals by the Departmental Committee (DC) consisting of two senior faculty members and concerned supervisor of the department. The DC is constituted by the Principal on the recommendations of the Head of the Department. The department shall have individual DCs for each M. Tech. Program with senior faculty members and the supervisor specialized in the program.

12.2.3. **Project Work:**

12.2.3.1. Student shall register for the Project work with the approval of DC in the III Semester and continue the work in the IV Semester too. The DC shall monitor the progress of the project work. In III Semester, Phase–I of the Project Work has to be completed. A Student has to identify the topic of work, collect relevant Literature, preliminary data, implementation tools/ methodologies etc., and perform a critical study and analysis of the problem identified. He shall submit status report in two different phases in addition to oral presentation before the DC for evaluation and award of internal marks. At the end of Phase –I, the Viva-Voce examination shall be conducted as per the III Semester examinations schedule by a committee consisting of HOD, Supervisor and a senior faculty member specialized in the program other than the two senior faculty members of the DC. The senior faculty member will be nominated by the Chief Controller of the Examinations from the panel of three members submitted by the Department for all the students of the specialization. A candidate shall continue the Project Work in IV Semester (Phase – II) and submit a Project report at the end of Phase–II after approval of the DC. During Phase–II, the student shall submit status report in two different phases, in addition to oral presentation before the DC. The DC shall evaluate the project based on the progress, presentations and quality of work. A candidate shall be allowed to submit the dissertation only after passing all the courses from 1st to 3rd semesters and on recommendations of the DC. The Viva-Voce examination shall be conducted as per the IV Semester examinations schedule.

12.2.3.2 Three copies of the dissertation certified in the prescribed form by the concerned Supervisor and HOD shall be submitted to the Department. One copy is to be submitted to the Chief Controller of Examinations, SVEC (Autonomous) and one copy to be sent to the examiner. The examiner shall be nominated by the Chief Controller of the Examinations from the panel of three examiners submitted by the Department for a maximum of 5 students at a time for adjudication.

12.2.3.3 If the report of the examiner is favorable, Viva-Voce examination shall be conducted by a board consisting of the concerned Supervisor, Head of the Department and the examiner who adjudicated the dissertation. The board shall jointly evaluate the candidates project work. If the report of the examiner is not favorable, the candidate should revise and resubmit the project report followed by Viva-Voce examination.

12.2.3.4 The candidates who fail in Viva-Voce examination shall have to re-appear the Viva-Voce examination after three months. Extension of time within the total permissible limit for completing the project is to be obtained from the Chairman, Academic Council, SVEC (Autonomous).

12.2.3.5 If a candidate desires to change the topic of the project already chosen, during Phase–II, he has to re-register for Project work with the approval of the DC and repeat Phases–I & II. Marks already earned in Phase–I stand cancelled.

12.2.3.6 If a candidate unable to complete the project work after Phase–II and desires to change the topic of the project already chosen, he has to re-register for Project work with the approval of the DC and repeat Phases–I & II. Marks already earned in Phase–I & II stand cancelled.

12.3. Eligibility to appear for the semester-end examination:

12.3.1 A student shall be eligible to appear for semester-end examinations if he acquires a minimum of 75% of attendance in aggregate of all the courses in a semester.

12.3.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee.

12.3.3 Shortage of attendance below 65% in aggregate shall in no case be condoned.

12.3.4 Students whose shortage of attendance is not condoned in any semester shall not be eligible to take their semester-end examination and their registration shall stand cancelled.

12.3.5 A student shall not be promoted to the next semester unless he satisfies the attendance requirements of the semester, as applicable. The student may seek readmission for the semester when offered next. He will not be allowed to register for the courses of the semester while he is in detention.

12.3.6 A stipulated fee shall be payable to the college towards condonation of shortage of attendance.

12.4. **Evaluation**: Following procedure governs the evaluation.

12.4.1. Marks for components evaluated internally by the faculty should be submitted to the Controller of Examinations one week before the commencement of the semester-end examinations. The marks for the internal evaluation components shall be added to the external evaluation marks secured in the semester-end examinations, to arrive at total marks for any course in that semester.

12.4.2. Performance in all the courses is tabulated course-wise and shall be scrutinized by the Results Committee and moderation is applied if needed, and course-wise marks are finalized. Total marks obtained in each course are converted into letter grades.

12.4.3. Student-wise tabulation shall be done and individual grade sheet shall be generated and issued.

12.5. Personal verification / Revaluation / Recounting:

Students shall be permitted for personal verification/request for recounting/ revaluation of the semester-end examination answer scripts within a stipulated period after payment of prescribed fee. After recounting or revaluation, records shall be updated with changes if any and the student shall be issued a revised grade sheet. If there are no changes, the student shall be intimated the same through a notice.

12.6. Supplementary Examination:

In addition to the regular semester-end examinations conducted, the College may also schedule and conduct supplementary examinations for all the courses of other semesters when feasible for the benefit of students. Such of the candidates writing supplementary examinations may have to write more than one examination per day.

13. Re-Registration for Improvement of Internal Marks:

Following are the conditions to avail the benefit of improvement of internal evaluation marks.

13.1 The candidate should have completed the course work and obtained examinations results for I and II semesters.

13.2 Out of the courses the candidate has failed in the examinations due to internal evaluation marks secured being less than 50%, the candidate shall be given one chance for a maximum of 3 theory courses for improvement of internal evaluation marks.

13.3 He should have passed all the remaining courses for which the internal evaluation marks secured more than or equal to 50%.

13.4 The candidate has to register for the chosen courses and fulfill the academic requirements.

13.5 For each course, the candidate has to pay a fee equivalent to one third of the semester tuition fee and the amount is to be remitted in the form of D.D./ Challan in favour of the Principal, Sree Vidyanikethan Engineering College payable at Tirupati along with the requisition through the concerned Head of the Department.

13.6 In the event of availing the Improvement of Internal evaluation marks, the internal evaluation marks as well as the semester-end examinations markssecured in the previous attempt(s) for the re-registered courses stand cancelled.

14. Academic Requirements for completion of M.Tech Program of study:

The following academic requirements have to be satisfied in addition to the attendance requirements for completion of M.Tech Program of study.

14.1 A student shall be deemed to have satisfied the minimum academic requirements for each theory, laboratory and project work, if he secures not less than 40% of marks in the semester-end examination and a minimum of 50% of marks in the sum total of the internal evaluation and semester-end examination taken together. For the seminar, he should secure not less than 50% of marks in the semester-end examination.

14.2 A student shall register for all the 86 credits and earn all the 86 credits. Marks obtained in the 86 credits shall be considered for the calculation of the DIVISION based on CGPA.

14.3 A student who fails to earn 86 credits as indicated in the curriculum within **four** academic years from the year of his admission shall forfeit his seat in M.Tech. Program and his admission stands cancelled.

15. Transitory Regulations:

Students who got detained for want of attendance (**or**) who have not fulfilled academic requirements (**or**) who have failed after having undergone the Program in earlier regulations (**or**) who have discontinued and wish to continue the Program are eligible for admission into the unfinished semester from the date of commencement of class work with the same (**or**) equivalent courses as and when courses are offered and they will be in the academic regulations into which they are presently readmitted.

A regular student has to satisfy all the eligibility requirements within the maximum stipulated period of **four years** for the award of M.Tech Degree.

16. Grades, Grade Point Average and Cumulative Grade Point Average:

16.1. Grade System: After all the components and sub-components of any course (including laboratory courses) are evaluated, the final total marks obtained shall be converted to letter grades on a "**10 point scale**" as described below.

Grades conversion and Grade points allotted

% of Marks obtained	Grade	Description of Grade	Grade Points (GP)
≥ 95	O	Outstanding	10
≥ 85 to < 95	S	Superior	9
≥ 75 to < 85	A	Excellent	8
≥ 65 to < 75	B	Very Good	7
≥ 55 to < 65	C	Good	6
≥ 50 to <55	D	Pass	5
< 50	F	Fail	0
Not Appeared	N	Absent	0

Pass Marks: A student shall be declared to have passed theory course, laboratory course and project work if he secures minimum of 40% marks in Semester-end examination, and a minimum of 50% marks in the sum total of internal evaluation and Semester-end examination taken together. For the seminar, he shall be declared to have passed if he secures minimum of

50% of marks in the semester-end examinations. Otherwise he shall be awarded fail grade - **F** in such a course irrespective of internal marks. **F** is considered as a fail grade indicating that the student has to pass the semester-end examination in that course in future and obtain a grade other than **F** and **N** for passing the course.

16.2. Semester Grade Point Average (SGPA):

Semester Grade Point Average (SGPA) shall be calculated as given below on a "10 point scale" as an index of the student's performance at the end of each semester:

$$\text{SGPA} = \frac{\sum (C \; X \; GP)}{\sum C}$$

where ***C*** denotes the credits assigned to the courses undertaken in that semester and ***GP*** denotes the grade points earned by the student in the respective courses.

Note: *SGPA is calculated only for the candidates who passed all the courses in that semester.*

16.3. Cumulative Grade Point Average (CGPA):

The CGPA for any student is awarded only when he completes the Program i.e., when the student passes in all the courses prescribed in the Program. The CGPA is computed on a 10 point scale as given below:

$$\text{CGPA} = \frac{\sum (C \; X \; GP)}{\sum C}$$

where ***C*** denotes the credits assigned to courses undertaken up to the end of the Program and *GP* denotes the grade points earned by the student in the respective courses.

17. Grade Sheet: A grade sheet (Marks Memorandum) shall be issued to each student indicating his performance in all courses registered in that semester indicating the SGPA.

18. Transcripts: After successful completion of the entire Program of study, a transcript containing performance in all academic years shall be issued as a final record. Duplicate transcripts will also be issued, if required, after payment of requisite fee. Partial transcript will also be issued upto any point of study to a student on request.

19. Award of Degree: The Degree shall be conferred and awarded by Jawaharlal Nehru Technological University Anantapur, Ananthapuramu on the recommendations of the Chairman, Academic Council, SVEC (Autonomous).

19.1. Eligibility: A student shall be eligible for the award of M.Tech Degree if he fulfills all the following conditions:

- Registered and successfully completed all the components prescribed in the Program of study to which he is admitted.
- Successfully acquired the minimum required credits as specified in the curriculum corresponding to the Program of study within the stipulated time.
- Obtained CGPA greater than or equal to 5.0 (Minimum requirement for declaring as passed).
- Has no dues to the College, Hostel, Library etc. and to any other amenities provided by the College.
- No disciplinary action is pending against him.

19.2. Award of Division: Declaration of division is based on CGPA.

Awarding of Division

CGPA	Division
> = 7.0	First Class with Distinction
> = 6.0 and < 7.0	First Class
> = 5.0 and < 6.0	Second Class

20. Additional academic regulations:

20.1 A student may appear for any number of supplementary examinations within the stipulated time to fulfill regulatory requirements for award of the degree.

20.2 In case of malpractice/improper conduct during the examinations, guidelines shall be followed as shown in the **Annexure-I**.

20.3 When a student is absent for any examination (Mid-term or Semester-end) he shall be awarded **zero** marks in that component (course) and grading will be done accordingly.

20.4 When a component is cancelled as a penalty, he shall be awarded zero marks in that component.

21. Withholding of Results:

If the candidate has not paid dues to the College/University (or) if any case of indiscipline is pending against him, the result of the candidate shall be withheld and he will not be allowed/promoted to the next higher semester

22. Amendments to regulations:

The Academic Council of SVEC (Autonomous) reserves the right to revise, amend, or change the Regulations, Scheme of Examinations, and / or Syllabi or any other policy relevant to the needs of the society or industrial requirements etc., with the recommendations of the concerned Board(s) of Studies.

23. General:

The words such as "he", "him", "his" and "himself" shall be understood to include all students irrespective of gender connotation.

Note: *Failure to read and understand the regulations is not an excuse.*

Annexure-I

GUIDE LINES FOR DISCIPLINARY ACTION FOR MALPRACTICES / IMPROPER CONDUCT IN EXAMINATIONS

Rule No.	Nature of Malpractices/ Improper conduct	Punishment
	If the candidate:	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the course of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the course of the examination)	Expulsion from the examination hall and cancellation of the performance in that course only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that course only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the course of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the courses of that Semester. The Hall Ticket of the candidate is to be cancelled.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred for four consecutive semesters from class work and all Semester-end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the courses of the examination (including labs and project work) already appeared and shall not be allowed to appear for examinations of the remaining courses of that semester. The candidate is also debarred for four consecutive semesters from class work and all Semester-end examinations, if his involvement is established. Otherwise, The candidate is debarred for two consecutive semesters from class work and all Semester-end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The candidate is also debarred for two consecutive semesters from class work and all Semester-end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that course only.
6.	Refuses to obey the orders of the Chief Controller of Examinations/Controller of Examinations/any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the Controller of Examinations or any person on duty in or outside the examination hall of any injury	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that course and all other courses the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the courses of that semester. If the candidate physically assaults the invigilator/Controller of the Examinations, then the

	to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the Controller of Examinations, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	candidate is also debarred and forfeits his/her seat. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The candidate is also debarred for two consecutive semesters from class work and all Semester-end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The candidate is also debarred and forfeits the seat.

Note: Whenever the performance of a student is cancelled in any course(s) due to Malpractice, he has to register for Semester-end Examinations in that course(s) consequently and has to fulfill all the norms required for the award of Degree.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)

SREE SAINATH NAGAR, TIRUPATI – 517 102

SVEC16 - M. Tech (Computer Science)

I-Semester

Course Code	Course Title	Contact Periods per Week				Credits	Scheme of Examination Max. Marks		
		L	T	P	Total		Internal Marks	External Marks	Total Marks
16MT10501	Advanced Computer Networks	4	-	-	4	4	40	60	100
16MT10502	Advanced Database Management Systems	4	-	-	4	4	40	60	100
16MT10503	Advanced Operating Systems	4	-	-	4	4	40	60	100
16MT10504	Data Warehousing and Data Mining	4	-	-	4	4	40	60	100
16MT12502	Data Structures and Algorithms	4	-	-	4	4	40	60	100
	Professional Elective-1	4	-	-	4	4	40	60	100
16MT10505	Computer Vision								
16MT10506	Information Retrieval Systems								
16MT10507	Internet of Things								
16MT22504	Software Testing Techniques								
16MT10531	Database Management Systems & Data Warehousing and Data Mining Lab	-	-	4	4	2	50	50	100
16MT10532	Data Structures & Computer Networks Lab	-	-	4	4	2	50	50	100
	Total:	**24**	**-**	**8**	**32**	**28**	**340**	**460**	**800**
16MT13808	Research Methodology (Audit Course)	-	2	-	2	-	-	-	-

II-Semester

Subject Code	Course Title	Contact Periods per Week				Credits	Scheme of Examination Max. Marks		
		L	T	P	Total		Internal Marks	External Marks	Total Marks
16MT20501	Advanced Computer Architecture	4	-	-	4	4	40	60	100
16MT20502	Big Data Analytics	4	-	-	4	4	40	60	100
16MT20503	Object Oriented Analysis and Design	4	-	-	4	4	40	60	100
16MT12501	Cloud Computing	4	-	-	4	4	40	60	100
16MT22505	Web Technologies	4	-	-	4	4	40	60	100
	Professional Elective-2	4	-	-	4	4	40	60	100
16MT20504	Embedded Systems								
16MT20505	Information Security								
16MT20506	Mobile Computing								
16MT20507	Software Project Management								
16MT20531	Cloud Computing and Big Data Analytics Lab	-	-	4	4	2	50	50	100
16MT20532	Object Oriented Analysis and Design Lab	-	-	4	4	2	50	50	100
16MT20533	Seminar	-	-	-	-	2	--	100	100
Total:		**24**	**-**	**8**	**32**	**30**	**340**	**560**	**900**
16MT23810	Intellectual Property Rights (Audit Course)	-	2	-	2	-	-	-	-

III-Semester

S. No.	Course Code	Course Title	Contact Periods per Week				Credits	Scheme of Examination Max. Marks		
			L	T	P*	Total		Internal Marks	External Marks	Total Marks
1.	16MT3MOOC	MOOC	-	-	-	-	-	-	-	-
2.	16MT30531	Project Work – Phase I	-	-	-	-	8	50	50	100
		Total:	**-**	**-**	**-**	**-**	**8**	**50**	**50**	**100**

*Fulltime Project Work

IV-Semester

S. No.	Course Code	Course Title	Contact Periods per Week				Credits	Scheme of Examination Max. Marks		
			L	T	P*	Total		Internal Marks	External Marks	Total Marks
1.	16MT40531	Project Work – Phase II	-	-	-	-	20	150	150	300
		Total:	**-**	**-**	**-**	**-**	**20**	**150**	**150**	**300**
						Grand Total:	**86**	**880**	**1220**	**2100**

*Fulltime Project Work

M. Tech. (CS) – I Semester
(16MT10501) ADVANCED COMPUTER NETWORKS
(Common to CS & CNIS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*--*	*--*	*4*

PRE-REQUISITES: A Course on "Computer Networks"

COURSE DESCRIPTION:

Computer Networks and Protocols, Data Link Layer, LAN and Network Routing; Transport Layer and Internet Protocols; Wireless and Optical Networks; MANETs and Wireless Sensor Networks

COURSE OUTCOMES:

After successful completion of this course, students will be able to:

CO1. Gain knowledge on principles of computers, network topologies, routing mechanisms.

CO2. Analyze the computer network with suitable network protocols and routing algorithms.

CO3. Formulate solutions for engineering problems pertaining to the advanced networking technologies.

CO4. Develop techniques for subnet masks and addresses to fulfill networking requirements.

CO5. Conduct Research to solve the problems related to Routing Algorithms in Networks.

DETAILED SYLLABUS:

UNIT I – REVIEW OF COMPUTER NETWORKS AND FOUNDATION OF NETWORKING PROTOCOLS (11 periods)

Review of Computer Networks and the Internet-The Network edge, The Network core, Access Networks and Physical Media, ISPs and Internet Backbones, Delay and Loss in Packet, Packet-Switched Networks.

Foundations of Networking Protocols-5-layer TCP/IP Model, 7-Layer OSI Model, Internet Protocols and Addressing, Equal-Sized Packets Model: ATM.

UNIT II – DATA LINKS, TRANSMISSION AND ROUTING (11 periods)

The Link Layer and Local Area Networks-Link Layer Introduction and Services, Error-Detection and Error-Correction Techniques, Multiple Access Protocols, Link Layer Addressing.

Routing and Internet Working-Network Layer Routing, Least-Cost-Path Algorithms, Non-Least-Cost-Path algorithms, Intradomain Routing Protocols, Interdomain Routing Protocols

UNIT III – TRANSPORT LAYER PROTOCOLS AND NETWORK APPLICATIONS (11 p*eriods*)

Transport and End-to-End Protocols-Transport Layer, Transmission Control Protocol (TCP), User Datagram Protocol (UDP), TCP Congestion Control.

Application Layer-Principles of Network Applications, the Web and HTTP, File Transfer: FTP, Electronic Mail in the Internet, Domain Name System (DNS).

UNIT IV – WIRELESS NETWORKS AND OPTICAL NETWORKS (11 periods)

Wireless Networks and Mobile IP-Infrastructure of Wireless Networks, Wireless LAN Technologies, IEEE 802.11 Wireless Standards, Cellular Networks, Mobile IP, Wireless Mesh Networks (WMNs).

Optical Networks and WDM Systems-Overview of Optical Networks, Basic Optical Networking Devices, Large-Scale Optical Switches, Optical Routers

UNIT V – MANETS AND WIRELESS SENSOR NETWORKS (11 p*eriods*)

Mobile Ad-Hoc Networks-Overview of Wireless Ad–Hoc Networks, Routing in Ad-Hoc Networks, Routing Protocols for Ad-Hoc Networks- DSDV, DSR, CGSR and AODV. Wireless Sensor Networks-Sensor Networks and Protocol Structures, Communication Energy Model, Clustering Protocols, Routing Protocols

Total Periods: 55

TEXT BOOKS:

1. Nader F. Mir, "*Computer and Communication Networks*," Pearson Education, 2007.
2. F. Kurose, Keith W. Ross, *"Computer Networking: A Top-Down Approach Featuring the Internet,"* 3ed,Pearson Education, 2007.

REFERENCE BOOKS:

1. Behrouz A. Forouzan, *"Data Communications and Networking,"* 4 ed ,Tata McGraw Hill,2007
2. Andrew S. Tanenbaum, *"Computer Networks,"* 4 ed, Pearson Education, New Delhi, 1997

M. Tech. I Semester
(16MT10502) Advanced Database Management Systems

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*--*	*--*	*4*

PRE-REQUISITES: A Course on "Database Management System".
COURSE DESCRIPTION:
Concepts of Database System and Architectures, Data modeling using ER-Model; SQL, Objects Relational Database and XML; Database Design and File Organizations; Query Processing, Concurrency and Recovery; Distributed DBMS Architecture and Design.
COURSE OUTCOMES:
After successful completion of this course the students will be able to:
CO1: Gain Advanced knowledge in
- Database System Concepts , Languages , Interfaces and Architectures
- Query Languages , Relational Databases and XML
- Database Design and File Organization.
- Query Processing and Recovery
- Distributed Database Architecture and Design

CO2: Analyze database management architecture and categorize languages and database objects.
CO3: Design a wide range of potential solutions for the database problems using ER-diagrams SQL, Normalization and XML.
CO4: Initiate Research to develop new Architectural models and Query processing using SQL in database Systems.
CO5: Apply appropriate modern techniques, resources and tools for the real world problems in databases.
DETAILED SYLLABUS:
UNIT I–Database System Concepts and Architectures, Data modeling using ER-Model (11 periods)
Database System Concepts and Architectures:
Architecture And Data Independence, Database Languages and Interfaces, Database System Environment, Centralized and Client/server Architectures for DBMS.
Data modeling using ER-Model:
Using High-Level Conceptual data Model for Database Design, A Sample Database Application, Entity Types, Entity Sets, Attributes, and Keys, Relationship Types, Relationship Sets, Roles, and Structural Constraints, Weak Entity Types, Refining the ER Design for the COMPANY Database, ER Diagrams, Naming Conventions, and Design Issues, Relationship Types of Degree Higher than Two, Relational Database Design using ER-to-Relational Model.
UNIT II: SQL, Objects Relational Database and XML (12 Periods)
SQL: Schema Definition, Constraints, Queries, Joins, Assertions, Triggers and Views
Object Relational Databases: Concepts for Object Databases, Standards, Languages and Design.
XML: Hierarchical data model, Documents, DTD, XML Schema, Documents and Databases, Querying.
UNIT III: Database Design and File Organizations (11 Periods)
Database Design: Functional Dependencies, Types of Normal Forms, properties of relational decompositions, Algorithms for Relational Database Design.
File Organizations: Introduction, Secondary Storage Devices, Buffering of Blocks, Placing File Records on Disk, Operations on Files, Files of Unordered Records, Files of Ordered Records, Hashing Techniques, Other Primary File Organizations, Parallelizing Disk Access Using RAID Technology, New Storage Systems.
UNIT IV: Query Processing, Concurrency and Recovery (12 Periods)
Query Processing: Problem, Objectives, Characterization, Layers and Query Optimization and Query Optimization Algorithms: INGRES, System R, Distributed INGRES, R*, SDD-1 Algorithms
Concurrency Control: Transaction management types and properties, Algorithms, Deadlock Management.
Recovery: Concepts, Techniques Based on Deferred Update and Immediate Update, Shadow paging and ARIES Algorithm.
UNIT V: Distributed DBMS Architecture and Design (09 Periods)
Distributed DBMS Architecture: Architectural Models and Architectures
Distributed Database Design: Alternative Design Strategies, Distribution Design Issues, Fragmentation and Allocation **Total Periods: 55**
TEXT BOOKS:
1. Ramez Elmasri & Shamkant B. Navathe, "*Database Systems: Models, Languages, Design and Application Programming,"* 6 ed., Pearson Education, New Delhi , 2013.
2. M. Tamer Ozsu, Patrick Valduriez, "*Principles of Distributed Database System,"* 2 ed., Pearson Education, New Delhi ,2006.
REFERENCE BOOKS:
1. Abraham Silberchatz, Henry F. Korth, S. Sudarsan, "Database System Concepts," 5 ed., McGraw-Hill, New York, 2006.

2. Thomas M. Connolly, Carolyn E. Begg, "Database Systems – A Practical Approach to Design, Implementation and Management," 3 ed., Pearson Education, New Delhi, 2003.

M. Tech (CS) – I Semester
(16MT10503) Advanced Operating Systems

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*--*	*--*	*4*

PRE-REQUISITES:
A Course on ***"Operating Systems"***

COURSE DESCRIPTION
Process management and process scheduling; Concurrency, synchronization and deadlocks; Memory management, file system and secondary storage; I/O systems, protection and security; Introduction to Distributed Systems, Synchronization in Distributed Systems

COURSE OUTCOMES:
After Successful completion of the course, students will be able to:

CO-1: Gain advanced knowledge in
- Process management concepts.
- Synchronization and Deadlocks
- Inter Process Communication.
- Group Communication.
- Remote Procedure Call.

CO-2: Analyze how operating system manages resources among the users**.**
CO-3: Formulate solutions for engineering problems pertaining to the advanced Operating Systems
CO-4: Design real time solutions for the problems related to CPU Scheduling, concurrency and Synchronization
CO-5: Apply the concepts of semaphores, monitors, message-passing and other forms of synchronization to maintain Concurrency.

DETAILED SYLLABUS:

UNIT I – INTRODUCTION TO OPERATING SYSTEMS, PRO-CESS MANAGEMENT AND PROCESS SCHEDULING (12 periods)
Introduction: Operating system operations, Protection and Security, Distributed Systems, Special Purpose Systems, Open-Source Operating Systems, Operating System Services, System Calls.
Process Management: Process Concepts, Process State, Process Control Block, Operations on Processes, Inter Process Communication, Multithreaded programming.
Process Scheduling: Scheduling Criteria, Scheduling Algorithms, Multiple-Processor scheduling, thread scheduling

UNIT II – CONCURRENCY AND SYNCHRONIZATION, DEAD LOCKS (12 periods)
Concurrency and Synchronization: Process Synchronization, Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of synchronization, Readers and Writers Problem, Dining Philosophers Problem, Monitors.
Deadlocks: System Model, Deadlock Characterization, Deadlock Prevention, Deadlock Detection and Avoidance, Recovery from Deadlock- Bankers Algorithm.

UNIT III – MEMORY MANAGEMENT, FILE SYSTEM IMPLEMENTATION AND SECONDARY STORAGE STRUCTURE (12 p*eriods*)
Memory Management: Swapping, Contiguous Memory Allocation, Paging, Segmentation, Virtual Memory, Demand Paging, Page Replacement Algorithms, Allocation of Frames, Thrashing.
File System Interface &Implementation: Concept of a File, Access Methods, Directory Structure, File Sharing, Protection.
Secondary Storage Structure: Overview of Mass-Storage Structure, Disk Structure, Disk Attachment, Disk scheduling algorithms

UNIT IV – I/O SYSTEMS, PROTECTION AND SECURITY (11 periods)
I/O Systems: I/O systems, Hardware, Application I/O Interface, and Transforming I/O requests Hardware Operation.
Protection: Goals of Protection, Principles of Protection, Domain of Protection, Access Matrix, Implementation of Access Matrix, and Access control, Revocation of Access Rights.
Security: The Security Problem, Program Threats, System and Network Threats, Cryptography as a Security Tool, User Authentication.

UNIT V–DISTRIBUTED SYSTEMS, SYNCHRONIZATION IN DISTRIBUTED SYSTEMS (08 p*eriods*)
Introduction to Distributed systems: Goals of distributed system- hardware and software concepts- design issues, the client server model- Remote Procedure Call and Group Communication.
Synchronization in distributed systems: Clock Synchronization- Election Algorithms- Bully Algorithm, Ring Algorithm

Total Periods: 55

TEXT BOOKS:
1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne," *Operating System Concepts*," 7 ed., John Wiley and Sons**,** 2009
2. Andrew. S. Tanenbaum, "*Distributed Operating System*," Prentice Hall, New Delhi 2010

REFERENCE BOOKS:
1. William Stallings, "*Operating Systems – Internals and Design Principles*," 5 ed., Pearson Education, New Delhi, 2008
2. Andrew S Tanenbaum, "*Modern Operating Systems*,", 3 ed., Pearson Education, New Delhi, 2008
3. Charles Crowley "*Operating Systems - A Design Approach,*" 1 ed., TMH, New Delhi, 2009.

M. Tech (CS) I Semester
(16MT10504) Data Warehousing and Data mining
(Common to CS & CNIS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*0*	*--*	*4*

PRE-REQUISITES: A Course on "Database Management System".
COURSE DESCRIPTION: Concepts of Data Warehousing and Data mining; Pre-processing techniques in Data Warehouses; Data cube computation and OLAP query processing; Data Mining process and System architecture; relationship with data warehouse and OLAP Systems; Data mining Techniques and Applications.
COURSE OUTCOMES:
After successful completion of this course, the student will be able to:
CO1: Gain knowledge in -
- Multidimensional data model and Data warehouse Architecture.
- Data mining algorithms.
- Association Rules, Classification and Prediction and Cluster Analysis.

CO2: Analyse data mining algorithms for complex industrial problems.

CO3: Solve engineering problems to get wide variety of solutions by applying data mining algorithms.

CO4: Ability to carry out research in Spatial Mining, Spatio Temporal Mining, Text Mining Multimedia Mining and web Mining
CO5: Create and apply appropriate techniques & tools of data mining to solve real world problems.

DETAILED SYLLABUS:
UNIT I – INTRODUCTION TO DATA WAREHOUSE AND DATA MINING (10 periods)
Data Warehouse- A Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehouse to Data Mining.
Data Mining – Kinds of Data, Data Mining Functionalities, Primitives, Major Issues in Data Mining
UNIT II – DATA PREPROCESSING, MINING FREQUENT PATTERNS AND ASSOCIATIONS (10 periods)
Data Preprocessing- Descriptive Data Summarization, Data Cleaning, Data Integration and Transformation, Data Reduction.
Mining Frequent Patterns and Associations- Efficient and Scalable Frequent Item set Mining Methods, Mining various kinds of Association Rules, Constraint based association mining.
UNIT III – CLASSIFICATION AND PREDICTION (8 p*eriods*)
Issues regarding classification and prediction, classification by decision tree induction, Bayesian classification, Rule based classification, classification by Back propagation, Prediction, Accuracy and Error Measures.
UNIT IV – CLUSTER ANALYSIS (11 periods)
Cluster Analysis: Basic Concepts and Algorithms : Introduction to Cluster Analysis, different Types of Clustering, Different Types of Clusters, K-means, The Basic K-means Algorithm, K-means: Additional Issues, Bisecting Kmeans, K-means and Different Types of Clusters, Strengths and Weaknesses, K-means as an Optimization Problem, Agglomerative Hierarchical Clustering, Basic Agglomerative Hierarchical Clustering Algorithm, Specific Techniques, DBSCAN, Traditional Density: Center-Based Approach, The DBSCAN Algorithm, Strengths and Weaknesses.
UNIT V – MINING STREAM, TIME SERIES, SPATIAL DATA, MULTIMEDIA, TEXT AND WORLD WIDE WEB (9 p*eriods*)
Mining Data Streams, Mining Time Series Data, Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Data Mining, Multimedia Data Mining, Text Mining, Mining the World Wide Web.

Total Periods: *48*

TEXT BOOKS:
1. Jiawei Han and MichelineKamber, "*Data Mining: Concepts and Techniques*," 2 ed. , Elsevier, 2009
2. Pang-Ning Tan, Michael Steinbach, Vipin Kumar,"Introduction to Data Mining", Pearson Education, 2009.

REFERENCE BOOKS:
1. Margaret H Dunham, *Data Mining Introductory and Advanced Topics*," 2 ed., Pearson Education, 2006
2. Amitesh Sinha, "*Data Warehousing*," PHI Learning, 2007.

M.Tech (CS) I-Semester
(16MT12502) DATA STRUCTURES AND ALGORITHMS
(Common to SE and CS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Computer Programming".
COURSE DESCRIPTION:
Introduction to Data Structures and Algorithms; Searching and Sorting; Trees and Graphs; Divide and Conquer; Greedy method; Dynamic Programming, Back Tracking; Branch and Bound.
COURSE OUTCOMES:
After successful completion of this course, students will be able to:

1. Gain knowledge on:
   - Linear data structures including Stack, Queue and Linked Lists and Non-linear data structures like Trees and Graphs.
   - Divide and Conquer Method, Greedy Method, Dynamic Programming, Backtracking and Branch & Bound algorithms.
2. Analyze the efficiency of algorithms using space and time complexities.
3. Solve real world problems using algorithm design techniques.
4. Apply Dynamic programming techniques to provide software solutions.

DETAILED SYLLABUS:
UNIT-I: INTRODUCTION TO DATA STRUCTURES AND ALGORITHMS (10 Periods)
Data Structures: Review of Data Structures - Stack, Queue, Circular Queue, Linked Lists, Applications, **Algorithm Analysis:** Efficiency of algorithms, Apriori Analysis, Asymptotic Notations, Polynomial vs Exponential Algorithms, Average, Best and Worst Case Complexities, Analyzing Recursive Algorithms.
UNIT-II: SEARCHING, SORTING AND TREES & GRAPHS (10 Periods)
Searching and Sorting: Linear Search, Fibonacci Search, Counting Sort, Bucket Sort, Radix Sort, **Trees and Graphs:** Introduction to trees, representation of trees, binary trees, binary tree traversal techniques, Introduction to graphs, representation of graphs, graph traversal techniques.
UNIT-III: BINARY SEARCH TREES, AVL TREES, B- TREES AND HASH TABLES (10 Periods)
Binary Search Trees: Definition, Operations, Applications, AVL Trees: Definition, Operations, Applications, **Heaps:** Definition, Heap Implementation, Applications, **Hash Tables:** Definition, Hash Functions, Applications.
UNITI-IV: DIVIDE AND CONQUER & GREEDY METHODS (10 Periods)
Divide and Conquer: General Method, Binary Search, Finding Maximum and Minimum, Quick Sort, Merge sort, Strassen's Matrix Multiplication.
Greedy Method: General Method, Job sequencing with deadlines, Minimum Cost Spanning Tree and Single Source Shortest Path.
UNIT-V: DYNAMIC PROGRAMMING, BACK TRACKING & BRANCH AND BOUND (11 Periods)
Dynamic Programming: General Method, All Pairs Shortest Path, 0/1 Knapsack problem, Traveling Salesperson Problem, **Back Tracking:** General Method, 8 – Queen's Problem, Graph Coloring, **Branch and Bound:** General Method, LC Search, LIFO and FIFO branch and bound solutions of 0/1 Knapsack Problem.

[Total Periods: 50]

TEXT BOOKS:

1. G. A. V. Pai, *"Data Structures and Algorithms: Concepts, Techniques and Applications,"* 1st Edition, Tata McGraw Hill, 2008.
2. Ellis Horowitz, Sartaj Sahni, and Sanguthevar Rajasekaran, *"Fundamentals of Computer Algorithms,"* 2nd Edition, Universities Press (India) Pvt. Ltd, 2008.

REFERENCE BOOKS:

1. Richard Gileberg, Behrouz A. Forouzan, *"Data Structures: A Pseudocode Approach with C,"* Second Edition, 2007.
2. Mark Allen Weiss, *"Data Structures and Algorithm Analysis in C++,"* 3rd Edition, Pearson Education, 2007.
3. Sartaj Sahni, *"Data structures, Algorithms and Applications in C++,"* 2nd Edition, Universities press (India) Pvt. Ltd., 2005.

M. Tech (CS) – I Semester
(16MT10505) COMPUTER VISION
(Professional Elective-I)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*-*	*-*	*4*

PRE-REQUISITES:
A Course on "Computer Graphics"

COURSE DESCRIPTION:
Concepts of Cameras, Measuring Light , Sources, Shadows and Shading; Linear filters, Edge detection; Segmentation by clustering, Segmentation by fitting a model; Finding templates using classifiers , Recognition by relations between Templates; Geometric camera models, Camera calibration.

COURSE OUTCOMES:
After successful completion of this course the students will be able to:
CO -1: Gain knowledge in image processing techniques.
CO -2: Analyze the applicability of various techniques such as Fourier Transforms, Normalized Correlation, Estimating Derivatives in filtering and edge detection to generate quality images.
CO -3: Solve complex image segmentation problems using clustering and fitting models.
CO -4: Conduct Research on geometric methods and tools for camera calibration.
CO -5: Apply building classifiers, voting and search techniques and Image Processing tools for finding templates for real world images.

DETAILED SYLLABUS:

UNIT-I: CAMERAS, SOURCES, SHADOWS AND SHADING (10 Periods)
Cameras: Pinhole Cameras, Camera with Lenses, the Human Eye and Sensing. **Radiometry-Measuring Light:** Light in Space, Light at Surfaces and Important Special Cases.
Sources, Shadows and Shading: Qualitative Radiometry, Sources and their effects, Local Shading Models, Application: Photometric Stereo, Inter reflections: Global Shading Models.

UNIT-II: LINEAR FILTERS AND EDGE DETECTION (11 Periods)
Linear Filters: Linear Filters and Convolution, Shift Invariant Linear Systems, Spatial Frequency and Fourier Transforms, Sampling and Aliasing ,Filters as Templates, Techniques- Normalized Correlation and Finding Patterns, Scale and Image Pyramids.
Edge Detection: Noise, Estimating Derivatives, Detecting Edges, Texture: Representing Texture, Analysis using Oriented Pyramids.
Application: Synthesizing Textures for Rendering Shape for Texture for Planes.

UNIT-III: SEGMENTATION BY CLUSTERING AND FITTING A MODEL (11 Periods)
Segmentation by Clustering: Introduction to Segmentation, Human Vision: Grouping and Gestalt, Applications: Shot Boundary Detection and Background Subtraction, Image Segmentation by Clustering Pixels, Segmentation by Graph-Theoretic Clustering.
Segmentation by Fitting a Model: The Hough Transform, Fitting Lines, Fitting Curves, Fitting as Probabilistic Inference Problem, Robustness, Example: Using RANSAC to Fit Fundamental Matrices, Missing Data Problems, the EM Algorithm.

UNIT-IV:FINDING TEMPLATES USING CLASSIFIERS AND RECOGNITION BY RELATIONS BETWEEN TEMPLATES (13 Periods)
Finding Templates using Classifiers: Method for Building Classifiers, Building Classifiers from Class Histograms, Feature Selection, Neural Networks, the Support Vector Machine**.**
Recognition by relations between Templates: Finding Objects by Voting on Relations between Templates, Relational Reasoning Using Probabilistic Models and Search, Using Classifiers to Prune Search, Hidden Markov Models, Application: HMM and Sign Language Understanding, Finding People with HMM.

UNIT-V: GEOMETRIC CAMERA MODELS AND GEOMETRIC CAMERA CALIBRATION (10 Periods)
Geometric Camera Models: Elements of Analytical Euclidean Geometry, Camera Parameters and the Perspective Projection, Affine Cameras and Affine Projection Equations, **Geometric Camera Calibration:** Least-Squares Parameter Estimation, A Linear Approach to Camera Calibration, Taking Radial Distortion into Account, Analytical Photogrammetry, An Application: Mobile Robot Localization, **Introduction to image processing tools**: Adobe Photoshop, Macromedia Fireworks.

Total Periods: *55*

TEXT BOOK:
1. David A. Forsyth and Jean Ponce:"*Computer Vision – A Modern Approach*," PHI Learning, 2009.

REFERENCE BOOKS:

1. G Sommer, "*Geometric Computing with Clifford Algebra*, "1 ed., Springer ,Newyork,2001
2. Milan Sonka, Vaclav Hlavac, Roger Boyle "*Digital Image Processing and Computer Vision*," 1 ed., Ceneage Learning India Pvt. Ltd, New Delhi , 2008.
3. Jack," *Computer Vision and Applications*," Concise Edition, Academy Press, 2000.

M. Tech (CS) – I Semester
(16MT10506) INFORMATION RETRIEVAL SYSTEMS
(Professional Elective - I)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITE:
A Course on **"**Database Management Systems"

COURSE DESCRIPTION:
Concepts of Information retrieval Systems; Indexing and data structures; indexing, Document and term clustering; user search techniques; Text search algorithms, information system Evaluation;

COURSE OUTCOMES:
After successful completion of this course, students will be able to:

CO-1 : Acquire knowledge in fundamental concepts of
- Information Retrieval System capabilities
- Data Structures
- Indexing and Search Algorithms

CO -2: Analyze concepts of Database, Data Warehouses of real time applications related to Document Store, Document data warehouses like space research , judicial, biomedical, scientific documents.

CO -3 : Solve complex search problems like ranking , weighted ,software text searches by implementing A* Search, Zipf and Information retrieval frame work

CO -4: Initiate research to identify and develop algorithms for indexing , clustering and searching.

CO -5: Create and apply online Information Retrieval Systems like search engines.

DETAILED SYLLABUS:

UNIT I: INTRODUCTIONTO INFORMATION RETRIEVAL SYSTEM (11 Periods)
Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses.

Information Retrieval System Capabilities: Search, Browse.

UNIT II: INDEXING AND DATA STRUCTURES (11 Periods)
Objectives of Indexing, Indexing Process, Automatic Indexing.

Data Structures: Introduction to Data Structures, Stemming Algorithms, Inverted file structures, N-gram data structure, PAT data structure, Hypertext data structure.

UNIT III: AUTOMATIC INDEXING AND CLUSTERING (10 Periods)
Classes of automatic indexing, Statistical indexing, Natural language, Concept indexing. **Document and Term Clustering:** Introduction to Clustering, Thesaurus generation, Manual clustering, Automatic Term Clustering, Hierarchy of clusters.

UNIT IV: USER SEARCH TECHNIQUES (12 Periods)
Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, weighted searches of Boolean systems.

UNIT V: TEXT SEARCH ALGORITHMS (11 Periods)
Introduction to Text Search Techniques, Software text search algorithms, Hardware text search systems.

Information System Evaluation: Introduction to Information System Evaluation, Measures used in system evaluation.

Total No. of periods: 55

TEXT BOOK:

1. Kowalski, Gerald, Mark T Maybury Kluwer, *"Information Storage and Retrieval Systems: Theory and Implementation"*, Springer, Seventh Indian reprint 2 ed., 2013..

REFERENCE BOOKS:

1. Ricardo Baeza-Yates ,*"Modern Information Retrieval"* , Pearson Education, 2007
2. David A Grossman and Ophir Frieder, *"Information Retrieval: Algorithms and Heuristics"* , Springer International Edition ,2 ed., 2012.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
M. Tech (CS) – I Semester
(16MT10507)INTERNET OF THINGS
(Common to CS and CNIS)
(Professional Elective – 1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*-*	*--*	*4*

PRE-REQUISITES:
C*ourses on "Computer Networks" and "Java"*
COURSE DESCRIPTION:
Domain Specific IoT's; M2M& System Management with Netconf-Yang; Developing Internet of Things Using Python; IoT Physical Devices & Case Studies Illustrating IoT Design

COURSE OUTCOMES:
After successful completion of this course, students will be able to:
CO1: Gain knowledge on
- Building blocks of Internet of Things and characteristics.
- Application areas of IoT
- Concept of M2M (machine to machine) with necessary protocols

CO2: Analyze Domain specific IoT's, revolution of Internet in Mobile Devices.
CO3: Design and Develop Techniques for solutions to solve the problems in IoT using Python Scripting Language.
CO4: Conduct research on domain specific IoT's and IoT enabling Technologies.
CO5: Acquire knowledge to recognize the opportunities and contribute to collaborative-multidisciplinary Scientific Research.

DETAILED SYLLABUS:
UNIT I– INTRODUCTION & CONCEPTS (08 periods)
Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, Logical Design of IOT, IOT Enabling Technologies, IoT Levels and Templates
UNIT II – DOMAIN SPECIFIC IOTS (09 periods)
Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style
UNIT III – M2M & SYSTEM MANAGEMENT WITH NETCONF-YANG (11 p*eriods*)
IoT and M2M – M2M, Difference between IOT and M2M, difference between SDN and NFV for IoT, Software defined networks, network function virtualization, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements.
Basics of IoT System Management with NETCOZF, YANG, YANG- NETCONF
UNIT IV – DEVELOPING INTERNET OF THINGSUSING PYTHON (15 periods)
Introduction, IOT Design Methodology, Installing Python, Language features of Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, File Handling, Date/ Time Operations, Classes, Exception handling, Python Packages of Interest for IoT.
UNIT V – IOT PHYSICAL DEVICES & ENDPOINTS (12 p*eriods*)
What is an IOT Device, Exemplary Device, Board, Linux on Raspberry Pi, Interfaces, Programming and IOT Devices, Case Studies Illustrating IoT Design: Home Automation, Cities and Agriculture.

Total Periods: *55*

TEXT BOOK:
1. Vijay Madisetti and Arshdeep Bahga," *Internet of Things A Hands On Approach*", Universities Press, 2015.

REFERENCE BOOKS:
1. Adrian McEwen, "*Designing the Internet of Things*", Wiely Piblishers, 2014.
2. Daniel Kellmereit, "*The Silent Intelligence: The Internet of Things*". 2013, DND Ventures LLc, 2013

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
M.Tech (CS) – I Semester
(16MT22504) SOFTWARE TESTING TECHNIQUES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Software Development Methodologies".
COURSE DESCRIPTION: Basic concepts of Software Testing; Testing Techniques – Levels of Testing; Testing Process – Test Planning; Test Metrics and Reports; Software Test Automation.
COURSE OUTCOMES:
On successful completion of this course, the students will be able to:

1. Gain knowledge on the Software Testing types and Process for different programming environments.
2. Analyze and apply the appropriate testing techniques suitable for testing the software.
3. Perform testing by applying appropriate strategies for selecting test cases to meet requirements of the product.
4. Apply efficient modern software testing tools for automation.
5. Write test cases and perform defect reporting.

DETAILED SYLLABUS
UNIT-I: BASIC CONCEPTS OF SOFTWARE TESTING (12 Periods)
Fundamentals of software testing - software verification and validation – V test model: V model for software, testing during proposal stage, testing during requirements stage, testing during test-planning phase, test during design phase, VV model, critical roles and responsibilities.
UNIT-II: TESTING TECHNIQUES (12 Periods)
Levels of testing, Acceptance testing, Feature based testing, and Application based testing.
UNIT-III: TESTING PROCESS (11 Periods)
Test planning –test policy, contents, strategy, test plan, Quality plan, test plan template, guidelines, test administration and estimation, standards, building test data, test cases, scenarios, templates for test cases, test scripts, effective test cases, building test data, generation of test data, roles and responsibilities in testing life cycle, test process monitoring.
UNIT-IV: TEST METRICS AND REPORTS (10 Periods)
Testing related data, defect data, efficiency data, categories of test metrics, estimated, budgeted, approved and actual, resources, effectiveness in testing, defect density, defect leakage ratio, residual defect density, test team efficiency, test case efficiency, rework, MTBF/ MTTR, test reports, status reports, integration test reports, system test reports, final test reporting, test status report, Bench marking.
UNIT-V: SOFTWARE TEST AUTOMATION (10 Periods)
Test Automation: Scope of Automation, Design and Architecture of automation, Process Model for Automation, challenges in automation; Load Runner, Selenium, QTP, RFT and RQM.

[Total Periods: 54]

TEXT BOOKS:

1. M. G. Limaye, *"Software Testing: Principles and Techniques and Tools,"* Tata McGraw Hill Education, 1st Edition, 2012.
2. Srinivasan Desikan and Gopalaswamy Ramesh, "*Software Testing: Principles and Practices*", Pearson education, 2012

REFERENCE BOOKS:

1. Dr. K. V. K. K. Prasad*, "Software Testing Tools,"* Dreamtech, 1st Edition, 2004.
2. Aditya P. Mathur, "*Foundations of Software Testing*", Pearson, 2008

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
M. Tech (CS) I Semester
(16MT10531) DATABASE MANAGEMENT SYSTEMS & DATA WAREHOUSING AND DATA MINING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	*50*	*100*	*-*	*-*	*4*	*2*

PRE-REQUISITES:

Courses on "Database Management Systems" and "Data Warehousing and Data Mining"

Course Description:

Hands on practice and implementation of data mining algorithms - Apriori, Fp-tree; Bayesian classification; Back propagation; k-means clustering; Bisecting k-means clustering in C++.

Designing and implement basic SQL Queries, PL/SQL and advanced concepts in PL/SQL such as Object creation structures; Triggers; Embedded SQL using Oracle Database Management System Package.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO-1: Acquire Practical Knowledge on

- SQL Queries
- Triggers
- Data Mining Algorithms
- Classification , Prediction and Cluster Analysis

CO-2: Analyze Integrity Constraints on databases for validation and Data Mining algorithms for solving real time applications

CO-3: Develop and Design solutions to complex problems related to frequent item sets, classification and clustering.

CO-4: Apply advanced knowledge to identify research challenges, and issues related to databases and data mining.

CO-5**:** Use modern software tools and technologies for designing simple to complex applications in databases and Data warehousing and data mining.

CO-6: Attitude for independent and continuous learning for improved knowledge with newer versions of DBMS packages and data mining.

'ADBMS' LABORATORY EXERCISES:

1. Consider the following tables:
   Employee(employee_name, street,city)
   Works(employee_name, company_name,salary)
   Company(company_name,city)
   Manages(employee_name,manager-name)

Write the SQL Queries for the following:

a. Find the names and cities of residence of all employees who work for First Bank Corporation.
b. Find the names, street address ad cities of residence of all employees .
c. Find all employees in the database who do not work for First Bank Corporation
d. Find all employees in the database who earn more than each employee of small bank corporation.
e. Assume that the companies may be located in several cities. Find all companies located in every city in which small bank corporation is located.
f. Find the company that has the most employees find those companies whose employees earn a higher salary, on average, than the average salary at First Bank Corporation.

2. Write a PL/SQL block to do the following:

a. Read a Number and reverse the given number.
b. Factorial of a given number using while, for and until loops
c. Check whether the given number is prime or not.
d. To calculate the sum of individual numbers.

3. a. Write a PL/SQL block that inserts a row and updates salary of an employee in employee table by using update_sal function which takes employee number as argument, calculates increment and returns increment based on the following criteria.

If salary <= 3000 increment = 30% of salary

If salary > 3000 and <= 6000 increment = 20% of salary

Else increment = 10% of salary.

b. Write a stored procedure, raise salary which accepts an employee number. It uses update_salfunction of previous program to get the salary increase amount and uses employee number to select the current salary from employee table. If employee number is not found or if the current salary is null, it should raise an exception. Otherwise, updates the salary.

4. Design and develop a suitable Student Database application by considering appropriate attributes. Couple of attributes to be maintained is the Attendance of a student in each subject for which he/she has enrolled and Internal Assessment Using TRIGGERS for the following:
   a) Whenever the attendance is updated, check if the attendance is less than 85%; if so, notify the Head of the Department concerned.
   b) Whenever, the marks in an Internal Assessment Test are entered, check if the marks are less than 40%; if so, and notify the Head of the Department concerned.
5. Implement Database Objects and creation of object structures for complex relations.
6. Implement C program segment with embedded SQL.

'DATA WAREHOUSING AND DATA MINING' EXERCISES:

1. Implementation of multi dimensional data model using oracle warehouse builder/SQL Server.

'Weka' laboratory Exercises:

2.Demonstration of preprocessing on dataset student.arff
3. Demonstration of preprocessing on dataset labor.arff
4. Demonstration of Association rule process on dataset contactlenses.arff using apriori algorithm
5. Demonstration of Association rule process on dataset test.arff using apriori algorithm
6. Demonstration of classification rule process on dataset student.arff using j48 algorithm
7. Demonstration of classification rule process on dataset employee.arff using j48 algorithm

Implementation of data mining algorithms in C++:

8. Write a C++ program to implement Apriori algorithm and find the frequent item sets.
9. Write a C++ program to implement FP tree algorithm.
10. Write a C++ program to Implement Naïve Bayesian classification algorithm to classify the data.
11. Write a C++ program to Implement of Back propagation algorithm to classify the data.
12. Write a C++ program to Implement K-means clustering algorithm to cluster the data.

REFERENCE BOOKS:

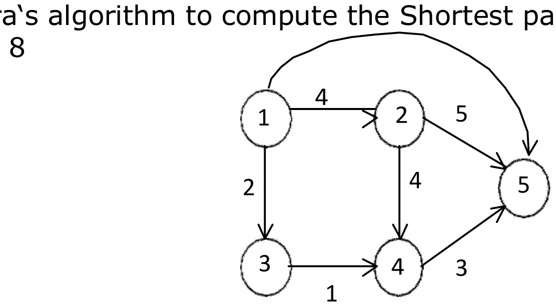
1. Margaret H Dunham, *Data Mining Introductory and Advanced Topics*," 2 ed., Pearson Education, 2006.
2. Amitesh Sinha, "*Data Warehousing*," PHI Learning, 2007.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
M. Tech. (CS) – I Semester
(16MT10532) DATA STRUCTURES AND COMPUTER NETWORKS LAB

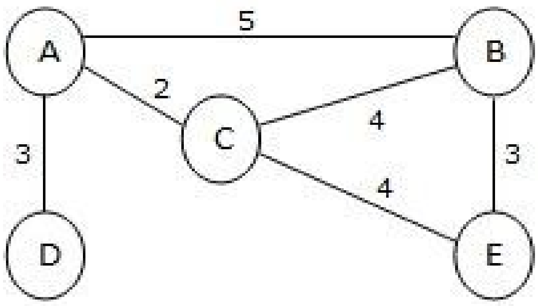
Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	*50*	*100*	*--*	*--*	*4*	*2*

PRE-REQUISITES:
Courses on "Advanced Computer Networks" and "Data Structures"
COURSE DESCRIPTION:
Hands on practical experience on implementing data link layer farming methods and routing algorithms;
Practical implementation of linked lists, stacks, queues, binary tree, binary search tree, AVL tree, B - tree, graphs, N-Queen's problem using C++.
COURSE OUTCOMES:
After successful completion of this course the students will be able to:
CO-1. Gain basic programming skills to implement
a. Framing mechanisms for data link layer,
b. Shortest path using Dijkstra's routing mechanism
c. Distance vector routing mechanism
d. Linear and non-linear data structures, backtracking problems.
CO-2. Analyze data structures for various problem solving techniques and typical performance measures of network models.
CO-3 Design, conceptualize and solve real world problems by providing the best solutions for data structures and networking models.
CO-4:. Use modern software tools and technologies for designing simple to complex applications in real world.
CO-5: Apply advanced knowledge to identify research challenges, and contribute individually or in teams to the development of network projects for real world problems.
CO-6: Develop effective professional and business communication in data structures and networks.

CO-7: Attitude for independent and continuous learning for improved knowledge with newer versions of object oriented software and new simulation models of protocols.
DETAILED SYLLABUS:
LIST OF EXERCISES IN COMPUTER NETWORKS
1. Implement the following data link layer farming methods
a. Character Count
b. Character Stuffing
c. Bit Stuffing
2. Design a program to compute checksum for the given frame 1101011011 using CRC-12, CRC-16, CRC-CCIP. Display the actual bit string transmitted. Suppose any bit from is inverted during transmission. Show that this error is detected at the receivers end.
3. Implement Dijkstra's algorithm to compute the Shortest path through a graph.



4. Design a program to obtain routing table for each node using distance vector routing algorithm by considering the given subnet with weights indicating delay between nodes.



5. Write a program to simulates flow based routing
6. Simulate the Random Early Detection congestion control algorithm

LIST OF EXERCISES IN DATA STRUCTURES

1. Implementation of Stacks and Queue operations using linked list.
2. Perform the following operations on binary search tree:
   a) Insertion b) Deletion c) Searching
3. Perform the following operations on AVL-tree:
   a) Insertion b) Deletion
4. Implementing the following operations on B-Tree:
   a) Insertion b) Searching c) Deletion
5. Implement the following using recursive and non-recursive traversals for binary tree:
   a) Pre-order b) In-order c) Post-order
6. Implement the following functions of a dictionary using hashing:
   a) Insertion b) Searching c) Deletion
7. Implement single source shortest path in a graph by using Bellman and Ford algorithm.
8. Implement N-queen's problem using Backtracking. The N Queen is the problem of placing N chess queens on an N×N chessboard so that no two queens attack each other.The expected output is a binary matrix which has 1s for the blocks where queens are placed. For example following is the output matrix for above 4 queen problem's solution.
   {0, 1, 0, 0}
   {0, 0, 0, 1}
   {1, 0, 0, 0}
   {0, 0, 1, 0}

REFERENCE BOOKS:

1. G. A. V. Pai, "Data Structures and Algorithms: Concepts, Techniques and Applications," Mc Graw Hill, First Edition, 2008
2. Nader F. Mir, "Computer and Communication Networks," Pearson Education, 2007.
3. Behrouz A. Forouzan, "Data Communications and Networking," Tata McGraw Hill, Fourth Edition, 2007.
4. D. Samanta, "Classic Data Structures," PHI learning, 2005.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
M. Tech. I Semester
(16MT13808) RESEARCH METHODOLOGY
(Common to all M. Tech. Programs)
(Audit Course)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	-	2	-	-

PREREQUISITES: --

COURSE DESCRIPTION:
Overview of Research, research problem and design, various research designs, data collection methods, statistical methods for research, importance of research reports and its types.

COURSE OUTCOMES: After completion of the course, students should be able to:

1. Acquire in-depth knowledge on
    a. Research design and conducting research
    b. Various data collection methods
    c. Statistical methods in research
    d. Report writing techniques.
2. Analyze various research design issues for conducting research in core or allied areas
3. Formulate solutions for engineering problems by conducting research effectively in the core or allied areas
4. Carryout literature survey and apply research methodologies for the development of scientific/technological knowledge in one or more domains of engineering.
5. Select and Apply appropriate techniques and tools to complex engineering activities in their respective fields
6. Write effective research reports.
7. Develop attitude for lifelong learning to do research.
8. Develop professional code of conduct and ethics of research.

DETAILED SYLLABUS:

Unit-I: Introduction to Research Methodology (5 Periods)

Objectives and Motivation of Research, Types of Research, Research Approaches, Research Process, Criteria of good Research, Defining and Formulating the Research Problem, Problem Selection, Necessity of Defining the Problem, Techniques involved in Defining a Problem.

Unit-II: Research Problem Design and Data Collection Methods (7 Periods)

Features of Good Design, Research Design Concepts, Different Research Designs, Different Methods of Data Collection, Data preparation: Processing Operations, Types of Analysis.

Unit-III: Statistics in Research (6 Periods)

Review of Statistical Techniques - Mean, Median, Mode, Geometric and Harmonic Mean, Standard Deviation, Measure of Asymmetry, ANOVA, Regression analysis.

Unit-IV: Hypothesis Testing (7 Periods)

Normal Distribution, Properties of Normal Distribution, Basic Concepts of Testing of Hypothesis, Hypothesis Testing Procedure, Hypothesis Testing: t-Distribution, Chi-Square Test as a Test of Goodness of Fit.

Unit-V: Interpretation and Report Writing (3 Periods)

Interpretation – Techniques and Precautions, Report Writing – Significance, Stages, Layout, Types of reports, Precautions in Writing Reports.

[Total Periods: 28]

Text Book:

1) C.R. Kothari, "*Research Methodology: Methods and Techniques*," New Age International Publishers, New Delhi, 2^{nd} Revised Edition, 2004.

Reference Books:

1) Ranjit Kumar, "*Research Methodology: A step-by-step guide for beginners*," Sage South Asia, 3^{rd} ed., 2011.
2) R. Panneerselvam, "Research Methodology," PHI learning Pvt. Ltd., 2009

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
M.Tech (CS) II-Semester
(16MT20501) ADVANCED COMPUTER ARCHITECTURE

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES: *A course on* "Computer Organization".

COURSE DESCRIPTION

Quantitative design and analysis, memory hierarchy design; parallel computer models and network properties; pipelining, superscalar techniques, multiprocessors and multi computers; Multi-Vector, SIMD and Multi-Core computers

COURSE OUTCOMES:

After successful completion of this course, students will be able to:

CO1. Acquire knowledge of:
- Models and Computer Architectures.
- Concepts of parallel computer models.
- Scalable Architectures.
- Pipelining, Superscalar processors, multiprocessors, SIMD and Multi core Computers.

CO2. Analyze architectures of parallel computers, sub systems and their interconnection structures.

CO3. Apply concepts and techniques of advanced computer architectures to solve engineering problems

CO4. Conduct research in the area of parallel computer architecture development and warehouse scale computing.

DETAILED SYLLABUS:

UNIT-I: FUNDAMENTALS OF QUANTITATIVE DESIGN AND ANALYSIS, MEMORY HIERARCHY DESIGN (10 Periods)

Fundamentals of Quantitative Design and Analysis: Introduction, Classes of computers, Defining Computer Architecture, Trends in technology, Trends in power and energy in ICs, Trends in cost, Dependability, Quantitative Principles of Computer Design.

Memory Hierarchy Design: Introduction, Advanced optimizations of cache performance, Memory technology and optimizations

UNIT-II: PARALLEL COMPUTER MODELS AND NETWORKS PROPERTIES (10 Periods)

Parallel Computer Models: The state of computing, Multiprocessors and multi-computers, Multi vector and SIMD computers,

P**rogram and Networks Properties:** Conditions of Parallelism, Program partitioning and scheduling, Program flow mechanisms, System interconnect architectures.

Examples: Detection of Parallelism in a program using Bernstein's conditions.

UNIT-III: PRINCIPLES OF SCALABLE PERFORMANCE AND MEMORY (12 Periods)

Principles of Scalable Performance: Performance metrics and measures, Parallel Processing applications, Speedup performance laws.

Bus, Cache and Shared memory: Bus systems, Cache memory organizations, Shared memory organizations.

UNIT-IV: PIPELINING, MULTIPROCESSORS AND MULTI COMPUTERS (12 Periods)

Pipelining: Linear pipeline processors, nonlinear pipeline processors, Instruction pipeline design, Arithmetic pipeline design.

Multiprocessors and Multi-computers: Multiprocessor system interconnects; Cache Coherence and synchronization mechanisms.

UNIT-V: MULTIVECTOR AND SIMD COMPUTERS, MULTICORE COMPUTERS (10 Periods)

Multi-Vector and SIMD computers: Vector processing principles, Multi-vector multiprocessors, SIMD computer organizations, The Evolution of Dataflow computers Computer Architecture of Warehouse–Scale Computers

Multi-Core computers: Multi-core organization.

Example Architectures: Intel x86 Multi core Organization **[Total Periods: 54]**

TEXT BOOKS:

1. Kai Hwang and Naresh Jotwani, "*Advanced Computer Architecture,*" 2 ed., McGraw Hill, New Delhi ,2011.
2. John L. Hennessy and David A. Patterson, *"Computer Architecture-A Quantitative Approach,"* 5 ed., Elsevier, U.S.A, 2012

REFERENCE BOOKS:

1. William Stallings, *"Computer Organization and Architecture-Designing for performance,"* 9 ed., Pearson Education, New Delhi, 2014.
2. Kai Hwang "*Advanced Computer Architecture,"* 1 ed., Tata McGraw Hill, New Delhi, 2001.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
M. Tech (CS) – II Semester
(16MT20502) BIG DATA ANALYTICS
(Common to CS & CNIS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*--*	*--*	*4*

PRE-REQUISITES:
Courses on "Data Base Management Systems" & "Data Warehousing and Data Mining".

COURSE DESCRIPTION:
Concepts of Big Data, Types of Data Elements; Introduction to Hadoop, Hadoop Ecosystem; Map Reduce; Building Blocks of Hadoop; Big data analytics applications; Predictive and Descriptive Analytics.

COURSE OUTCOMES:
After successful completion of this course, the student will be able to:

CO-1: Gain knowledge in:
- Big data Characteristics
- Hadoop Framework
- Map Reduce.
- Hadoop Release

CO-2: Analyze and develop solutions for database systems for storing and analyzing the large data.
CO-3: Apply Big Data Analytics for estimating the data sets to solve the real world problems.
CO-4: Design and model for an effective database by using big data tools.
CO-5: Carry out research on Predictive Analysis and Sentiment Analysis

CO-6: Learning advance analytics techniques for effective Database monitoring.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION TO BIG DATA: (10 periods)
Big Data Characteristics: Volume-Variety-Velocity-Veracity, Analytics, Basic Nomenclature, Analytics Process Model, Analytical Model Requirements, Types of Data Sources, Sampling, Types of Data Elements, Missing Values, Standardizing Data, Outlier Detection and Treatment, Categorization.

UNIT II: INTRODUCTION TO HADOOP: (10 periods)
Data, data types, Storage and Analysis, Relational Database Management Systems, Grid Computing, Volunteer Computing, A Brief History of Hadoop, Apache Hadoop and the Hadoop Ecosystem.

UNIT III – MAPREDUCE: (11 periods)
A weather Dataset: Data format, Analyzing the data with unix tools, Analyzing the data with Hadoop: MapReduce, Java MapReduce, Scaling Out: Data Flow, Combiner Functions, Running a Distributed MapReduce Job, Hadoop Streaming: Ruby, Python, Hadoop Pipes, Compiling and Running.

UNIT IV – HADOOP RELEASES (11 Periods)
The Building Blocks of Hadoop: Name Node-Data Node-Secondary Name Node-Job Tracker-Task Tracker. BIG DATA ANALYTICS APPLICATIONS: Back Testing Analytical Model, Credit Risk Modeling, Fraud Detection, Net Lift Response, Web Analytics, Social Media Analytics, and Business Process Analytics.

UNIT V–PREDICTIVE ANALYTICS AND DESCRIPTIVE ANALYTICS (11 Periods)
Predictive Analytics: Target Definition, Linear Regression, Logistic Regression, Decision Trees, Support Vector Machines, Ensemble Methods, Multiclass Classification Techniques, Evaluating Predictive Models.
Descriptive Analytics: Association Rules, Sequence Rules.

Total No. of Periods: 53

TEXT BOOKS:

1. Bart Baesens, "*Analytics in a Big Data World: The Essential Guide to Data Science and its Applications,"* Wiley Publications, 2014.
2. Tom White, "*Hadoop: The Definitive Guide,"* 3 ed., O'REILLY Publications, 2012.

REFERENCE BOOKS:

1. Paul Zikopoulos, IBM, Chris Eaton, Paul Zikopoulos *"Understanding Big Data: Analytics for Enterprise Class Hadoop and streaming Data,"* The McGraw-Hill Companies, 2012.
2. Chuck Lam "*Hadoop in Action,"* Manning Publications, 2011.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
M. Tech (CS) II-Semester
(16MT20503) OBJECT ORIENTED ANALYSIS AND DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*--*	*--*	*4*

PRE-REQUISITES:
A Course on "Object Oriented Programming"
COURSE DESCRIPTION:
Concepts of Unified Modeling language; Sequence and collaboration diagrams; Behavioral Modeling; Unified Process and phases of unified process
COURSE OUTCOMES:
After successful completion of the course, the students will be able to:
CO-1: Gain advanced knowledge in
- Object Oriented Methodologies
- UML Diagrams
- Unified Process

CO-2: Analyze Various UML Models which are required for solving Real World problems.
CO-3: Formulate solutions for engineering problems pertaining to the Object Oriented Analysis and Design
CO-4: Design UML Diagrams Using Visual Modelling Tools
CO-5: Apply unified process models for building of Applications, which is required for effective project management.
DETAILED SYLLABUS:
UNIT – I: INTRODUCTION TO UML (11 Periods)
Introduction To UML: Importance Of Modeling- Principles Of Modeling Object Oriented Modeling- Conceptual Model Of The UML- Architecture.
Basic Structural Modeling: Classes- Relationships- Common Mechanisms - and Diagrams.
Class Diagram: Terms - Concepts- Modeling Techniques for Class Diagram.
UNIT – II: INTERACTION DIAGRAMS AND COLLABORATION DIAGRAMS (11 Periods)
Interaction Diagrams: Sequence Diagrams: Terms - Concepts and Common Modeling Techniques
Collaboration Diagrams: Terms- Concepts and Common Modeling Techniques.
Basic Behavioral Modeling: Use Cases- Use Case Diagrams- Activity Diagrams.
UNIT -III: ADVANCED BEHAVIORAL MODELING (11 Periods)
Advanced Behavioral Modeling: Events And Signals- State Machines - State Chart Diagrams.
Architectural Modeling: Component – Deployment - Component Diagrams and Deployment Diagrams.
Case Studies: Online Bookshop, Point of sales System.
UNIT – IV: THE UNIFIED PROCESS (11 Periods)
The Unified Process: Use Case Driven- Architecture Centric- Iterative and Incremental.
The Four Ps: People- Project- Product- And Process.
Use Case Driven Process: Why Use Case - Capturing Use Cases-Analysis- Design - And Implementation To Realize The Use Cases - Testing The Use Cases.
Architecture-Centric Process: Architecture In Brief- Why We Need Architecture - Use Cases and Architecture- An Architecture Description.
Iterative Incremental Process: Iterative Incremental In Brief- Why Iterative Incremental Development? The Iterative Approach Is Risk Driven- The Generic Iteration.
UNIT – V: PHASES OF UNIFIED PROCESS (11 Periods)
Inception Phase: Early In The Inception Phase- The Archetypal Inception Iteration Workflow- Execute The Core Workflows- Requirements To Test.
Elaboration Phase: Elaboration Phase In Brief- Early In The Elaboration Phase- The Architectural Elaboration Iteration Workflow- Execute The Core Workflows-Requirements to Test.
Construction Phase: Early In The Construction Phase- The Archetypal Construction Iteration Workflow- Execute The Core Workflow.
Transition Phase: Early In the Transition Phase- Activities in Transition Phase. **Total Periods: 55**
TEXT BOOKS:
1. Grady Booch, James Rumbaugh, Ivar Jacobson, *"The Unified Modeling Language User Guide, "Pearson* Education, 2 ed., 2006
2. Ivar Jacobson, Grady Booch, James Rumbaugh, *"The Unified Software Development Process",* Pearson Education, 1 ed., 2009
REFERENCE BOOKS:
1. Mark Priestley, *"Practical Object-Oriented Design with UML,"* Second Edition, Tata McGraw Hill, 2011.

2. Mike O' Docherty, *"Object-Oriented Analysis and Design with UML Version 2.0,"* Wiley India Pvt. Ltd, 2012.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
M.Tech (CS) II Semester
(16MT12501) CLOUD COMPUTING
(Common to SE, CS & CNIS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: *Courses on* "Operating Systems" and "Computer Networks"

COURSE DESCRIPTION:

Virtualization, Case studies – XEN, VMware, Microsoft Hyper-V; Cloud architecture; Services and Applications; Cloud Programming; Industry practices and Case studies –Amazon Web Services, Google App Engine, and Microsoft Azure.

COURSE OUTCOMES:

After successful completion of this course, students will be able to:

CO1: Demonstrate knowledge on Virtualization models, Cloud Architecture, Services and Programming concepts.
CO2: Analyze the problems in existing cloud architectures.
CO3: Apply concurrent programming, throughput computing and Data intensive computing in Cloud programming.
CO4: Conduct research on emerging technologies in cloud and energy management in cloud
CO5: Apply virtualization techniques to optimize resource sharing.

DETAILED SYLLABUS:

Unit I: Introduction to Virtualization (9 Periods)

Characteristics of Virtualized Environments, Taxonomy of Virtualization Techniques, Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology Examples – XEN, VMware, Microsoft Hyper-V.

UNIT II: Cloud Architecture (11 Periods)

Introduction to Cloud: Defining Cloud Computing, Cloud Types - The NIST model, The Cloud Cube Model, Deployment models, Service models, Examining the Characteristics of Cloud Computing, Paradigm shift, Benefits of cloud computing, Disadvantages of cloud computing, Assessing the Role of Open Standards.

Cloud Architecture: Exploring the Cloud Computing Stack, Composability, Infrastructure, Platforms, Virtual Appliances, Communication Protocols, and Applications.

UNIT III: Defining Cloud Services (10 Periods)

Defining Infrastructure as a Service (IaaS) – IaaS workloads, Pods, aggregation, and silos, **Defining Platform as a Service (PaaS), Defining Software as a Service (SaaS)** – SaaS characteristics, Open SaaS and SOA, Salesforce.com and CRM SaaS, **Defining Identity as a Service (IDaaS)** – Introduction to identity, Networked identity service classes, Identity system codes of conduct, IDaaS interoperability, **Defining Compliance as a Service (CaaS)**.

UNIT IV: Cloud Programming Concepts (12 Periods)

Concurrent Programming – Introduction to Parallelism for Single Machine Computation, Programming Applications with Threads, **High Throughput Computing** – Task Programming, Task based Application Models, **Data Intensive Computing** – Introduction to Data Intensive Computing and Technologies for Data Intensive Computing.

UNIT V: Industrial Platforms and Trending Developments (13 Periods)

Case Studies on Cloud Platforms – Amazon Web Services, Google App Engine, and Microsoft Azure, Case Studies on Cloud Applications – Scientific Applications, Business and Consumer Applications.

Enhancements in Cloud – Energy Efficiency in Clouds, Market based Management of Clouds, Federated Clouds / InterCloud, Third Party Cloud Services.

Total Periods: 55

TEXT BOOKS:

1. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, "*Mastering Cloud Computing: Foundations and Applications Programming,*" 1st Edition, McGraw Hill,New Delhi, 2013.
2. Barrie Sosinsky, "*Cloud Computing Bible,*" 1st Edition, Wiley India Pvt Ltd, New Delhi,2011.

REFERENCE BOOKS:

1. Anthony T. Velte, Toby J. Velte Robert Elsenpeter, "*Cloud Computing: A Practical Approach,*" 1st Edition, Tata McGraw Hill, 2010.

2. George Reese, "*Cloud Application Architectures,*" 1st Edition, O'Reilly Publishers, 2010.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
M.Tech (CS) II Semester
(16MT22505) WEB TECHNOLOGIES
(Common to SE and CS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Object Oriented Programming".
COURSE DESCRIPTION: Web Technologies: HTML5, CSS, JavaScript, JQuery; Open source server-side scripting language- PHP; MySQL database concepts; and AJAX.

COURSE OUTCOMES:
On successful completion of this course, the students will be able to:
CO1: Gain knowledge on web technologies.
CO2: Analyze the functionality of client as well as server side web technologies for validating web pages.
CO3: Gain programming skills to design and develop novel web applications
CO4: Apply web technologies to make web pages more interactive, scalable and user friendly web applications.

DETAILED SYLLABUS

UNIT–I: HTML5 AND CSS3 **(14 Periods)**
HTML5: Overview of HTML and XHTML, HTML5 - Introduction, HTML5 Document Structure, Creating Editable Content, Checking Spelling Mistakes, Exploring Custom Data Attributes, Microdata, Client-Side Storage, Drag and Drop Feature, ARIA Accessibility, Offline Web Applications, Web Communications, Cross-Document Messaging and Desktop Notifications, 2D and 3D Graphics; **CSS3**: Introduction, Features of CSS3, Syntax of CSS, Exploring CSS selectors, Inserting CSS in HTML Document, State of CSS3.
UNIT–II: JAVASCRIPT AND JQUERY **(10Periods)**
JavaScript: Overview of JavaScript**,** JavaScript Functions, Events, Image Maps and Animations, JavaScript Objects; **JQuery**: Fundamentals of JQuery, JQuery Selectors, JQuery Methods to Access HTML Attributes and Traversing, JQuery Manipulators, Events and Effects.
UNIT–III: INTRODUCTION TO PHP **(10 Periods)**
Introduction, Data Types, Variables, Constants, Expressions, String Interpolation, Control Structures, Functions, Arrays, Embedding PHP Code in Web Pages, Object Oriented PHP.
UNIT–IV: PHP AND MYSQL **(10Periods)**
PHP and Web Forms, Sending Form Data to a Server, Authenticating Users with PHP, Session Handlers, PHP with MySQL, Interacting with the Database, Database Transactions.
UNIT–V: AJAX **(08 Periods)**
Exploring Different Web Technologies, Exploring AJAX, Creating a Sample AJAX Application, Displaying Date and Time using AJAX, Creating the XML HttpRequest Object, Reading a File Synchronously and Asynchronously, Reading Response Headers, Loading List Boxes Dynamically using XML HttpRequest Object, JQuery with AJAX, Validating a Field using AJAX and PHP.

[Total Periods: 52]

TEXT BOOKS:
1. Kogent Learning Solutions Inc, *"HTML 5 Black Book: Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP and JQuery,"* 1st Edition, Dreamtech Press, 2011.
2. W. Jason Gilmore, *"Beginning PHP and MySQL,"* 4th Edition, APress, 2011.

REFERENCE BOOKS:
1. Andrea Tarr, *"PHP and MySQL,"* 1st Edition, Willy India, 2012.
2. Thomas A. Powell, *"The Complete Reference: HTML and CSS,"* 5th Edition, Tata McGraw Hill, 2010.
3. Steve Suehring, Tim Converse and Joyce Park, *"PHP6 and MySQL,"* 1st Edition, Willy India, 2009.
4. P. J. Deitel and H. M. Deitel, "*Internet & World Wide Web How to Program*," 4th Edition, Pearson, 2009.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
M.Tech (CS) II-Semester
(16MT20504) EMBEDDED SYSTEMS
(PROFESSIONAL ELECTIVE–II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*--*	*--*	*4*

PRE-REQUISITES:
Courses on Computer Organization & Operating Systems
COURSE DESCRIPTION:
Concepts of Embedded System components, Micro controller program-ming; Programming in Embedded Systems, design using hardware and software components; Real-Time Operating systems, Embedded Product Development Life Cycle .
COURSE OUTCOMES:
After successful completion of this course the students will be able to:
CO-1: Gain advanced knowledge in
- Embedded system components.
- Micro controller programming.

CO-2: Analyze critical problems related to programming for hardware and software components by conducting detailed research.
CO-3: Apply and solve issues in computer based systems using a range of solutions provided by Embedded Systems..
CO-5: Use appropriate techniques, tools, resources and usage of modern Embedded Product Development Life Cycle (EDLC) tools for the design and development of Embedded Systems.
DETAILED SYLLABUS
UNIT I - INTRODUCTION TO EMBEDDED SYSTEMS (11 Periods)
Embedded Systems, History, classification, application areas, purpose. Core of Embedded systems, memory, sensors and actuators, communication Interface, firmware, other system components, PCD and Passive components. Embedded systems Applications and domain specific.
UNIT II -MICRO CONTROLLER (11 Periods)
8051 Architecture, Real World Interfacing, Introduction to Advanced Architectures, Processor and Memory Organization, Instruction -level parallelism, memory-types, memory-maps and addresses, processor selection, memory selection.
UNIT III-EMBEDDED SYSTEM DESIGN AND DEVELOPMENT (11 Periods)
Hardware Design: Analog and Digital components, VLSI circuit Design, EDA tools, PCB Layout design and Fabrication.
Firmware Design and Development: Firmware design approaches, development languages, Programming
UNIT IV-PROCESSES AND REAL - TIME OPERATING SYSTEM (11 Periods)
OS-basics-types-tasks, process and threads-Multi-processing and Multi-tasking-Task Scheduling-Task communication-Task Synchronization-Device Drivers-Case study: VxWorks and MicroC/OS-II.
UNIT V- EMBEDDED SYSTEM DEVELOPMENT (11 Periods)
Integrated Development Environment, Cross-compilation, De-compiler, simulators, Emulators, Debuggers. **Embedded Product Development Life cycle**: EDLC-the EDLC Objectives -Phases-Modeling.

TOTAL PERIODS: 55

TEXT BOOKS:

1. SHIBU KV, "Introduction to Embedded Systems", Fifth Edition, McGraw Hill ,2012.
2. Manish K Patel, "Microcontroller based Embedded Systems", McGraw Hill ,2014.

REFERENCE BOOKS:

1. Wayne Wolf, "Computers as Components -Principles of Embedded Computing System Design", Morgan Kaufman Publishers, First Indian Reprint, 2001.
2. Steve Heath, "Embedded Systems Design", Second Edition, Newnes Publications, 2003.
3. David E. Simon, "An Embedded Software Primer", Pearson Education, First Indian Reprint, 2000.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
M. Tech (CS) II-Semester
(16MT20505)INFORMATION SECURITY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*--*	*--*	*4*

PRE-REQUISITES:
A Course on **"**Computer Networks***"***
COURSE DESCRIPTION
Concepts of cryptographic algorithms, public key and private key encryption; security models, Hash Algorithms; Intrusion Detection, IP Security; analysis of security principles in internet and system security
COURSE OUTCOMES:
After successful completion of this course, students will be able to:
*CO1.*Gain advanced knowledge in
- Symmetric and Asymmetric Encryption Algorithms
- Key distribution and message Authentication
- Hash algorithms and digital signature techniques
- IP security and Wireless network security
- Intrusion Detection and Firewall configurations

CO2. Analyze the symmetric algorithms, Public-Key Encryption and Hash Algorithms.
CO3. Develop solutions to solve the problems related to Public-Key Encryption, Digital signatures, Secure Hash Functions
CO4.Conduct research to identify efficient ciphers and cryptographic algorithms to provide novel solutions for Real- Time applications
*CO5.*Apply the appropriate Cryptographic Techniques and security Algorithms in the area of Information Security
DETAILED SYLLABUS
UNIT-I: INTRODUCTION (**10Periods**)
Security Attacks, Security Services, Security Mechanisms, Model for Network Security, Mono alphabetic cipher and Poly alphabetic cipher
Symmetric Block Encryption- Symmetric Block Encryption Algorithms-DES, Triple-DES, AES, Cipher Block Modes of Operation
UNIT-II: PUBLIC-KEY ENCRYPTION **(10 Periods)**
Message Authentication-Approaches to Message Authentication, Simple hash function, Secure Hash Functions –SHA-1, SHA-512, Message Authentication Codes and HMAC
Public-Key Cryptography-Public-Key Cryptography Algorithms-RSA, Diffie-Hellman Key Exchange, Digital signature standard
UNIT-III: NETWORK SECURITY APPLICATIONS **(12 Periods)**
Key Distribution and User Authentication-Kerberos, Key Distribution Using Asymmetric Encryption, X.509 Certificates, Public Key Infrastructure
Electronic Mail Security-Pretty Good Privacy, Key Rings, Multipurpose Internet Mail Extensions, S/MIME - Functionality, Messages and certificate processing.
UNIT-IV: INTERNET SECURITY **(11 Periods)**
Transport Level Security- Secure Socket Layer and Transport Layer Security.
IP Security-Overview, policy, Encapsulating Security Payload and IKE.
Wireless Network security- IEEE 802.11 Wireless LAN Overview, IEEE 802.11i Wireless LAN Security
UNIT-V: SYSTEM SECURITY **(10 Periods)**
Intruders-Intrusion Detection, Password Management, Malicious Software - Types, Viruses, Virus Countermeasures, Worms.
Firewalls- Firewall Characteristics, Firewall Basing, Types of Firewalls, Firewall Location and Configurations.

Total number of Periods: 53

TEXTBOOKS:

a. William Stallings, "*Network Security Essentials: Applications and Standards," 4ed,* Pearson Education, New Delhi,2011
b. Douglas R.Stinson, "*Cryptography – Theory and Practice,"* 3ed, CRC Press, 2005

REFERENCE BOOKS:

1. William Stallings, "*Cryptography and Network Security,"* 5ed., Pearson education, New Delhi,2011.
2. Eric Maiwald, "*Fundamentals of Network Security"*, 1ed., McGraw-Hill, 2003

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
M.Tech (CS) – II Semester
(16MT20506) MOBILE COMPUTING
(Professional Elective-II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*--*	*--*	*4*

PRE-REQUISITES:
A Course on "Computer Networks"
COURSE DESCRIPTION:
GSM architecture, Wireless MAC and CDMA Systems; Mobile IP network layer, Mobile Transport Layer; Databases, Data Dissemination and Broadcasting Systems; Synchronization in Mobile Devices and Mobile Computing Systems; Mobile Application Languages and Mobile Operating Systems.
COURSE OUTCOMES:
After successful completion of this course, students will be able to:
CO1. Gain advanced knowledge in
- GSM and CDMA Systems.
- Mobile IP, and Mobile TCP
- Databases and Data Dissemination
- Mobile Data Synchronization

CO2. Analyze various methods in data dissemination and broadcasting models
CO3. Evaluate and implement novel applications to realize power computing and context-aware computing. .
CO4. Contribute positively to multidisciplinary scientific research on mobile application languages and mobile operating systems.
CO5. Apply Database Hoarding Techniques, Selective Indexing and Tuning Techniques to solve problems in Mobile Computing

DETAILED SYLLABUS:
UNIT I – GSM AND WIRELESS MEDIUM ACCESS CONTROL (11 periods)
GSM and Similar Architectures: GSM, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services.
Wireless MAC and CDMA – Based Communication: Medium Access control, Introduction to CDMA-based Systems, Spread Spectrum in CDMA Systems, Coding Methods in CDMA.
UNIT II – MOBILE IP NETWORK LAYER AND MOBILE TRANSPORT LAYER (11 periods)
Mobile IP Network Layer: IP and Mobile IP Network Layer, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, Dynamic Host Configuration Protocol.
Mobile Transport Layer: Conventional Transport Layer Protocols, Indirect TCP, Snooping TCP and Mobile TCP.
UNIT III – DATABASES AND DATA DISSEMINATION (11 p*eriods*)
Databases: Database Hoarding Techniques, Data Caching, Client-Server Computing and Adaptation.
Data Dissemination and Broadcasting Systems: Communication Asymmetry, Classification of Data-Delivery Mechanisms, Data Dissemination Broadcast Models, Selective Tuning and Indexing Techniques.
UNIT IV – DATA SYNCHRONIZATION IN MOBILE COMPUTING SYSTEMS AND MOBILE DEVICES (11 periods)
Data Synchronization in Mobile Computing Systems: Synchronization, Synchronization Software for Mobile Devices, Synchronization Protocols, SynML- Synchronization Language for Mobile Computing, Sync4J (Funambol).
Mobile Devices: Server and Management –Mobile Agent, Application Server, Gateways, Portals, Service Discovery, Device Management, Mobile File Systems, Security.
UNIT V – MOBILE APPLICATION LANGUAGES AND MOBILE OPERATING SYSTEMS (10 p*eriods*)
Mobile Application Languages: Introduction, XML, JAVA, Java 2 Micro Edition (J2ME), JavaCard.
Mobile Operating Systems: Operating System, Palm OS, Windows CE, Symbian OS, Linux for Mobile Devices.

[Total Periods: 54]

TEXT BOOK:
1. Raj Kamal, "Mobile Computing," 2 ed., OXFORD University Press, 2007.
REFERENCE BOOKS:

1. Jochen H. Schiller, "Mobile Communications," 2 ed. , Pearson Education, 2004
2. Ashok K Talukder, Roopa R Yavagal, "Mobile Computing," 2 ed., Tata McGraw Hill, 2010

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
M. Tech (CS) – II Semester
(16MT20507) SOFTWARE PROJECT MANAGEMENT
(Professional Elective-II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*			*4*

PRE-REQUISITES:
A course on "Software Engineering"

COURSE DESCRIPTION:
Concepts of Software Project Management; Software efforts estimation techniques; Software economics; life cycle phases; model based software architectures; project organizations & responsibilities.

COURSE OUTCOMES:
After successful completion of this course the students will be able to:

CO-1: Gain knowledge on project planning and management, client management and project Scheduling and monitoring.
CO-2: Analyze the major and minor milestones, artifacts and metrics from management and technical perspective.
CO-3: Design software products using conventional and modern principles of software project management.
CO-4: Apply Software Metrics for a given Project to calculate Cost estimation models.
CO-5: Adopt team effectiveness through Work Breakdown Structures by optimal cost and schedule estimates
CO-6: Demonstrate skills of project management and process measurement in software projects.

DETAILED SYLLABUS:

UNIT-I: SOFTWARE EFFORTS ESTIMATION TECHNIQUES (10 Periods)
Introduction to software project management, An overview of project planning, The Waterfall model, Conventional Software Management Performance, Evolution of Software Economics, Software Economics

UNIT-II: IMPROVING SOFTWARE ECONOMICS (11 Periods)
Reducing Software product size, improving software processes, improving team effectiveness, improving automation, achieving required quality, peer inspections, the old way and the new, the principles of conventional software Engineering, and principles of modern software management.

UNIT-III: LIFE CYCLE PHASES (10 Periods)
Engineering and production stages, inception, Elaboration, construction phase, transition phases, ISO 12207 approach to software lifecycle processes, Artifacts of the process, the artifact sets, Management artifacts, engineering artifacts.

UNIT-IV: MODEL BASED SOFTWARE ARCHITECTURES (10 Periods)
A Management perspective and Technical perspective, Workflows of the process, Software process workflows, Iteration workflows. Checkpoints of the Process- Major mile stones, Minor Milestones, Periodic status assessments, Iterative Process Planning, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.

UNIT-V: PROJECT ORGANIZATIONS AND RESPONSIBILITIES (14 Periods)
Line-of-Business organization, Project organizations- case study, evolution of organizations, Automation building blocks, The project environment, the seven core metrics, Management indicators, quality indicators, life cycle expectations, Software Metrics automation, Tailoring the process discriminates, COCOMO cost estimation model- case study.

[Total Periods: 55]

TEXT BOOKS:
1. Walker Royce, "*Software Project Management*," Pearson Education, 2005.
2. Bob Hughes and Mike Cotterell, "*Software Project Management*," 4 ed., Tata McGraw-Hill Edition, 2006.

REFERENCE BOOKS:
1. Joel Henry, "*Software Project Management*," 1 ed., Pearson Education,2003.
2. Pankaj Jalote, "*Software Project Management in Practice,"* 7 ed., Pearson Education,2008.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
M. Tech. II-Semester
(16MT20531) CLOUD COMPUTING & BIG DATA ANALYTICS LAB
(Common to CS and CNIS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	--	--	4	2

PRE-REQUISITES:
Course on "Cloud Computing" and "Operating Systems"

COURSE DESCRIPTION:
Hands-on experience on creating Virtual machines on Windows and Linux platforms, Development of Service based web applications & their deployment and Mobile app development, Designing and implementing Hadoop cluster.

COURSE OUTCOMES:
After successful completion of this course , students will be able to:

***CO-1*:** Demonstrate hands-on experience on Virtualization models, Cloud Environment and Hadoop cluster setup.
***CO-2*:** Analyze the given experiment and measure the performance of services and datasets.
***CO-3*:** Apply API development skills in web applications for Cloud deployment and develop solutions for real time applications using Hadoop.
***CO-4*:** Devise virtual environments based on virtualization techniques and processing huge amount of data using Big data tools
***CO-5*:** Develop written and oral communications in preparing and presenting reports.

LIST OF PRACTICAL EXERCISES:
1 : Create Virtual machines with given set of configuration on Hyper-V, " Ubuntu 14 LTS OS, with 2 GB RAM and 200 GB HDD". (IaaS)
2: Create Virtual machines with given set of configuration on Ubuntu OS: "Windows 7 OS with 4 GB RAM and 500 GB HDD". (IaaS)
3: Develop a Design document for a web application, to perform operations based on service calls and to be deployed on cloud environment. (Design Doc)
4: Develop a web application for performing Calculator operations be selecting relevant services. Deploy it on cloud platform. (SaaS)
5: Develop a HTTPS web application with social media interfaces (Facebook / Twitter / Instagram / Google+ APIs). (SaaS)
6: Develop a mobile app on Google App Engine for uploading a resume into a website, collaborated with Drop box. The resume should be encrypted. (PaaS)
7: Develop a service call to run on Drop box resumes for picking the resumes of given skill set. (PaaS)

- i. 6+ years of Exp in Java Development.
- ii. 10 years of experience in Automation Testing.
- iii. 15+ years of Managerial experience with technical background.
- iv. 5-7 years of on-site experience in .NET support and programming.

8: Install and run Hadoop using Single node Cluster.
9: Install and run Hadoop using Multi node cluster
10: Write a program to count words in a program using map and reduce functions and Hadoop.
11: Illustrate installation and configuring of Hive

REFERENCE BOOKS:
1: Ivanka Menken and Ivanka Menken, "*Cloud Computing Virtualization Specialist Complete Certification Kit - Study Guide Book,*" 1 st Edition, Emereo Pty. Ltd., 2009.
2: Barrie Sosinsky, "*Cloud Computing Bible,*" 1st Edition, Wiley India Pvt Ltd, 2011.
3: Tom White, "*Hadoop: The Definitive Guide*," 3rd Edition, O'REILLY Publications, 2012.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
M. Tech – II Semester
(16MT20532) OBJECT ORIENTED ANALYSIS & DESIGN LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	--	--	4	2

PRE-REQUISITES:
A Course on "Object Oriented Programming"
COURSE DESCRIPTION:
Concepts of Unified Modeling language; Sequence and collaboration diagrams; Behavioral Modeling; Unified Process and phases of unified process.
COURSE OUTCOMES:
After successful completion of this course the students will be able to:
CO-1: Demonstrate knowledge on Object Oriented concepts, project planning and modeling concepts.
CO-2: Analyze and understand requirements of given real life problems.
CO-3: Design Structural and Behavioral Diagrams to solve real world problems.
CO-5: Apply UML to develop blueprints of a given problem.
CO-6: Develop written and oral communications in preparing and presenting reports.
CO-7: Update knowledge in object oriented analysis and design continuously
LIST OF EXERCISES:
Case Study No: 1
Problem Title: Automated Teller Machine (ATM)
Problem Statement:
Software is designed for supporting a computerized ATM banking network. All the process involved in the bank is computerized these days. All the accounts maintained in the bank and also the transactions effected, including ATM transactions are to be processed by the computers in the bank. An ATM accepts a relevant cash card, interacts with user, communicates with the central system to carry out the transaction, dispenses cash, and prints receipts. The system to be designed and implemented must include appropriate record keeping and security provisions. The system must handle concurrent access to the same account.
Case Study No: 2
Problem Title: Online Ticket Reservation for Railways
Problem Statement:
Computer play an integral part of the day in today's life. It makes the entire job easier and faster, every job is computerized so as the ticket reservation we can book over the online ticket reservation system. During the booking of the ticket reservation passenger has to select origin, data of journey, destination, class of train etc. The reservation counter keeps track of passenger's information. Thus the system will have all the details about the trains and facilities provided by them. There are various trains with the different level of convenience for the passengers. The whole database will be maintained by database administrator. There are varieties of trains where the passengers can select the train according to the convenience for their destination journey. The journey could be within the state or across the India. Each train has the three types of classes ie Sleeper class, First class and the AC compartment. Design the application for the above problem description.
Case Study No: 3
Problem Title: A Point-of-Sale (POS) System
Problem Statement:
A POS system is a computerized application used to record sales and handle payments, it is typically used in a retail store, it includes hardware components such as a computer and bar code scanner, and software to run the system. It interfaces to various service applications, such as a third-party tax calculator and inventory control. These systems must be relatively fault tolerant, that is, even if remote services are temporarily unavailable they must still be of capturing sales and handling at least cash payments. A POS system must support multiple and varied client-side terminals and interfaces such as browser, PDA's, touch-screens.
Case Study No: 4
Problem Title: University Course Information System
Problem Statement:
Each student has access to his or her course and grade information only and must be authenticated prior to viewing or updating the information. A course instructor will use the system to view the list of courses he or she is assigned for a given semester or has taught previously, view the list of students registered for the course(s) he or she is teaching, and record final grades for each student in the course(s). TA assignments will also be viewable through this system. Instructors must also be authenticated prior to viewing or updating any information.
Case Study No: 5
Problem Title: Hospital Management System
Problem Statement:

Hospital Management System (HMS) is state-of-the-art software that offers comprehensive solutions to various segments of Healthcare Industry such as Super Specialty, Multispecialty and General Hospitals of varied capacities, small Nursing Homes, HMOs, Polyclinics and General Practitioners. This HMS solution addresses the issues from multi-discipline angels namely Patients, Doctors, Pharmacy, Hospital Management and Services.

The Software provides both clinical as well as patient care aspects to hospital management. The software is divided into different modules, each addressing a specific activity of the hospital and there by facilitating better patient care. Each module can be used as a standalone solution or can be integrated in a phased manner. Modules are designed so that they meet the present and future requirements of the hospital.HMS offers various sub-systems and a seamless integration. By being modular, each module can be used as a standalone solution or can be integrated in a phased manner. Modules are also so designed to meet the present as well as future requirements of the organization and process a unique ability with the business growth.HMS consists of the Base modules, Add-on modules and Specialty modules. Additional modules both add-on and specialty modules can be seamlessly integrated to the HMS at any time. The Integration Manager takes care of all the data consistency issues.

Case Study No: 6

Problem Title: Unified Library Application

Problem Statement:

A library lends books and magazines to members, who are registered in the system. Also it handles the purchase of new titles for the library. Popular titles are bought in multiple copies. A member can reserve a book or magazine that is not currently available in the library, so that when it is returned by the library that person is notified. The library can easily create, update and delete information about the titles, members, loans and reservations in the systems.

Case Study No: 7

Problem Title: Online Shopping

Problem Statement:

A POS System is a computerized application used to record sales and handle payments; it is typically used in a retail store. It includes hardware components such as a computer and bar code scanner, and software to run the system. It interfaces to various service applications, such as a third-party tax calculator and inventory control. These systems must be relatively fault tolerant; that is, even if remote services and temporarily unavailable they must still be of capturing sales and handling at least cash payments. A POS system must support multiple and varied client – side terminals and interfaces such as browser, PDA s, touch – screens.

Case Study No: 8

Problem Title: Passport Automation System

Problem Statement:

Passport Automation System (PAS) is used in the effective dispatch of passport to all of the applicants. This system adopts a comprehensive approach to minimize the manual work and schedule resources, time in a cogent manner. The core of the system is to get the online registration form (with details such as name, address etc.,) filled by the applicant whose testament is verified for its genuineness by the Passport Automation System with respect to the already existing information in the database.

This forms the first and foremost step in the processing of passport application. After the first round of verification done by the system, the information is in turn forwarded to the regional administrator's (Ministry of External Affairs) office. The application is then processed manually based on the report given by the system, and any forfeiting identified can make the applicant liable to penalty as per the law. The system forwards the necessary details to the police for its separate verification whose report is then presented to the administrator. After all the necessary criteria have been met, the original information is added to the database and the passport is sent to the applicant.

Case Study No: 9

Problem Title: Recruitment Procedure for Software Industry

Problem Statement:

In the software industry the recruitment procedure is the basic thing that goes in the hand with the requirement as specified by the technical management team. HR first gives an advertisement in leading Newspapers, Journals, Weeklies and Websites. The job seekers can apply for it through by Post or by e-mail to the company.

The technical skill and the experience of the candidates are reviewed and the sort listed candidates are called for the interview. There may be different rounds for interview like the written test technical interview, HR interview. After the successful completion of all rounds of interview, the selected candidate’s names are displayed. Mean while HR gives all the details about the salary, working hours, terms and conditions and the retirement benefit to the candidate.

REFERENCE BOOKS:

R1. Mark Priestley, “Practical Object-Oriented Design with UML,” Second Edition, Tata McGraw Hill, 2011.

R2. Mike O’ Docherty, “Object-Oriented Analysis and Design with UML Version 2.0,” Wiley India Pvt. Ltd, 2012.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
M. Tech. (CS)-II Semester
(16MT20533) SEMINAR

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
--	100	100	--	--	--	2

PRE-REQUISITES:--

COURSE DESCRIPTION:
Identification of seminar topic; literature survey; preparation of technical report and presentation

COURSE OUTCOMES:
On successful completion of this course, the students will be able to:

- CO1. Demonstrate capacity to identify an advanced topic for seminar in core and allied areas.
- CO2. Extract information pertinent to the topic through literature survey.
- CO3. Comprehend extracted information through analysis and synthesis critically on the topic.
- CO4. Plan, organize, prepare and present effective written and oral technical report on the topic.
- CO5. Adapt to independent and reflective learning for sustainable professional growth in Computer Science and software systems
- CO6. Contribute to multidisciplinary scientific working the field of Computer Science and software systems
- CO7. Understand ethical responsibility towards environment and society in the field of Computer Science and software systems
- CO8. Engage in lifelong learning for development of technical competence in the field of Computer Science and software systems

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
M. Tech. – II Semester
(16MT23810) INTELLECTUAL PROPERTY RIGHTS
(Common to all M. Tech. Programs)
(Audit Course)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	-	2	-	-

PRE-REQUISITES: --

COURSE DESCRIPTION:
Introduction to Intellectual Property; Trade Marks; Law of Copy Rights; Law of Patents; Trade Secrets; Unfair Competition; New Development of Intellectual Property.

COURSE OUTCOMES: After successful completion of the course, students will be able to:
1. Demonstrate in-depth knowledge on
   a. Intellectual Property
   b. Trade Marks & Secrets
   c. Law of Copy Rights, Patents
   d. New development of Intellectual Property
2. Analyze the different forms of infringement of intellectual property rights.
3. Solve problems pertaining to Intellectual Property Rights.
4. Stimulate research zeal for patenting of an idea or product.
5. Write effective reports required for filing patents.
6. Develop life-long learning capabilities.
7. Develop awareness of the relevance and impact of IP Law on their academic and professional lives.
8. Develop attitude for reflective learning.

DETAILED SYLLABUS:

UNIT - I: Introduction to Intellectual property (5 Periods)
Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT - II: Trade Marks: (5 Periods)
Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT - III: Law of copy rights: (6 Periods)
Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.
Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT - IV: Trade Secrets: (6 Periods)
Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.
Unfair competition: Misappropriation right of publicity, False advertising.

UNIT - V: New development of intellectual property: (6 Periods)
New developments in trade mark law; copy right law, patent law, intellectual property audits.
International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

[Total Periods: 28]

REFERENCE BOOKS:

1. Deborah, E. Bouchoux, *Intellectual property rights*, Cengage learning.
2. Prabuddha Ganguli, *Intellectual property right - Unleashing the knowledge economy*, Tata Mc Graw Hill Publishing Company Ltd.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
M. Tech. (CS) III & IV Semesters
(16MT30531 & 16MT40531) PROJECT WORK

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
200	200	400	--	--	--	28

PRE-REQUISITES: --

COURSE DESCRIPTION:

Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Writing of thesis and presentation.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to

CO1. Demonstrate capacity to identify an advanced topic for project work in core and allied areas.

CO2. Extract information pertinent to the topic through literature survey.

CO3. Comprehend extracted information through analysis and synthesis critically on the topic.

CO4. Solve engineering problems in the chosen topic with higher order skill to obtain solutions.

CO5. Use the techniques, skills and modern engineering tools necessary for project work.

CO6. Perform time and cost analysis on the project.

CO7. Plan, prepare and present effective written and oral technical report on the topic.

CO8. Adapt to independent and reflective learning for sustainable professional growth. CO9**.**Contribute to multidisciplinary scientific working the field of Computer Science and Software Systems

CO10.Understand ethical responsibility towards environment and society in the field of Computer Science and Software Systems

CO11.Engage lifelong learning for development of technical competence in the field of Computer Science and Software Systems.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
SVEC-16 - M. Tech (Computer Networks & Information Security)
Course Structure
I-Semester

Course Code	Course Title	Contact Periods per Week				Credits	Scheme of Examination Max. Marks		
		L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
16MT10501	Advanced Computer Networks	4	-	-	4	4	40	60	100
16MT10504	Data Warehousing and Data Mining	4	-	-	4	4	40	60	100
16MT20505	Information Security	4	-	-	4	4	40	60	100
16MT20506	Mobile Computing	4	-	-	4	4	40	60	100
16MT22505	Web Technologies	4	-	-	4	4	40	60	100
	Professional Elective-1	4	-	-	4	4	40	60	100
16MT16301	Design of Secure Protocols								
16MT16302	Ethical Hacking								
16MT10507	Internet of Things								
16MT22508	Software Security								
16MT16331	Computer Networks & Information Security Lab	-	-	4	4	2	50	50	100
16MT16332	Web Technologies Lab	-	-	4	4	2	50	50	100
Total:		**24**	**-**	**8**	**32**	**28**	**340**	**460**	**800**
16MT13808	Research Methodology (Audit Course)	-	2	-	2	-	-	-	-

II-Semester

Course Code	Course Title	Contact Periods per Week				Credits	Scheme of Examination Max. Marks		
		L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
16MT20502	Big Data Analytics	4	-	-	4	4	40	60	100
16MT12501	Cloud Computing	4	-	-	4	4	40	60	100
16MT26301	Intrusion Detection Systems	4	-	-	4	4	40	60	100
16MT26302	Network Programming	4	-	-	4	4	40	60	100
16MT26303	Wireless Networks	4	-	-	4	4	40	60	100
	Professional Elective-2	4	-	-	4	4	40	60	100
16MT10506	Information Retrieval Systems								
16MT26304	Computer Forensics								
16MT26305	Database Security								
16MT26306	Social Networks								
16MT20531	Cloud Computing & Big Data Analytics Lab	-	-	4	4	2	50	50	100
16MT26331	Wireless Networks Lab	-	-	4	4	2	50	50	100
16MT26332	Seminar	-	-	-	-	2	--	100	100
	Total:	**24**	**-**	**8**	**32**	**30**	**340**	**560**	**900**
16MT23810	Intellectual property Rights	-	2	-	2	-	-	-	-

III-Semester

S. No.	Course Code	Course Title	Contact Periods per Week				Credits	Scheme of Examination Max. Marks		
			L	T	P*	Total		Int. Marks	Ext. Marks	Total Marks
1.	16MT3MOOC	MOOC	-	-	-	-	-	-	-	-
2.	16MT36331	Project Work Phase I	-	-	-	-	8	50	50	100
		Total:	**-**	**-**	**-**	**-**	**8**	**50**	**50**	**100**

*Fulltime Project Work

IV-Semester

S. No.	Course Code	Course Title	Contact Periods per Week				Credits	Scheme of Examination Max. Marks		
			L	T	P*	Total		Int. Marks	Ext. Marks	Total Marks
1.	16MT46331	Project Work Phase II	-	-	-	-	20	150	150	300
		Total:	**-**	**-**	**-**	**-**	**20**	**150**	**150**	**300**
						Grand Total:	**86**	**880**	**1220**	**2100**

*Fulltime Project Work

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
I M. Tech. (CN&IS) I-Semester
(16MT10501) ADVANCED COMPUTER NETWORKS
(Common to CS and CN&IS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES:
A Course on "Computer Networks"
COURSE DESCRIPTION:
Computer Networks and Protocols; Data Link Layer, LAN and Network routing; Transport Layer and Internet Protocols; Wireless and Optical Networks; MANETs and Wireless Sensor Networks
COURSE OUTCOMES:
After successful completion of this course, students will be able to:
CO1. Gain knowledge on principles of computers, network topologies, routing mechanisms.
CO2. Analyze the computer network with suitable network protocols and routing algorithms.
CO3. Formulate solutions for engineering problems pertaining to the advanced networking technologies.
CO4. Develop new techniques for subnet masks and addresses to fulfill networking requirements.
CO5. Conduct research to solve the problems related to routing algorithms in Network applications.

DETAILED SYLLABUS:
UNIT I – REVIEW OF COMPUTER NETWORKS AND FOUNDATION OF NETWORKING PROTOCOLS (11 periods)
Review of Computer Networks and the Internet-The Network edge, The Network core, Access Networks and Physical media, ISPs and Internet Backbones, Delay and Loss in Packet, Packet-Switched Networks.
Foundations of Networking Protocols-5-layer TCP/IP Model, 7-Layer OSI Model, Internet Protocols and Addressing, Equal-Sized Packets Model: ATM.
UNIT II – DATA LINKS, TRANSMISSION AND ROUTING (11 periods)
The Link Layer and Local Area Networks-Link Layer Introduction and Services, Error-Detection and Error-Correction Techniques, Multiple Access Protocols, Link Layer Addressing.
Routing and Internet Working-Network Layer Routing, Least-Cost-Path algorithms, Non-Least-Cost-Path Algorithms, Intradomain Routing Protocols, Interdomain Routing Protocols
UNIT III – TRANSPORT LAYER PROTOCOLS AND NETWORK APPLICATIONS (11 p*eriods*)
Transport and End-to-End Protocols-Transport Layer, Transmission Control Protocol (TCP), User Datagram Protocol (UDP), TCP Congestion Control.
Application Layer-Principles of Network Applications, The Web and HTTP, File Transfer: FTP, Electronic Mail in the Internet, Domain Name System (DNS).
UNIT IV – WIRELESS NETWORKS AND OPTICAL NETWORKS (11 periods)
Wireless Networks and Mobile IP-Infrastructure of Wireless Networks, Wireless LAN Technologies, IEEE 802.11 Wireless Standards, Cellular Networks, Mobile IP, Wireless Mesh Networks (WMNs).
Optical Networks and WDM Systems-Overview of Optical Networks, Basic Optical Networking Devices, Large-Scale Optical Switches, Optical Routers
UNIT V – MANETS AND WIRELESS SENSOR NETWORKS (11period*s*)
Mobile Ad-Hoc Networks-Overview of Wireless Ad–Hoc Networks, Routing in Ad-Hoc Networks, Routing Protocols for Ad-Hoc Networks- DSDV, DSR, CGSR and AODV
Wireless Sensor Networks-Sensor Networks and Protocol Structures, Communication Energy Model, Clustering Protocols, Routing Protocols

Total Periods: 55

TEXT BOOKS:

1. Nader F. Mir, "*Computer and Communication Networks*," Pearson Education, 2007.
2. F. Kurose, Keith W.Ross, "*Computer Networking: A Top-Down Approach Featuring the Internet*," 3ed, Pearson Education, 2007.

REFERENCE BOOKS:

1. Behrouz A. Forouzan, "*Data Communications and Networking*," 4ed, Tata McGraw Hill, 2007
2. Andrew S. Tanenbaum, "*Computer Networks*," 4ed, Pearson Education, New Delhi, 1997.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
I M. Tech (CN&IS)I-Semester
(16MT10504) DATA WAREHOUSING AND DATA MINING
(Common to CS and CN&IS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	--	4

PRE-REQUISITES:
A course on "Database Management Systems"
COURSE DESCRIPTION
Concepts of Data Warehousing and Data Mining; Pre-processing Techniques in Data Warehouses; Data cube computation and OLAP query processing; Data Mining process and System architecture; relationship with data warehouse and OLAP Systems; Data mining Techniques and Applications
COURSE OUTCOMES:
After successful completion of this course, students will be able to:
CO1. Gain knowledge in:
- Multidimensional data model and Data Warehouse architectures. .
- Data mining algorithms.
- Association Rules, Classification and Prediction and Cluster Analysis.

CO2. Analyse data mining algorithms for complex industrial problems.
CO3. Solve engineering problems to get wide variety of solutions by applying data mining algorithms.
CO4. Ability to carry out research in spatial mining, spatio temporal mining, text mining, multimedia and web mining
CO5. Create and apply appropriate techniques & tools of data mining to solve real world problems
DETAILED SYLLABUS:
UNIT I – INTRODUCTION TO DATA WAREHOUSE AND DATA MINING (10 periods)
Data Warehouse- A Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehouse to Data Mining.
Data Mining – Kinds of Data, Data Mining Functionalities, Primitives, Major Issues in Data Mining
UNIT II – DATA PREPROCESSING, MINING FREQUENT PATTERNS AND ASSOCIATIONS(10 periods)
Data Preprocessing- Descriptive Data Summarization, Data Cleaning, Data Integration and Transformation, Data Reduction.
Mining Frequent Patterns and Associations- Efficient and Scalable Frequent Item set Mining Methods, Mining various kinds of Association Rules, Constraint based association mining.
UNIT III – CLASSIFICATION AND PREDICTION (8 p*eriods*)
Issues regarding classification and prediction, classification by decision tree induction, Bayesian classification, Rule based classification, classification by Back propagation, Prediction, Accuracy and Error Measures.
UNIT IV – CLUSTER ANALYSIS (11 periods)
Cluster Analysis: Basic Concepts and Algorithms : introduction to Cluster Analysis, Different Types of Clustering, Different Types of Clusters, K-means, The Basic K-means Algorithm, K-means: Additional Issues, Bisecting K-means, K-means and Different Types of Clusters, Strengths and Weaknesses, K-means as an Optimization Problem, Agglomerative Hierarchical Clustering, Basic Agglomerative Hierarchical Clustering Algorithm, Specific Techniques, DBSCAN, Traditional Density: Center-Based Approach, The DBSCAN Algorithm, Strengths and Weaknesses.
UNIT V – MINING STREAM, TIME SERIES, SPATIAL DATA, MULTIMEDIA, TEXT AND WORL WIDE WEB (9 p*eriods*)
Mining Data Streams, Mining Time Series Data, Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Data Mining, Multimedia Data Mining, Text Mining, Mining the World Wide Web.

Total Periods: *48*

TEXT BOOKS:
1. Jiawei Han and Micheline Kamber, "*Data Mining: Concepts and Techniques*," 2ed, Elsevier, 2009
2. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, "*Introduction to Data Mining*", Pearson Education,2009.

REFERENCE BOOKS:
1. Margaret H Dunham, *Data Mining Introductory and Advanced Topics*," 2ed, Pearson Education, 2006

2. Amitesh Sinha, "*Data Warehousing*," PHI Learning, 2007

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
I M. Tech (CN&IS) I-Semester
(16MT20505) INFORMATION SECURITY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*--*	*--*	*4*

PRE-REQUISITES:
A Course on **"**Computer Networks**"**

COURSE DESCRIPTION
Concepts of cryptographic algorithms, public key and private key encryption, security models, Hash Algorithms, Intrusion Detection, IP Security, analysis of security principles in internet and system security

COURSE OUTCOMES:
After successful completion of this course, students will be able to:

*CO1.*Gain advanced knowledge in
- Symmetric and Asymmetric Encryption Algorithms
- Key distribution and message Authentication
- Hash algorithms and digital signature techniques
- IP security and Wireless network security
- Intrusion Detection and Firewall configurations

CO2. Analyze the symmetric algorithms, Public-Key Encryption and Hash Algorithms.

CO3. Develop solutions to solve the problems related to Public-Key Encryption, Digital signatures, Secure Hash Functions

CO4.Conduct research to identify efficient ciphers and cryptographic algorithms to provide novel solutions for real time applications

*CO5.*Apply the appropriate Cryptographic Techniques and security Algorithms in the area of Information Security

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION (**10Periods**)
Security Attacks, Security Services, Security Mechanisms, Model for Network Security, Mono alphabetic cipher and Poly alphabetic cipher

Symmetric Block Encryption- Symmetric Block Encryption Algorithms-DES, Triple-DES, AES, Cipher Block Modes of Operation

UNIT-II: PUBLIC-KEY ENCRYPTION **(10 Periods)**
Message Authentication-Approaches to Message Authentication, Simple hash function, Secure Hash Functions –SHA-1, SHA-512, Message Authentication Codes and HMAC

Public-Key Cryptography-Public-Key Cryptography Algorithms-RSA, Diffie-Hellman Key Exchange, Digital signature standard

UNIT-III: NETWORK SECURITY APPLICATIONS **(12 Periods)**
Key Distribution and User Authentication-Kerberos, Key Distribution Using Asymmetric Encryption, X.509 Certificates, Public Key Infrastructure

Electronic Mail Security-Pretty Good Privacy, Key Rings, Multipurpose Internet Mail Extensions, S/MIME - Functionality, Messages and certificate processing.

UNIT-IV: INTERNET SECURITY **(11 Periods)**
Transport Level Security- Secure Socket Layer and Transport Layer Security.

IP Security-Overview, Policy, Encapsulating Security Payload and IKE.

Wireless Network security- IEEE 802.11 Wireless LAN Overview, IEEE 802.11i Wireless LAN Security

UNIT-V: SYSTEM SECURITY **(10 Periods)**
Intruders-Intrusion Detection, Password Management, Malicious Software - Types, Viruses, Virus Countermeasures, Worms.

Firewalls- Firewall Characteristics, Firewall Basing, Types of Firewalls, Firewall Location and Configurations. **Total number of Periods: 53**

TEXTBOOKS:
1. William Stallings, "*Network Security Essentials: Applications and Standards,"* 4ed,Pearson Education, New Delhi,2011
2. Douglas R.Stinson, "*Cryptography – Theory and Practice,"* 3ed, CRC Press, 2005

REFERENCE BOOKS:
1. William Stallings, "*Cryptography and Network Security,"* 5ed, Pearson education, New Delhi, 2011.

2. Eric Maiwald, "*Fundamentals of Network Security*", 1ed, McGraw-Hill, 2003

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
I M.Tech (CN&IS) I-Semester
(16MT20506) MOBILE COMPUTING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*--*	*--*	*4*

PRE-REQUISITES:
A Course on "Computer Networks"
COURSE DESCRIPTION:
GSM architecture, Wireless MAC, and CDMA Systems; Mobile IP network layer; Mobile Transport Layer; Databases, Data dissemination and Broadcasting systems; Synchronization in mobile devices and Mobile Computing Systems; Mobile Application Languages and Mobile Operating Systems.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Gain advanced knowledge in
- GSM and CDMA Systems.
- Mobile IP, and Mobile TCP
- Databases and Data Dissemination
- Mobile Data Synchronization

CO2. Analyze various methods in data dissemination and broadcasting models
CO3. Evaluate and implement novel applications to realize power computing and context-aware computing.
CO4. Contribute positively to multidisciplinary scientific research in design and development of mobile application languages and mobile operating systems for mobile.
CO5. Apply Database hording Techniques, Selective indexing and Tuning techniques to solve mobile computing problems.

DETAILED SYLLABUS:
UNIT I – GSM AND WIRELESS MEDIUM ACCESS CONTROL (11 periods)
GSM and Similar Architectures: GSM, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services.
Wireless MAC and CDMA – Based Communication: Medium Access control, Introduction to CDMA-based Systems, Spread Spectrum in CDMA Systems, Coding Methods in CDMA.
UNIT II – MOBILE IP NETWORK LAYER AND MOBILE TRANSPORT LAYER (11 periods)
Mobile IP Network Layer: IP and Mobile IP Network Layer, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, Dynamic Host Configuration Protocol.
Mobile Transport Layer: Conventional Transport Layer Protocols, Indirect TCP, Snooping TCP and Mobile TCP.
UNIT III – DATABASES AND DATA DISSEMINATION (11 p*eriods*)
Databases: Database Hoarding Techniques, Data Caching, Client-Server Computing and Adaptation.
Data Dissemination and Broadcasting Systems: Communication Asymmetry, Classification of Data-Delivery Mechanisms, Data Dissemination Broadcast Models, Selective Tuning and Indexing Techniques.
UNIT IV – DATA SYNCHRONIZATION IN MOBILE COMPUTING SYSTEMS AND MOBILE DEVICES (11 periods)
Data Synchronization in Mobile Computing Systems: Synchronization, Synchronization Software for Mobile Devices, Synchronization Protocols, SynML- Synchronization Language for Mobile Computing, Sync4J (Funambol).
Mobile Devices: Server and Management –Mobile Agent, Application Server, Gateways, Portals, Service Discovery, Device Management, Mobile File Systems, Security.
UNIT V – MOBILE APPLICATION LANGUAGES AND MOBILE OPERATING SYSTEMS (10 p*eriods*)
Mobile Application Languages: Introduction, XML, JAVA, Java 2 Micro Edition (J2ME), JavaCard.
Mobile Operating Systems: Operating System, Palm OS, Windows CE, Symbian OS, Linux for Mobile Devices. **Total Periods: 54**
TEXT BOOK:
1. Raj Kamal, "Mobile Computing," 2ed ,OXFORD University Press, 2007.
REFERENCE BOOKS:

1. Jochen H. Schiller, "Mobile Communications," 2ed, Pearson Education, 2004
2. Ashok K Talukder, Roopa R Yavagal, "Mobile Computing,"2ed, Tata McGraw Hill,2010

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
I M. Tech (CN&IS) I-Semester
(16MT22505) WEB TECHNOLOGIES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES:
A course on "Object Oriented Programming"
COURSE DESCRIPTION:
Web Technologies: HTML5, CSS, JavaScript, JQuery; Open source server-side scripting language- PHP; MySQL database concepts; and AJAX
COURSE OUTCOMES:
On successful completion of this course, the students will be able to:
- CO1. Gain knowledge on web technologies.
- CO2. Analyze the functionality of client as well as server side web technologies for validating web pages.
- CO3. Gain programming skills to design and develop novel web applications
- CO4. Apply web technologies to make web pages more interactive, scalable and user friendly web applications.

DETAILED SYLLABUS
UNIT–I: HTML5 AND CSS3 (Periods: 14)
HTML5: Overview of HTML and XHTML, HTML5 - Introduction, HTML5 Document Structure, Creating Editable Content, Checking Spelling Mistakes, Exploring Custom Data Attributes, Microdata, Client-Side Storage, Drag and Drop Feature, ARIA Accessibility, Offline Web Applications, Web Communications, Cross-Document Messaging and Desktop Notifications, 2D and 3D Graphics; **CSS3**: Introduction, Features of CSS3, Syntax of CSS, Exploring CSS selectors, Inserting CSS in HTML Document, State of CSS3.

UNIT–II: JAVASCRIPT AND JQUERY (Periods: 10)
JavaScript: Overview of JavaScript**,** JavaScript Functions, Events, Image Maps and Animations, JavaScript Objects; **JQuery**: Fundamentals of JQuery, JQuery Selectors, JQuery Methods to Access HTML Attributes and Traversing, JQuery Manipulators, Events and Effects.

UNIT–III: INTRODUCTION TO PHP (Periods: 10)
Introduction, Data Types, Variables, Constants, Expressions, String Interpolation, Control Structures, Functions, Arrays, Embedding PHP Code in Web Pages, Object Oriented PHP.

UNIT–IV: PHP AND MYSQL (Periods:10)
PHP and Web Forms, Sending Form Data to a Server, Authenticating Users with PHP, Session Handlers, PHP with MySQL, Interacting with the Database, Database Transactions.

UNIT–V: AJAX (Periods:08)
Exploring Different Web Technologies, Exploring AJAX, Creating a Sample AJAX Application, Displaying Date and Time using AJAX, Creating the XMLHttp Request Object, Reading a File Synchronously and Asynchronously, Reading Response Headers, Loading List Boxes Dynamically using XMLHttp Request Object, JQuery with AJAX, Validating a Field using AJAX and PHP. **[Total Periods: 52]**

TEXT BOOKS:
1. Kogent Learning Solutions Inc, *"HTML 5 Black Book: Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP and JQuery,"*1ed, Dreamtech Press, 2011.
2. W. Jason Gilmore, *"Beginning PHP and MySQL,"* 4ed, APress, 2011.
REFERENCE BOOKS:
1. Andrea Tarr, *"PHP and MySQL,"* 1st Edition, Willy India, 2012.
2. Thomas A. Powell, *"The Complete Reference: HTML and CSS,"*5ed, Tata McGraw Hill, 2010.
3. Steve Suehring, Tim Converse and Joyce Park, *"PHP6 and MySQL,"* 1ed, Willy India, 2009.

4. P. J. Deitel and H. M. Deitel, "*Internet & World Wide Web How to Program*," 4ed, Pearson, 2009.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
M. Tech (CNIS) I-Semester
(16MT16301) DESIGN OF SECURE PROTOCOLS
(Professional Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*-*	*-*	*4*

PRE-REQUISITES:
A Course on "Cryptography and Network Security, "

COURSE DESCRIPTION:
Pseudo-random-Bit generation and algorithm modes; Symmetric and asymmetric cryptography; Authentication protocols and Hash functions; Modern cryptography and its applications, Security implementations over resource constrained networks.

COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Gain advanced knowledge on Basic Cryptography Techniques Pseudo-random-Bit generators used in Cryptography.
CO2. Analyze various Authentication Protocols and security threats of systems against various attacks possible over the Internet services to provide secure access to the system.
CO3.Solve the security issues by adopting mathematical and logical operators such as hash functions.
CO4.Carryout research on advanced and modern Cryptographic protocol solutions to resolve security problems in the real world.
CO5. Evaluate the use of Cryptographic algorithms and tools in providing security to resource constraint networks and e-commerce systems.

DETAILED SYLLABUS:

UNIT-I: BASICS OF CRYPTOGRAPHY (10 Periods)
Mathematics for Cryptography: Modular arithmetic, Finite fields, Primarily testing, Discrete Logarithms and Chinese Remainder theorem
Pseudo-random-Bit: Introduction, Random Bit Generation, Pseudo-random-Bit generation, Statistical Tests, Cryptographically Secure Pseudo-random-Bit Generation, Linear Congruential Generators, Linear Feedback Shift Registers, Stream Ciphers Using LFSRs.

UNIT-II: AUTHENTICATION PROTOCOLS (12 Periods)
Basic Authentication Techniques, Password based Authentication, The one-time-pad encryption scheme, Authenticated Key Exchange Based on Asymmetric Cryptography, Typical Attacks on Authentication Protocols, SSH, Kerberos Protocol.
IP SECURITY: Attacks against naming and addressing in the Internet, Security protocols for address resolution and address auto configuration, Security for global IP mobility, IP Security (IP Sec) protocol.

UNIT-III: ONE-WAY HASH FUNCTIONS (10 Periods)
Background, N-Hash, Ripe-MD, Haval, Other One-Way Hash Functions, One-Way Hash Function using Symmetric Block Algorithms, Using Public–Key Algorithms, Choosing a One- Way Hash Functions, Advanced Attacks on Hash Functions, Message Authentication Codes, The birthday attack.

UNIT-IV: MODERN CRYPTOGRAPHIC APPLICATIONS (13 Periods)
Advanced cryptographic protocols: Selected Classic Ciphers and Cryptanalysis: World War II Ciphers. Selected Modern Ciphers and Cryptanalysis: Smart Card, Cellular and Wireless Communication Ciphers, Zero Knowledge Protocols, Secret Sharing Schemes. Protection in Operating Systems
E-commerce protocols/schemes: E-cash, micropayment, blind signature, Electronic voting, electronic auction, payment servers, fair exchange of signatures for contract signing, Data on move and Data on rest in World Wide Web.

UNIT-V: OVERVIEW OF RESOURCE CONSTRAINT NETWORKS (10 Periods)
Sensor networks, wireless ad hoc networks, mobile ad hoc networks, radio frequency identification networks; Security issues in resource constraint networks: lightweight cryptography, Tag and ownership transfer protocols, Yoking/grouping protocols, designing integrated security architecture, McCumber Cube model, secure protocols for behavior enforcement, Game theoretic model of packet forwarding

Total Periods: *55*

TEXT BOOKS:
1. Bruce Schneier, "*Applied Cryptography,*" 2ed,Wiley India Pvt. Ltd ,New Delhi:, 2012.
2.L. Buttyan, J. P. Hubaux, "Security and Cooperation in Wireless Networks", Cambridge University Press, 2008.

REFERENCE BOOKS:
1. Wenbo Mao, *"Modern Cryptography – Theory and Practice,"*,1ed, Pearson Education, New Delhi 2008.
2. James Kempf, "Wireless Internet Security: Architecture and Protocols", Cambridge University Press, 2008.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
I M. Tech (CN&IS) I-Semester
(16MT16302) ETHICAL HACKING
(Professional Elective – 1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*-*	*--*	*4*

PRE-REQUISITES:
Courses on "Computer networks, Cryptography & Network security"

COURSE DESCRIPTION:
Introduction to hacking concepts; Password hacking Techniques; Denial of service attacks; Web application vulnerabilities; Wireless hacking & physical security; overview of cryptography and penetration testing methodologies.

COURSE OUTCOMES:
After successful completion of this course, the students will be able to:

CO1: Gain Knowledge on
- Hacking and its societal issues
- Hacking methods
- Types of hacking
- Tools of hacking

CO2: Analyze system, network vulnerabilities which give a scope to perform hacking.
CO3: Develop skills to solve the different security risks that arise from hacking.
CO4: Design new techniques and tools to solve real world security problems.
CO5: Apply appropriate ethical hacking techniques to provide solution for a given security problem
CO6. Undertake research to solve security problems at host, data and Network level.

DETAILED SYLLABUS:

UNIT I :INTRODUCTION TO ETHICAL HACKING (11 Periods)
Introduction, Ethical hacking terminology, Types of hacking technologies, phases of ethical hacking, Foot printing, Social Engineering, Scanning and enumeration.

UNIT II: SYSTEM HACKING (11 Periods)
Understanding the password hacking techniques, Rootkits, Trojans, Backdoors, Viruses and worms, sniffers.

UNIT III: DENIAL OF SERVICE &WEB SERVER HACKING (11 Periods)
Denial of service, session hijacking, Hacking web servers, Web application vulnerability, web application vulnerabilities ,SQL Injection, Buffer overflow.

UNIT IV: WIRELESS HACKING & PHYSICAL SECURITY (11 Periods)
WEP, WPA Authentication mechanism-wireless sniffers-Physical Security-factors affecting physical security-honeypots-Firewall types

UNIT V: PENETRATION TESTING (11 Periods)
Cryptography-overview of MD5, SHA, RC4,Penetration testing methodologies- Defining security assessment, overview, steps, pen test legal framework, penetration testing tools.

Total Periods: *55*

TEXT BOOK:
1. *Kimberly graves "CEH* Official Certified Ethical Hacker Review Guide," Wiley publications,2007

REFERENCE BOOKS:
1. Micheal Gregg, "*Certified ethical hacker (CEH) Cert guide*", Pearson education, 2014.
2. Patrick Engebretson, "*The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy*", 2ed, Syngress Media, 2012.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
I M. Tech (CN&IS) I-Semester
(16MT10507) INTERNET OF THINGS
(Professional Elective-1)
(Common to CS and CNIS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*-*	*--*	*4*

PRE-REQUISITES:
C*ourses on "Computer Networks" and "Java"*

COURSE DESCRIPTION:
Domain Specific IoT's; M2M& System Management with Netconf-Yang; Developing Internet of Things Using Python; IoT Physical Devices & Case Studies Illustrating IoT Design

COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1: Gain knowledge on
- Building blocks of Internet of Things and characteristics.
- Application areas of IoT
- Concept of M2M (machine to machine) with necessary protocols

CO2: Analyze Domain specific IoT's, revolution of Internet in Mobile Devices.
CO3: Design and Develop Techniques for solutions to solve the problems in IoT using Python Scripting Language.
CO4: Conduct research on domain specific IoT's and IoT enabling Technologies.
CO5: Acquire knowledge to recognize the opportunities and contribute to collaborative-multidisciplinary Scientific Research.

DETAILED SYLLABUS:
UNIT I: INTRODUCTION & CONCEPTS (08 periods)
Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, Logical Design of IOT, IOT Enabling Technologies, IoT Levels and Templates

UNITII: DOMAIN SPECIFIC IOTS (09 periods)
Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style

UNITIII: M2M & SYSTEM MANAGEMENT WITH NETCONF-YANG (11 p*eriods*)
IoT and M2M – M2M, Difference between IOT and M2M, difference between SDN and NFV for IoT, Software defined networks, network function virtualization, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements.
Basics of IoT System Management with NETCOZF, YANG, YANG- NETCONF

UNITIV: DEVELOPING INTERNET OF THINGSUSING PYTHON (15 periods)
Introduction, IOT Design Methodology, Installing Python, Language features of Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, File Handling, Date/ Time Operations, Classes, Exception handling, Python Packages of Interest for IoT.

UNIT V: IOT PHYSICAL DEVICES & ENDPOINTS (12 p*eriods*)
What is an IOT Device, Exemplary Device, Board, Linux on Raspberry Pi, Interfaces, Programming and IOT Devices, Case Studies Illustrating IoT Design: Home Automation, Cities and Agriculture.

Total Periods: *55*

TEXT BOOK:
1. Vijay Madisetti, Arshdeep Bahga," *Internet of Things A Hands-On Approach*", University Press, 2015.

REFERENCE BOOKS:
1. Adrian McEwen, "*Designing the Internet of Things*", Wiely Piblishers, 2014.
2. Daniel Kellmereit, "*The Silent Intelligence: The Internet of Things*", 2013, DND Ventures LLc, 2013.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
I M.Tech. (CN&IS) I Semester
(16MT22508) SOFTWARE SECURITY
(Professional Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES:
Courses on "Software Engineering," and "Network Security"

COURSE DESCRIPTION:
Importance of Security in Software - Security a Software Issue, Secure Software; Requirements Engineering for Secure Software; Security Principles in SDLC - Secure Software Architecture and Design, Secure Coding and Testing; Security and Complexity - System Assembly Challenges; Governance and Managing for more Secure Software.

COURSE OUTCOMES:
After successful completion of this course, the students will be able to:

CO1: Gain knowledge on security issues in:
- Requirement Engineering
- Architecture and Design
- Coding and Testing

CO2: Analyze complex software projects to describe security risks and mitigation techniques.
CO3: Applying methods to detect software security defects, SQUARE process model for requirement gathering and coding practices & security testing for identifying security failures.
CO4: Initiate research issues in code analysis techniques to improve software security.

DETAILED SYLLABUS

UNIT-I: IMPORTANCE OF SECURITY IN SOFTWARE (Periods: 11)
Security a Software Issue: Introduction, The problem, Software Assurance and Software Security, Threats to software security, Sources of software insecurity, Benefits of detecting software security defects early, managing secure software development.
Secure Software: Introduction, Properties of Secure Software, Influencing the security properties of software, Asserting and specifying the desired security properties.

UNIT-II: REQUIREMENTS ENGINEERING (Periods: 10)
Requirements Engineering for Secure Software: Introduction, Misuse and abuse cases, the SQUARE process Model, SQUARE sample outputs, Requirements elicitation, Requirements prioritization.

UNIT-III: SECURITY PRINCIPLES IN SDLC (Periods: 11)
Secure Software Architecture and Design: Introduction, Software Security practices for Architecture and Design - architectural risk analysis, Software security knowledge for Architecture and Design - Security principles, Security guidelines and Attack patterns.
Secure Coding and Testing: Introduction, Code analysis, Coding Practices, Software Security testing, Security testing considerations throughput of the SDLC.

UNIT-IV: SECURITY AND COMPLEXITY (Periods: 10)
System Assembly Challenges: Introduction, Security failures, functional and attacker perspectives for security analysis in web services and identity management, system complexity drivers and security, Deep technical problem complexity.

UNIT-V: GOVERNANCE AND MANAGING (Periods: 10)
Governance and Managing for more Secure Software: Introduction, Governance and security, adopting an enterprise software security framework, Defining adequate security, Risk Management framework for software security, Security and Project Management, Maturity of Practice.

[Total Periods: 52]

TEXTBOOK:

1. Julia H. Allen, Sean Barnum, Robert J. Ellison, Gary McGraw, and Nancy R. Mead, *"Security Engineering: A Guide for Project Managers,"* Pearson Education, 2009.

REFERENCE BOOKS:

1. Gary McGraw, *"Software Security: Building Security In,"* Addison-Wesley, 2006.
2. Mark Dowd, John McDonald and Justin Schuh, *"The Art of Software Security Assessment: Identifying and Preventing Software Vulnerabilities,"* 1ed, Addison-Wesley, 2006.
3. John Viega and Gary McGraw, *"Building Secure Software: How to Avoid Security Problems the Right Way,"* Addison-Wesley, 2001.
4. G. Hoglund and G. McGraw, *"Exploiting Software: How to Break Code,"* Addison-Wesley, 2004.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
I M. Tech. (CN&IS) I-Semester
(16MT16331) COMPUTER NETWORKS & INFORMATION SECURITY LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	*50*	*100*	*--*	*--*	*4*	*2*

PRE-REQUISITES:
Courses on "Computer Networks" and "Information Security"

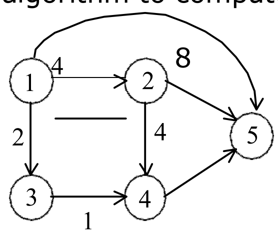
COURSE DESCRIPTION:
Hands experience on Data Link Layer Farming Methods; Routing Algorithms; Implementation of DES, RSA; AES Algorithms, Secure Hash Algorithms and Digital Signature Standards.

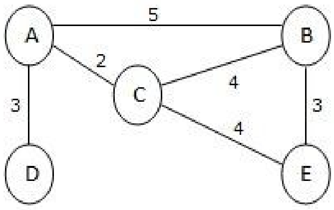
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:

CO1. Gain knowledge to implement
- Framing mechanisms for data link layer
- Shortest path routing algorithms
- Symmetric encryption algorithms- DES,AES and Asymmetric algorithm-RSA
- Secure Hash algorithms and digital signatures

CO2. Analyze the routing algorithms, Symmetric-key encryption and public-key encryption algorithms.
CO3. Develop the solutions to solve the problems in networks and information security systems.
CO4. Implement routing and encryption techniques using C or JAVA to provide solutions to the real world problems.

Laboratory Exercises:

Exercise Number.	Name of Experiment	No. of slots
1	Implement the following data link layer farming methods. a. Character Count b. Character Stuffing c. Bit Stuffing	1
2	Design a program to compute checksum for the given frame 1101011011 using CRC-12, CRC-16, CRC-CCIP. Display the actual bit string transmitted. Suppose any bit from is inverted during transmission. Show that this error is detected at the receivers end.	1
3	Implement Dijkstra's algorithm to compute the Shortest path through a graph.  	1
4	Design a program to obtain routing table for each node using distance vector routing algorithm by considering the given subnet with weights indicating delay between nodes.	1

		
5	Write a program to simulates flow based routing	1
6	Simulate the Random Early Detection congestion control algorithm	1
7	Write a program to encrypt and decrypt given text using DES symmetric key algorithm	1
8	Write a program to encrypt and decrypt given text in public key cryptographic system using RSA	1
9	Write a program to encrypt and decrypt given text using AES algorithm with 128-bit key	1
10	Write a program to generate a Hash code for the given text using SHA-512 algorithm	1
11	Create a digital signature for the given doc/pdf file using DSS algorithm	1
12	Configure Firewall filters to accept/reject URLs/web content	1

REFERENCE BOOKS:

1. William Stallings, “*Network Security Essentials: Applications and Standards*,” 4ed, New Delhi, Pearson Education, 2011
2. Nader F. Mir, “*Computer and Communication Networks*,” Pearson Education, 2007
3. Eric Maiwald, “*Fundamentals of Network Security*”, 4ed, Tata McGraw Hill, 2003

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
M. Tech (CN&IS) I-Semester
(16MT16332) WEB TECHNOLOGIES LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	*50*	*100*	*-*	*-*	*4*	*2*

PRE-REQUISITES:
Course on "Programming in C, and Java"

COURSE DESCRIPTION:
This course is hands-on and project-based; students will construct a substantial dynamic web application based on the concepts, technologies, and techniques presented during lecture.

COURSE OUTCOMES:
After completion of this course the students will be able to:
CO1. Gain knowledge in designing web pages using HTML, CSS, JS, PHP.
CO 2. Analyze the design problems in HTML Web pages with CSS
CO3. Design a dynamic webpage with HTML, CSS, Java Script, PHP concepts
CO4. Assess the HTML Website using XML Parsers
CO 5. Engage in lifelong learning by incorporating the best design practices.

LIST OF EXERCISES:

Exercise number.	Name of the Exercise	No. of Slots required
1.	Create an HTML web page with at least the following features: Keywords & description meta tags, title, Page formatting, including a background color *and* picture, a non-default text color, and non-default text and link colors, A horizontal rule, At least three levels of headers, Text formatting, including specifying a non-default font as well as centered, bold, italics, subscript, superscript, and strikeout, A three-level bulleted list and a two-level numbered list, At least two external links, with one a text link and one an image link, Three internal "bookmark" links – that is, a link to further down on the current page, A relative link to an image in a different directory than the directory in which your current HTML page resides, An image with a non-standard-width border in a non-standard color. The image should appear off to the right side of the page, An image map with at least three links, A table that includes at least three rows, two cells in each row, two colspan attributes, and one rowspan attribute. Put a background color on the entire table, a different background color on one cell, and a background image on one entire row of the table.	1
2.	Develop static pages (using only HTML) of an online Book store. The pages should resemble: www. amazon. com. The website should consist of the following pages. • Books catalogue • Shopping cart • Payment by credit card • Order Conformation	1
3.	Design a web page using CSS which includes the following: 1) Use different font styles 2) Set background image for both the page and single elements on page. 3) Control the repetition of image with background-repeat property 4) Define style for links as a:link, a:active, a:hover, a:visited 5) Add customized cursors for links. 6) Work with layers	1
4.	Create an HTML web page with JavaScript for the following problem: Get two input numbers from an HTML form. On submit, call a function to edit them to make sure that they are within the range of 1-100. If not, display an error message and set focus to the field in error. If the entered numbers are valid, add the two numbers together and display the total in an alert box. Pop up a prompt box to get a third number and edit it to make sure it's in the range of 1 to 5. Multiply the original total (from the two input boxes) by this third number.	1

	Store the result in a cookie and then automatically open a second page to display the cookie that you saved on the prior page.	
5.	Validate the registration, user login, user profile and payment by credit card pages using JavaScript.	1
6.	a. Write an XML file which will display the Book information which includes the following: 1) Title of the book 2) Author Name 3) ISBN number 4) Publisher name 5) Edition 6) Price	1
7.	b. Write a Document Type Definition (DTD) to validate the above XML file. Display the XML file as follows: The contents should be displayed in a table. The header of the table should be in color GREY. And the Author names column should be displayed in one color and should be capitalized and in bold. Use your own colors for remaining columns. Use XML schemas XSL and CSS for the above purpose. Note: Give at least for 4 books. It should be valid syntactically. Hint: You can use some xml editors like XML-spy	1
8	Write PHP Script to demonstrate a. String processing in PHP b. File uploading	1
9	Write PHP Script to demonstrate Sessions and Cookies	1
10	Write a PHP which inserts the details of the 3 or 4 users who register with the web site by using registration form. Authenticate the user when he submits the login form using the user name and password from the database	1
11	Write a PHP which does the following job: Insert the details of the 3 or 4 users who register with the web site by using registration form. Authenticate the user when he submits the login form using the user name and password from the database	1

REFERENCE BOOKS:

1. Chris Bates, *"Web Programming: Building Internet Applications,"* 3ed, Wiley India Pvt. Ltd., New Delhi, 2009.
2. W Jason Gilmore, *"Beginning PHP and MySQL: From Novice to Professional,"*4ed, New Delhi, India: Springer India Pvt. Ltd., 2011.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
I M. Tech.(CN&IS) I-Semester
(16MT13808) RESEARCH METHODOLOGY
(Common to all M. Tech. Programs)
(Audit Course)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	-	2	-	-

PREREQUISITES: --

COURSE DESCRIPTION:
Overview of Research, research problem and design, various research designs, data collection methods, statistical methods for research, importance of research reports and its types.

COURSE OUTCOMES: After completion of the course, students should be able to:

CO1. Acquire in-depth knowledge on
- Research design and conducting research
- Various data collection methods
- Statistical methods in research
- Report writing techniques.

CO2. Analyze various research design issues for conducting research in core or allied areas

CO3. Formulate solutions for engineering problems by conducting research effectively in the core or allied areas

CO4. Carryout literature survey and apply research methodologies for the development of scientific/technological knowledge in one or more domains of engineering.

CO5. Select and Apply appropriate techniques and tools to complex engineering activities in their respective fields

CO6. Write effective research reports.

CO7. Develop attitude for lifelong learning to do research.

CO8. Develop professional code of conduct and ethics of research.

DETAILED SYLLABUS:

Unit-I: Introduction to Research Methodology (Periods: 5)
Objectives and Motivation of Research, Types of Research, Research Approaches, Research Process, Criteria of good Research, Defining and Formulating the Research Problem, Problem Selection, Necessity of Defining the Problem, Techniques involved in Defining a Problem.

Unit-II: Research Problem Design and Data Collection Methods (Periods: 7)
Features of Good Design, Research Design Concepts, Different Research Designs, Different Methods of Data Collection, Data preparation: Processing Operations, Types of Analysis.

Unit-III: Statistics in Research (Periods: 6)
Review of Statistical Techniques - Mean, Median, Mode, Geometric and Harmonic Mean, Standard Deviation, Measure of Asymmetry, ANOVA, Regression analysis.

Unit-IV: Hypothesis Testing (Periods: 7)
Normal Distribution, Properties of Normal Distribution, Basic Concepts of Testing of Hypothesis, Hypothesis Testing Procedure, Hypothesis Testing: t-Distribution, Chi-Square Test as a Test of Goodness of Fit.

Unit-V: Interpretation and Report Writing (Periods: 3)
Interpretation – Techniques and Precautions, Report Writing – Significance, Stages, Layout, Types of reports, Precautions in Writing Reports.

Total Periods: 28

Text Book:
1. C.R. Kothari, "Research Methodology: Methods and Techniques," 2ed, New Age International Publishers, New Delhi, 2004.

Reference Books:
1) Ranjit Kumar, "Research Methodology: A step-by-step guide for beginners," 3ed, Sage South Asia, 2011.
2) R. Panneerselvam, "Research Methodology," PHI learning Pvt. Ltd., 2009

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
I M. Tech (CN&IS) II-Semester
(16MT20502) BIG DATA ANALYTICS
(Common to CS & CNIS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*--*	*--*	*4*

PRE-REQUISITES:
Courses on "Data Base Management Systems" & "Data Warehousing and Data Mining"
COURSE DESCRIPTION:
Concepts of Big Data**;** Types of Data Elements; Introduction to Hadoop; Hadoop Ecosystems; MapReduce; Building Blocks of Hadoop; big data analytics applications; Predictive and Descriptive Analytics**.**
COURSE OUTCOMES:
After successful completion of this course, the student will be able to:
CO1. Demonstrate in depth knowledge in

- Big data Characteristics
- Hadoop Framework
- MapReduce.
- Hadoop Release

CO2.Analyze and develop solutions for database systems for storing and analyzing the large data.
CO3.Apply Big Data Analytics for estimating the data sets to solve the real world problems
CO4. Design and model for an effective database by using big data tools.
CO5.Carry out research on predictive analysis and sentiment analysis.
CO5.Learning advance analytics techniques for effective Database monitoring.
DETAILED SYLLABUS:
UNIT I– Introduction to Big data: (10 periods)
Big Data Characteristics: Volume-Variety-Velocity-Veracity, Analytics, Basic Nomenclature, Analytics Process Model, Analytical Model Requirements, Types of Data Sources, Sampling, Types of Data Elements, Missing Values, Standardizing Data, Outlier Detection and Treatment, Categorization.
UNIT II –Introduction to Hadoop: (10 periods)
Data, data types, Storage and Analysis, Relational Database Management Systems, Grid Computing, Volunteer Computing, A Brief History of Hadoop, Apache Hadoop and the Hadoop Ecosystem.
UNIT III – MapReduce: (11 periods)
A weather Dataset: Data format, Analyzing the data with Unix tools, Analyzing the data with Hadoop: MapReduce, Java MapReduce, Scaling Out: Data Flow, Combiner Functions, Running a Distributed MapReduce Job, Hadoop Streaming: Ruby, Python, Hadoop Pipes, Compiling and Running.
UNIT IV – Hadoop Releases: (11 Periods)
The Building Blocks of Hadoop: Name Node-Data Node-Secondary Name Node-Job Tracker-Task Tracker.
BIG DATA ANALYTICS APPLICATIONS: Back Testing Analytical Model, Credit Risk Modeling, Fraud Detection, Net Lift Response, Web Analytics, Social Media Analytics, and Business Process Analytics.
UNITV–PREDICTIVE ANALYTICS AND DESCRIPTIVE ANALYTICS (11 Periods)
Predictive Analytics: Target Definition, Linear Regression, Logistic Regression, Decision Trees, Support Vector Machines, Ensemble Methods, Multiclass Classification Techniques, Evaluating Predictive Models.
Descriptive Analytics: Association Rules, Sequence Rules.

Total No. of Periods: 53

TEXT BOOKS:

1. Bart Baesens, "*Analytics in a Big Data World: The Essential Guide to Data Science and its Applications,"* Wiley Publications, 2014.
2. Tom White, "*Hadoop: The Definitive Guide,"*3ed, O'REILLY Publications, 2012.

REFERENCE BOOKS:

1. Paul Zikopoulos, IBM, Chris Eaton, Paul Zikopoulos *"Understanding Big Data: Analytics for Enterprise Class Hadoop and streaming Data,"* The McGraw-Hill Companies, 2012.

2. Chuck Lam, "*Hadoop in Action,"* Manning Publications, 2011.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
I M.Tech. (CNIS) II Semester
(16MT12501) CLOUD COMPUTING
(Common to SE, CS & CNIS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES:
Courses on "Operating Systems" and "Computer Networks"

COURSE DESCRIPTION:
Virtualization, Case studies – XEN, VMware, Microsoft Hyper-V; Cloud architecture; Services and Applications; Cloud Programming; Industry practices and Case studies –Amazon Web Services, Google App Engine, and Microsoft Azure.

COURSE OUTCOMES:
After successful completion of this course, students will be able to:
CO1: Demonstrate knowledge on Virtualization models, Cloud Architecture, Services and Programming concepts.
CO2: Analyze the problems in existing cloud architectures.
CO3: Apply concurrent programming, throughput computing and Data intensive computing in Cloud programming.
CO4: Conduct research on emerging technologies in cloud and energy management in cloud
CO5: Apply virtualization techniques to optimize resource sharing.

DETAILED SYLLABUS:

Unit I: INTRODUCTION TO VIRTUALIZATION (9 Periods)
Characteristics of Virtualized Environments, Taxonomy of Virtualization Techniques, Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology Examples – XEN, VMware, Microsoft Hyper-V.

UNIT II: CLOUD ARCHITECTURE (11 Periods)
Introduction to Cloud: Defining Cloud Computing, Cloud Types - The NIST model, The Cloud Cube Model, Deployment models, Service models, Examining the Characteristics of Cloud Computing, Paradigm shift, Benefits of cloud computing, Disadvantages of cloud computing, Assessing the Role of Open Standards.
Cloud Architecture: Exploring the Cloud Computing Stack, Composability, Infrastructure, Platforms, Virtual Appliances, Communication Protocols, and Applications.

UNIT III: DEFINING CLOUD SERVICES (10 Periods)
Defining Infrastructure as a Service (IaaS) – IaaS workloads, Pods, aggregation, and silos, **Defining Platform as a Service (PaaS), Defining Software as a Service (SaaS)** – SaaS characteristics, Open SaaS and SOA, Salesforce.com and CRM SaaS, **Defining Identity as a Service (IDaaS)** – Introduction to identity, Networked identity service classes, Identity system codes of conduct, IDaaS interoperability, **Defining Compliance as a Service (CaaS)**.

UNIT IV: CLOUD PROGRAMMING CONCEPTS (12 Periods)
Concurrent Programming – Introduction to Parallelism for Single Machine Computation, Programming Applications with Threads, **High Throughput Computing** – Task Programming, Task based Application Models, **Data Intensive Computing** – Introduction to Data Intensive Computing and Technologies for Data Intensive Computing.

UNIT V: INDUSTRIAL PLATFORMS AND TRENDING DEVELOPMENTS (13 Periods)
Case Studies on Cloud Platforms – Amazon Web Services, Google App Engine, and Microsoft Azure, Case Studies on Cloud Applications – Scientific Applications, Business and Consumer Applications.
Enhancements in Cloud – Energy Efficiency in Clouds, Market based Management of Clouds, Federated Clouds / InterCloud, Third Party Cloud Services. **Total Periods: 55**

TEXT BOOKS:

1. Rajkumar Buyya, Christian Vecchiola, and S. Thamarai Selvi, "*Mastering Cloud Computing: Foundations and Applications Programming,*" 1ed, McGraw Hill, New Delhi, 2013.
2. Barrie Sosinsky, "*Cloud Computing Bible,*" 1ed, Wiley India Pvt Ltd, New Delhi,2011.

REFERENCE BOOKS:

1. Toby J. Velte , Anthony T. Velte, and Robert Elsenpeter, "*Cloud Computing: A Practical Approach,*" 1ed, Tata McGraw Hill, 2010.

2. George Reese, "*Cloud Application Architectures,*" 1ed, O'Reilly Publishers, 2010.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
I M. Tech (CN&IS) II-Semester
(16MT26301) INTRUSION DETECTION SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*--*	*--*	*4*

PRE-REQUISITES:
Courses on "Computer Networks" and "Network security"
COURSE DESCRIPTION:
Introduction to threats , attacks and intrusions; Network security monitoring and Sinkhole design; Traffic threat assessment and network incident response; Malicious bots and botnet construction; introduction to network forensics and Intrusion prevention systems(IPS) in host and network level.
COURSE OUTCOMES:
After successful completion of this course, students will be able to:
CO1: Gain Knowledge on Intrusions, security monitoring, Network Forensic principles and Intrusion Prevention system (IPS).
CO2: Analyze the threats and vulnerabilities in the network traffic for designing the solutions.
CO3: Detect, identify and mitigate the security attacks from the network traffic to provide the solutions to the real word problems.
CO4: Conduct research to identify novel solutions for detecting and mitigation of Intrusions in public and private networks.
CO5: Gain exposure on IDS and IPs tools of Intrusion and Extrusion detection for NSM data collections.
DETAILED SYLLABUS:
UNIT I: NETWORK SECURITY MONITORING REVISITED AND EXTRUSION DETECTION ILLUSTRATED (12 periods)
Network Security Monitoring Revisited: Defining the security process, Principles, Network security monitoring (NSM) Theory, Techniques and tools. Defensible Network Architecture- Defensible network Monitoring, Controlling, Minimizing and current.
Extrusion Detection Illustrated: Definition of Intrusion detection, Definition of Extrusion detection, History of Extrusion detection and Extrusion detection through NSM
UNIT II LAYER-3 NETWORK ACCESS CONTROL AND TRAFFIC THREAT ASSESSMENT (10 periods)
Layer-3 Network Access Control: Internal network Design, ISP sink holes, Enterprise sink holes and Internal intrusion containment.
Traffic Threat Assessment: Assumptions, First cuts, looking for odd traffic, Inspecting individual services through NTP, ISAKMP, ICMP, Secure shell, WhoIs, LDAP, other ports.
UNIT III : NETWORK INCIDENT RESPONSE AND NETWORK FORENSICS (11 p*eriods*)
Network Incident Response: Preparation for network incident response, Secure CSIRT communication, Intruder Profiles, Incident Detection Methods, Network First Response, Network-Centric General Response and Remediation.
Collecting network traffic as evidence, protecting and preserving network based evidence, Analyzing network based evidence, presenting and defending conclusions.
UNIT IV : MALICIOUS BOTS AND INTRUSION PREVENTION OVERVIEW (11 periods)
Traffic Threat Assessment Case Study, Malicious Bots: IRC bots, communication and identification, server and control channels, exploitation and bot admin.
Intrusion Prevention Overview, Signatures and Actions: Types, Triggers and actions, Operational Tasks: deploying & configuring IPS devices and applications, Monitoring IPS activities, Securing IPS communications
UNIT V: HOST INTRUSION PREVENTION AND NETWORK INTRUSION PREVENTION (11 p*eriods*)
Host Intrusion Prevention Overview, Capabilities, Benefits, Limitations, HIPS Components: End agents, Gathering data about the operation, state, security policy and Infrastructure.
Network Intrusion Prevention Overview, Capabilities, Benefits, Limitations, NIPS Components: Capturing, Analyzing, Responding to Network Traffic, Sensor management and Monitoring.
Total Periods: 55
TEXT BOOKS:
1. Richard Bejtlich, "*Extrusion Detection: Security Monitoring for Internal Intrusions*," 1ed. Pearson Education, New Delhi, 2004.
2. Earl Carter, Jonathan Hogue, "*Intrusion Prevention Fundamentals*," 1ed, Pearson Education, New Delhi, 2002.
REFERENCE BOOKS:
1. Carl Endorf, Eugene Schultz and Jim Mellander, "*Intrusion Detection and Prevention*," McGraw-Hill, 2004

2. Stephen Northcutt, Judy Novak, “*Network Intrusion Detection*,” New Riders Publishing, 3ed, 2002

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
I M.Tech (CN&IS). II-Semester
(16MT26302) NETWORK PROGRAMMING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*-*	*-*	*4*

PRE-REQUISITES:
Courses on "Computer Networks" and "Unix Programming"

COURSE DESCRIPTION:
Concepts of Unix Standards; Protocol Usage by common internet application; Elementary TCP Sockets; Handling server process termination; crashing and rebooting; IPV6socket options; Interface with UDP; Function and IPV6 support; I/O multiplexing IPC creating and opening channels, permissions; Terminal Modes, Remote login overview;

COURSE OUTCOMES:
After successful completion of this course, the students will be able to:

CO1: Gain knowledge in
- Basic concepts of UNIX standards, networks and socket functions.
- TCP and UDP socket API and related functions.
- DNS and address conversions.
- I/O Multiplexing, IPC and RPC.

CO2: Analyze the key protocols that support the Internet and several common programming interfaces for network communication.

CO3: Solve I/O Multiplexing issues using TCP socket programming.

CO4: Design client server architecture by developing new TCP and UDP socket functions.

CO5: Apply appropriate techniques and tools to implement algorithms for modern network architectures.

DETAILED SYLLABUS:

UNIT I– INTRODUCTION TO NETWORK PROGRAMMING (13periods)
OSI model, UNIX standards, TCP and UDP & TCP connection establishment and Termination, SCTP Association Establishment and Termination, Port Numbers, TCP Port numbers and Concurrent Servers, Buffer sizes and limitation, standard internet services, Protocol usage by common internet application.
Sockets: Socket Address structures, value result arguments, Byte ordering and manipulation function and related functions Elementary TCP sockets – Socket, connect, bind, listen, accept, fork and exec function, concurrent servers. Close function and related function.

UNIT II – TCP AND UDP SOCKETS (12 periods)
TCP client server: Introduction, TCP Echo server functions, Normal startup and Termination, POSIX signal handling, Handling SIGCHILD signals, wait and wait pid functions, Connection Abort before accept returns, server process termination, Crashing and Rebooting of server host shutdown of server host.
Elementary UDP sockets: Introduction UDP Echo server function, Verifying Received Responses, Server not running, lost datagram, summary of UDP example, Lack of flow control with UDP, determining outgoing interface with UDP.

UNIT III –I/O MULTIPLEXING AND SOCKET OPTIONS (10 periods)
I/O Models, select function, shutdown function, poll function, pselect function, TCP Echo server, getsockopt and setsockopt functions. Socket states, Generic socket option IPV6 socket option ICMPV6 socket option IPV6 socket option and TCP socket options, fcntl function.

UNIT IV –ELEMENTARY NAME AND ADDRESS CONVERSIONS (8 periods)
DNS, getxxx() related functions, Resolver option, Function and IPV6 support, uname function, Obsolete IPV6 Address Lookup Functions, and other networking information.

UNIT V – IPC AND REMOTE PROCEDURE CALL (10 p*eriods*)
IPC: Posix IPC, File and record locking, Pipes, FIFOs streams and messages, Name spaces, system IPC, Message queues, Semaphores and Shared Memory. Introduction to RPC and Transparency Issues, Sun RPC, dup, dup2 System calls.

Total Periods: *55*

TEXT BOOKS:

1. *W.Richard Stevens, "UNIX Network Programming: The Sockets Networking API-1,"* 3ed, PHI, 2010.
2. W.Richard Stevens, "*UNIX Network Programming Inter process Communications*," 2ed, PHI, 2004.

REFERNCE BOOKS:

1. W.Richard Stevens, "*UNIX Network Programming*," 2ed, Pearson Education,2008.
2. M.J. Rockkind, "*Advanced Unix Programming," 2ed*, Pearson Education, 2005.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
I M. Tech (CN&IS)– II Semester
(16MT26303) WIRELESS NETWORKS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*-*	*-*	*4*

PRE-REQUISITES:
A Course on "Computer Networks"
COURSE DESCRIPTION:
Queuing theory; Mobile Radio Propagation; Channel Coding and Error Control; Multiple Radio Access, Multiple Division Techniques For Traffic Channels; Ad Hoc Networks and Sensor Networks; Wireless LANs; PANs, BANs and MANs.
COURSE OUTCOMES:
After successful completion of this course, students will be able to:
CO1. Acquire knowledge in physical layer, data link layer, network layer and transport layer of wireless networking models.
CO2. Analyse the traffic theories, mobile radio propagation, channel coding, cellular concepts to measure the performance.
CO3. Conduct research to develop routing protocols for MANETs to solve real world problems.
CO4. Develop solution for complex problems using networking tools

DETAILED SYLLABUS:
UNIT I: INTRODUCTION, PROBABILITY, STATISTICS, AND TRAFFICTEORIES (11periods)
Introduction-Characteristics and Fundamentals of cellular Systems, Cellular System Infrastructure, Cellular Concept- Cell area, Signal strength and Cell Parameters, Capacity of a Cell, Frequency Reuse, How to form a cluster, Cochannel Interference, Cell Splitting, Cell Sectoring.
Probability, Statistics, and Traffic Theories- Introduction, Basic Probability and Statistics Theories, Traffic Theory, Basic Queuing Systems
UNIT II – MOBILE RADIO PROPAGATION, CHANNEL CODING ANDERROR CONTROL (11 periods)
Mobile Radio Propagation-Introduction, Types of Radio Waves, Propagation Mechanisms, Free Space Propagation, Land Propagation, Path Loss, Slow Fading, Fast Fading, Doppler Effect, Delay Spread, Inter symbol Interference, Coherence Bandwidth, Cochannel Interference.
Channel Coding and Error Control- Introduction, Liner Block Codes, Cyclic Codes, Cyclic Redundancy Check, Convolutional Codes, Inter leaver, Turbo Codes, ARQ Techniques.
UNIT III – MULTIPLE RADIO ACCESS, MULTIPLE DIVISION TECHNIQUES FOR TRAFFIC CHANNELS (11 periods)
Multiple Radio Access- Introduction, Multiple Radio Access Protocols, Contention Based Protocols.
Multiple Division Techniques for Traffic Channels- Introduction, Concepts and Models for Multiple Divisions, Modulation Techniques
Network Protocols- TCP over Wireless, Internet Protocol Version (IPV6)
UNIT IV –AD HOC NETWORKS AND SENSOR NETWORKS (11 periods)
Ad Hoc Networks - Introduction, Characteristics of MANETs, Applications, Routing in MANETs - DSDV,AODV,DSR, ZRP.
Sensor Networks- Introduction, Fixed Wireless Sensor Networks, Wireless Sensor Networks, Sensor Deployment, Network Characteristics, Design Issues in Sensor Networks, Secured Communication in Wireless Sensor Networks.
UNIT V – WIRELESS LANS, PANS, BANS AND MANS (11 periods)
Wireless LANs, PANs, BANs and MANs-Introduction, ETSI High-Performance LAN (Hipher LAN), Wireless Personal Area Networks (WPANs), IEEE 802.15.1, Zigbee, Wireless Body Area Networks (WBANs), WMANs Using Worldwide Inter-operability for Microwave Access(WiMAX), WMAN Using a Mesh Network, WMANs Using 3GPP and Long Term Evaluation(LTE), WMAN Using Long Term Evaluation (LTE) and LTE – A.

Total Periods: *55*

TEXT BOOK:
1 .Dharma Prakash Agarwal, Qing-AnZeng, *"Introduction to Wireless & Mobile Systems," 4ed,* Cengage Learning, 2016.
REFERENCE BOOK:
1. Theodore S. Rappaport, *"Wireless Communications–Principles and Practice,"2ed*, PHI, 2002.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
I M.Tech (CN&IS). II-Semester
(16MT10506) INFORMATION RETRIEVAL SYSTEMS
(Professional Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITE:
A Course on "Database Management Systems"
COURSE DESCRIPTION:
Concepts of Information retrieval Systems; Indexing and data structures; indexing, Document and term clustering; user search techniques; Text search algorithms, information system Evaluation;
COURSE OUTCOMES:
After successful completion of this course, students will be able to:
CO1 : Acquire knowledge in fundamental concepts of
- Information Retrieval System capabilities
- Data Structures
- Indexing and Search Algorithms

CO2: Analyze concepts of Database, Data Warehouses of real time applications related to Document Store, Document data warehouses, judicial, biomedical, scientific documents.
CO3: Solve complex search problems like ranking , weighted ,software text searches by implementing A* Search, Zipf and Information retrieval frame work
CO4: Initiate research to identify and develop algorithms for indexing, clustering and searching
CO5: Create and apply online Information Retrieval Systems like search engines.

DETAILED SYLLABUS:
UNIT I: INTRODUCTIONTO INFORMATION RETRIEVAL SYSTEM (periods: 11)
Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses
Information Retrieval System Capabilities: Search, Browse.
UNIT II: INDEXING AND DATA STRUCTURES (periods: 11)
Objectives of Indexing, Indexing Process, Automatic Indexing
Data Structures: Introduction to Data Structures, Stemming Algorithms, Inverted file structures, N-gram data structure, PAT data structure, Hypertext data structure.
UNIT III: AUTOMATIC INDEXING AND CLUSTERING (periods: 10)
Classes of automatic indexing, Statistical indexing, Natural language, Concept indexing. **Document and Term Clustering:** Introduction to Clustering, Thesaurus generation, Manual clustering, Automatic Term Clustering, Hierarchy of clusters.
UNIT IV: USER SEARCH TECHNIQUES (periods: 12)
Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, weighted searches of Boolean systems.
UNIT V: TEXT SEARCH ALGORITHMS (periods: 11)
Introduction to Text Search Techniques, Software text search algorithms, Hardware text search systems.
Information System Evaluation: Introduction to Information System Evaluation, Measures used in system evaluation.

Total No. of periods (55)

TEXT BOOK:

1. Kowalski, Gerald, Mark T Maybury Kluwer, "*Information Storage and Retrieval Systems: Theory and Implementation*", 2ed, Springer, Seventh Indian reprint 2 , 2013...

REFERENCE BOOKS:

1. Ricardo Baeza-Yates ,"*Modern Information Retrieval*" , Pearson Education, 2007
2. David A Grossman and Ophir Frieder, "*Information Retrieval: Algorithms and Heuristics*", 2ed, Springer, 2012.

3.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
I M. Tech. (CN&IS) II-Semester
(16MT26304) COMPUTER FORENSICS
(Professional Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES:
A Course on "Information Security"

COURSE DESCRIPTION:
Concepts of computer forensic technologies and cybercrime; Evidence collection and data seizure; Initial Response and Forensic Duplication; Forensic Data Analysis and Validation; Processing crimes and incident scenes; Mobile Device Forensics, Network forensics and E-Mail Investigations

COURSE OUTCOMES:
After successful completion of this course, students will be able to:
CO1: Acquire knowledge in
- Computer Forensic Fundamentals and Technologies
- Evidence and Data Capture and Computer Forensic Analysis
- Law Enforcement crime and incident scenes

CO2: Analyze and validate forensic data related to mobile devices, E-Mails.
CO3: Provide solutions for a wide range of forensic problems like attack on routers, E-Mail crimes.
CO4: Conduct research and contribute in groups for the development of new forensics tools.
CO5: Create and apply appropriate forensic tools, techniques to capture the evidence and investigate crimes

DETAILED SYLLABUS

UNIT – I: OVERVIEW OF COMPUTER FORENSICS TECHNOLOGY AND CYBERCRIME (10 periods)
Computer Forensics Fundamentals: Introduction to computer Forensics, Use of computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources/Employment Proceedings, Computer Forensics Services, Benefits of Professional Forensics Methodology, Steps taken by Computer Forensics Specialists.
Types of Computer Forensics Technologies: Types of Military Computer Forensic Technology, Types of Law Enforcement- Computer Forensic Technology, Types of Business Computer Forensic Technology.
Introduction to Cybercrime: Introduction to Cybercrime, Cybercrime and Information Security, Cybercriminals, Classification of Cybercrimes, Cyber Detectives, Tools: Dig-x/nslookup, Whois, Ping.

UNIT – II: COMPUTER FORENSICS EVIDENCE AND (10 periods)
Data Recovery: Data back-up and Recovery, Role of Back-up in Recovery, Data-Recovery solution.
Evidence Collection and Data Seizure: Importance of Collect Evidence, Collection Options ,Obstacles, Types of Evidence, The Rules of Evidence, Volatile Evidence, General Procedure – Collection and Archiving, Methods of Collection, Artifacts, Collection Steps, Controlling Contamination: The Chain of Custody.

UNIT – III: INITIAL RESPONSE AND FORENSIC DUPLICATION (12 periods)
Initial Response & Volatile Data Collection from Windows system - Initial Response & Volatile Data Collection from Unix system. Forensic duplication: Forensic Duplicates as Admissible Evidence, Forensic Duplication Tool Requirements, Creating a Forensic Duplicate/Qualified Forensic Duplicate of a Hard Drive, Live Data Collection for Systems (Windows &Unix).

UNIT -IV: COMPUTER FORENSIC ANALYSIS (12 periods)
Data Analysis and Validation: Determining what data to collect and analyze, Validating forensic data, Addressing data, Hiding techniques, Performing remote acquisitions.
Processing Crime and Incident Scenes: Identifying digital evidence, Collecting evidence in private-sector incident scenes, Mobile Forensic Unit, Processing law enforcement crime, Preparing for a search, Seizing Digital Evidence at the Scene, Storing Digital Evidence.

UNIT – V: FORENSICS IN VARIOUS AREAS (10 periods)
Cell Phone & Mobile Device Forensics : Understanding Mobile Device Forensics, Acquisition Procedures for Cell Phones and Mobile Devices, Tool kits for hand-Held device forensics like EnCase, Device Seizure and PDA Seizure.
Network Forensics: Overview, Performing Live Acquisitions, Developing Standard Procedure for Network Forensics, Investigating Routers, Network Tools.
E-Mail Investigation: Exploring the role of E-Mail in investigations, Investigating E-Mail Crimes and Violations.

Total periods: 54

TEXT BOOKS:

1. John R.Vacca, *"Computer Forensics, Computer Crime Investigation "* 1ed,Firewall Media, New Delhi ,2009.
2. Nelson, Amelia Phillips, Christopher Steuart, *"Computer Forensics and Investigations"*,4ed, Cengage Learning, 2009.

REFERENCE BOOKS:

1. Sunit Belapure, Nina Godbole, *"Cyber Security: Understanding Cyber Crimes, Computer Forensics And Legal Perspectives"*, 1ed, Wiley India Pvt Ltd, 2011.
2. Kevin Mandia, Chris Prosise, *"Incident Response and Computer Forensics"*, 2ed, McGraw-Hill Osborne Media, 2003
3. EoghanCasey,*"Handbook Computer Crime Investigation's Forensic Tools and Technology"*, 1ed, Academic Press, 2001.

4. Peter Stephenson, Keith Gilbert, *"Investigating Computer Related Crime"*, 2ed, CRC Press, 2004.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
I M Tech (CN&IS) II-Semester
(16MT26305)DATABASE SECURITY
(Professional Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*--*	*--*	*4*

PRE-REQUISITES:
A course on "Database Management Systems"

COURSE DESCRIPTION:
Explore database access controls; data obscurity and physical database security; Password Policies, Privileges; fraud detection through the use of audit tables & triggers and obscurity through the use of encryption; views & virtual private databases.

COURSE OUTCOMES:
After successful completion of this course, students will be able to:

CO1: Acquire knowledge in
- Information System Security
- Design of Secure Databases.
- Database System Models and Applications.
- Need for database security architecture.

CO2: Analyze fundamental database security threats, vulnerabilities and associated risks.

CO3: Implement specific database security solutions that include: access controls, audit/control and obscurity (encryption, views, and VPDs) mechanisms.

CO4: Create database security architecture, database user roles using SQL Server

CO5: Conduct research on establishment of strong passwords and manage th resources through database audit/access controls.

CO6: Recognize database security issues, implementation methods to database security mechanisms and strategies in life- long learning.

DETAILED SYLLABUS:

UNIT-I: SECURITY ARCHITECTURE AND OPERATING SYSTEM SECURITY FUNDAMENTALS (11 periods)

Security Architecture: Introduction, Security, Information Systems, Database Management Systems, Information Security, Information Security Architecture, Database Security, Asset Type and their Values, Security Methods.

Operating System Security Fundamentals: Operating System Security Environment, Components, Authentication Methods, user Administration, Password Policies, Vulnerabilities.

UNIT-II: ADMINISTRATION OF USERS AND PROFILES, PASSWORD POLICES, PRIVILEGES (10 periods)

Administration of Users: Introduction, Documentation of User Administration, Operating System Authentication, Creating Users, Creating SQL Server User, Removing Users, Modifying Users, Default Users, Remote Users, Database Links, Linked Servers, Remote Servers, Practices for Administrators and Managers.

Profiles, Password Polices, Privileges: Defining and Using Profiles, Designing and Implementing Password Polices, Granting and Revoking User Privileges.

UNIT-III: SECURITY MODELS AND VIRTUAL PRIVATE DATABASES (11 periods)

Database Application Security Models: Introduction, Types of Users, Security Models, Application Types, Application Security Models.

Virtual Private Databases: Introduction, Overview of VPD, Implementing VPDs, Implementing Oracle VPD, Viewing VPD Policies and Application Context Using the Data Dictionary and Policy Manager, Implementing Row-and Column level Security with SQL Server .

UNIT-IV: DATABASE SECURITY DESIGN (10 periods)

Secure DBMS Design: Introduction, Security mechanisms in DBMSs, Secure DBMS architectures.

Design of Secure Databases: Preliminary Analysis, Requirement Analysis and Security Policy Selection, Conceptual Design, Logical Design, Physical Design, Implementation of Security Mechanisms, Verification and Testing.

UNIT-V: DATA AUDITING AND AUDITING DATABASE ACTIVITIES (10 periods)

Application Data Auditing: Introduction, DML Action Auditing Architecture, Oracle Triggers, SQL Server Triggers, Fine-grained Auditing with Oracle, DML Statement Audit Trail, Auditing Application Errors with Oracle.

Auditing Database Activities: Using Oracle Database Activities, Creating DLL Triggers with Oracle, Auditing Database Activities with Oracle, Auditing Server Activity with Microsoft SQL Server 2000, Implementing AQL Profiler, Security Auditing with SQL Server, SQL Injection **Total Periods: *54***

TEXT BOOKS:

1. Hassan A. Afyouni, *"Database Security and Auditing: Protecting Data Integrity and Accessibility,"* CENGAGE Learning, New Delhi, 2006.
2. S. Castano, M. Fugini, G. Martella, P. Samarati, *"Database Security,"* Addison-Wesley, New York, 1994

REFERENCE BOOKS:

1. Ron Ben Natan, *"Implementing Database Security and Auditing,"* U.S.A: Elsevier Digital Press, 2005.

2. Michael Gertz, SushilJajodia, "*Handbook of Database Security: Applications and Trends,*" New York: Springer, 2008.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
I M. Tech (CN&IS). II-Semester
(16MT26306)SOCIAL NETWORKS
(Professional Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*--*	*--*	*4*

PRE-REQUISITES:
A Course on "Computer Networks"

COURSEDESCRIPTION:
Concepts of Tweet rank model; Rich Media Communications patterns; Data Pre-Processing; Challenges of DOSN; Web accessibility analysis; Collaborative tagging; Visualization and Applications of Social Networks

COURSE OUTCOMES:
CO1: Gain knowledge on
- Social Media Analysis
- Mining and Privacy.
- Visualization and Applications of Social Networks.

CO2: Analyze the mining techniques, social network Infrastructures and Communities.
CO3: Apply the Baye's Conditional Probabilities technique in the real world applications of social networks.
CO4: Initiate research to identify solutions for security and privacy in social networks.
CO4: Develop effective communication among peers in the area of Social Networks.
CO5: Acquire professional code of conduct and social responsibility to contribute for development of society.

DETAILED SYLLABUS:

UNIT I Social Media Analysis and Organization (10 periods)
Social Network Analysis: History, Concepts, and Research, Analysis of Social Networks by Tensor Decomposition, Analyzing the Dynamics of Communication in Online Social Networks, Qualitative Analysis of Commercial Social Network Profiles.

UNIT II Social Media Mining and Search (11 periods)
Discovering Mobile Social Networks by Semantic Technologies, Online Identities and Social Networking, Detecting Communities in Social Networks, Concept Discovery in Youtube.com Using Factorization Method, Discovering Communities from Social Networks: Methodologies and Applications

UNIT III Social Network Infrastructures and Communities (11 periods)
Decentralized Online Social Networks, Multi-Relational Characterization of Dynamic Social Network Communities, Accessibility Testing of Social Websites, Understanding and Predicting Human Behavior for Social Communities

UNIT IV Privacy in Online Social Networks (11 periods)
Managing Trust in Online Social Networks, Security and Privacy in Online Social Networks, Investigation of Key-Player Problem in Terrorist Networks Using Bayes Conditional Probability, Security Requirements for Social Networks in Web 2.0

UNIT V Visualization and Applications of Social Networks (12 periods)
Visualization of Social Networks, Novel Visualizations and Interactions for Social Networks Exploration, Applications of Social Network Analysis, Online Advertising in Social Networks

Total Periods: *55*

TEXT BOOK:
1. Borko Furht, "Handbook of Social Network Technologies and Applications", 1ed, Springer, 2010.

REFERENCE BOOKS:

1. Peter Mika, "Social Networks and the Semantic Web", 1ed,Springer, 2007
2. John Lovett, "Social Media Metrics Secrets", Wiley India Private Limited, 2011.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
I M. Tech (CN&IS) – II Semester
(16MT20531) CLOUD COMPUTING & BIG DATA ANALYTICS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	--	--	4	2

PRE-REQUISITES:
Course on "Cloud Computing" and "Operating Systems"
COURSE DESCRIPTION:
Hands-on experience on creating Virtual machines on Windows and Linux platforms, Development of Service based web applications & their deployment and Mobile app development, Designing and implementing Hadoop cluster.
COURSE OUTCOMES:
After successful completion of this course , students will be able to:

CO1: Demonstrate hands-on experience on Virtualization models, Cloud Environment and Hadoop cluster setup.
CO2: Analyze the given experiment and measure the performance of services and datasets.
CO3: Apply API development skills in web applications for Cloud deployment and develop solutions for real time applications using Hadoop.
CO4: Devise virtual environments based on virtualization techniques and processing huge amount of data using Big data tools
CO5: Develop written and oral communications in preparing and presenting reports.

LIST OF PRACTICAL EXERCISES:
1. Create Virtual machines with given set of configuration on Hyper-V," Ubuntu 14 LTS OS, with 2 GB RAM and 200 GB HDD". (IaaS)
2. Create Virtual machines with given set of configuration on Ubuntu OS: "Windows 7 OS with 4 GB RAM and 500 GB HDD". (IaaS)
3. Develop a Design document for a web application, to perform operations based on service calls and to be deployed on cloud environment. (Design Doc)
4. Develop a web application for performing Calculator operations be selecting relevant services. Deploy it on cloud platform. (SaaS)
5. Develop a HTTPS web application with social media interfaces (Facebook / Twitter / Instagram / Google+ APIs). (SaaS)
6. Develop a mobile app on Google App Engine for uploading a resume into a website, collaborated with Drop box. The resume should be encrypted. (PaaS)
7. Develop a service call to run on Drop box resumes for picking the resumes of given skill set. (PaaS)
   a. 6+ years of Exp in Java Development.
   b. 10 years of experience in Automation Testing.
   c. 15+ years of Managerial experience with technical background.
   d. 5-7 years of on-site experience in .NET support and programming.
8. Install and run Hadoop using Single node Cluster.
9. Install and run Hadoop using Multi node cluster
10. Write a program to count words in a program using map and reduce functions and Hadoop.
11. Illustrate installation and configuring of Hive.

REFERENCE BOOKS:

1: Ivanka Menken and Ivanka Menken, "*Cloud Computing Virtualization Specialist Complete Certification Kit - Study Guide Book,*" 1ed, Emereo Pty. Ltd., 2009.
2: Barrie Sosinsky, "*Cloud Computing Bible,*" 1ed, Wiley India Pvt Ltd, 2011.
3: Tom White, "*Hadoop: The Definitive Guide*," 3ed, O'REILLY Publications, 2012.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
I M. Tech. (CN&IS) -II Semester
(16MT26331)WIRELESS NETWORKS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	*50*	*100*	*-*	*-*	*4*	*2*

COURSE DESCRIPTION:
This course introduces hands-on experience in designing and implementing wireless networking models.
COURSE OUTCOMES:
On successful completion of this course the students will be able to:
CO1. Gain practical knowledge on wireless network simulation.
CO2. Analyze performance measures of multi-hop wireless network models.
CO3.Design wireless networking models and validate networking protocols.
CO4. Compare and Contrast performance measures of new networking models.
CO5. Develop simulation models for wireless networking by using QUALNET.
List of Exercises in *Wireless Networks:*

Exercise Number	Description	No. of Slots required
1	Consider a Wireless channel with data rate 2Mbps and transmit data more than the channel capacity. Simulate TCP-SACK (Selective Acknowledgement Protocol) Protocol to retransmit the lost packets.	2
2	Given a wireless network with four channels, each with a frequency of 2.4Ghz, simulate ALOHA multiple access technique to access the channels.	1
3	The maximum achievable throughput in the aloha protocol is low because of more number of collisions. Simulate Carrier Sense Multiple Access (CSMA) Protocol to reduce the number of collisions.	1

Table-1

PARAMETER	VALUE
Simulation time	60 Sec
Simulation area	700m X 700m
Maximum number of packets	50
Packet rate	5 packets/sec
Traffic size	CBR
Number of channels	3
Node movement model	Random Way Point
Number of nodes	15
Mobility of nodes	Yes
Network interface type	Wireless
MAC type	802.11
Bandwidth	10 Mbps

4	Design a scenario using the a parameters given in table 1, Simulate Destination Sequenced Distance Vector (DSDV) Routing Algorithm for AdHoc Networks, and analyze the metrics throughput, average end to end delay, packet delivery ratio, jitter by changing the number of channels, maximum number of packets, packet rate, IPV6 and number of nodes.	2
5	Design a scenario using the parameters given in table 1, Simulate Ad Hoc on Demand Distance Vector (AODV) Routing Algorithm for AdHoc Networks, and analyze the metrics throughput, average end to end delay, packet delivery ratio, jitter by changing the number of channels, maximum number of packets, packet rate,IPV6, and number of nodes.	1
6	Design a scenario using the parameters given in table 1, Simulate Zone Routing Protocol(ZRP) Algorithm for AdHoc Networks, and analyze the metrics throughput, average end to end delay, packet delivery ratio,	1

jitter by changing the number of channels, maximum number of packets, packet rate,IPV6, and number of nodes.

7	Design a scenario using the parameters given in table 1, Simulate Wireless Routing Protocol(WRP),a path finding algorithm for AdHoc Networks. Analyze the metrics throughput, average end to end delay, packet delivery ratio, jitter by changing the number of channels, maximum number of packets, packet rate, control overhead,IPV6and number of nodes.	1
8	Design a scenario using the parameters given in table 1, Simulate Fisheye Source Routing(FSR) ProtocolforAdHoc Networks, which divide each node's neighborhood to blurred zones so that the information details and accuracy is better for nodes to be nearer. Analyze the metrics throughput, average end to end delay, packet delivery ratio, jitter by changing the number of channels, maximum number of packets, packet rate, control overhead, IPV6, and number of nodes.	1
9	Design a scenario using the parameters given in table 1, Simulate Clusterhead Gateway Switch Routing(CGSR) a multi-channel operation Protocol for AdHoc Networks. Analyze the metrics throughput, average end to end delay, packet delivery ratio, jitter by changing the number of channels, maximum number of packets, packet rate, control overhead, IPV6, and number of nodes.	1

Table-2

PARAMETER	VALUE
Simulation time	60 Sec
Simulation area	700m X 700m
Maximum number of packets	50
Packet rate	5 packets/sec
Traffic size	CBR
Number of channels	3
Node movement model	Random Way Point
Number of nodes	15
Mobility of nodes	Yes
Network interface type	Wireless
MAC type	802.16
Bandwidth	10 Mbps

10	Design a point-to-multipoint broadband wireless access scenario using the parameters given in table 2. Simulate WiMax IEEE 802.16 technology for wireless metropolitan area networks, and analyze the metrics throughput, average end to end delay, packet delivery ratio, jitter by changing the number of channels, maximum number of packets, packet rate,IPV6 and number of nodes.	1

REFERENCE BOOKS:

1.Dharma Prakash Agarwal, Qing-AnZeng, *"Introduction to Wireless & Mobile systems,"* Cengage Learning, Fourth edition, 2016.

2. Theodore S. Rappaport, *"Wireless Communications–Principles and Practice,"2ed*, PHI, 2002

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
I M. Tech. (CN&IS)-II Semester
(16MT26332) SEMINAR

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
--	100	100	--	--	--	2

PRE-REQUISITES:--

COURSE DESCRIPTION:

Identification of seminar topic; literature survey; preparation of technical report and presentation:

COURSE OUTCOMES:
On successful completion of this course, the students will be able to

CO1. Demonstrate capacity to identify an advanced topic for seminar in core and allied areas.
CO2. Extract information pertinent to the topic through literature survey.
CO3. Comprehend extracted information through analysis and synthesis critically on the topic.
CO4. Plan, organize, prepare and present effective written and oral technical report on the topic.
CO5. Adapt to independent and reflective learning for sustainable professional growth in Computer networks & information Security.
CO6. Contribute to multidisciplinary scientific work in the field of Computer networks & information Security
CO7. Understand ethical responsibility towards environment and society in the field of Computer networks & information Security.
CO8. Engage in lifelong learning for development of technical competence in the field of Computer Networks & information Security

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
M. Tech. – II Semester (CN&IS)
(16MT23810) INTELLECTUAL PROPERTY RIGHTS
(Common to all M. Tech. Programs)
(Audit Course)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-		-	2	-	-

PRE-REQUISITES: --

COURSE DESCRIPTION:
Introduction to Intellectual Property; Trade Marks; Law of Copy Rights; Law of Patents; Trade Secrets; Unfair Competition; New Development of Intellectual Property.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

CO1. Demonstrate in-depth knowledge on
- Intellectual Property
- Trade Marks & Secrets
- Law of Copy Rights, Patents
- New development of Intellectual Property

CO2. Analyze the different forms of infringement of intellectual property rights.
CO3. Solve problems pertaining to Intellectual Property Rights.
CO4. Stimulate research zeal for patenting of an idea or product.
CO5. Write effective reports required for filing patents.
CO6. Develop life-long learning capabilities.
CO7. Develop awareness of the relevance and impact of IP Law on their academic and professional lives.
CO8. Develop attitude for reflective learning.

DETAILED SYLLABUS:
UNIT - I: Introduction to Intellectual property **(Periods: 5)**
Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT - II: Trade Marks: **(Periods: 5)**
Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT - III: Law of copy rights: **(Periods: 6)**
Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.
Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT - IV: Trade Secrets: **(Periods: 6)**
Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.
Unfair competition: Misappropriation right of publicity, False advertising.

UNIT - V: New development of intellectual property: **(Periods: 6)**
New developments in trade mark law; copy right law, patent law, intellectual property audits.
International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

Total Periods: 28

REFERENCE BOOKS:

1. Deborah, E. Bouchoux, *Intellectual property right*, Cengage learning.

2. Prabuddha Ganguli, *Intellectual property right - Unleashing the knowledge economy*, Tata McGraw Hill Publishing Company Ltd

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Computer Science and Engineering
M. Tech. (CNIS)-III & IV Semesters
(16MT36331 &16MT46331) PROJECT WORK

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
200	200	400	--	--	--	28

PRE-REQUISITES: --
COURSE DESCRIPTION:
Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Writing of thesis and presentation.

COURSE OUTCOMES:
On successful completion of this course, the students will be able to:

CO1. Demonstrate capacity to identify an advanced topic for project work in core and allied areas.
CO2. Extract information pertinent to the topic through literature survey.
CO3. Comprehend extracted information through analysis and synthesis critically on the topic.
CO4. Solve engineering problems pertinent to the chosen topic for feasible solutions.
CO5. Use the techniques, skills and modern engineering tools necessary for project work.
CO6. Do time and cost analysis on the project.
CO7. Plan, prepare and present effective written and oral technical report on the topic.
CO8. Adapt to independent and reflective learning for sustainable professional growth.
CO9. Contribute to multidisciplinary scientific working the field of Computer Networks & Information Security
CO10. Understand ethical responsibility towards environment and society in the field of Computer Networks & Information Security.
CO11. Engage lifelong learning for development of technical competence in the field of Computer Networks & Information Security.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (AUTONOMOUS)

Sree Sainath Nagar, Tirupati – 517 102.

SVEC16

M. Tech. (Digital Electronics and Communication Systems)

Course Structure

I-Semester

S. No.	Course Code	Course Title	Contact Periods per Week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
1.	16MT13801	Computer Networks	4	-	-	4	4	40	60	100
2.	16MT13802	Digital Communication Techniques	4	-	-	4	4	40	60	100
3.	16MT13803	Digital System Design and Testing	4	-	-	4	4	40	60	100
4.	16MT13804	Image & Video Processing	4	-	-	4	4	40	60	100
5.	16MT13805	Modern Digital Signal processing	4	-	-	4	4	40	60	100
6.	**Professional Elective-1**		4	-	-	4	4	40	60	100
	16MT20501	Advanced Computer Architecture								
	16MT12541	Soft Computing Techniques								
	16MT13806	ASIC Design								
	16MT13807	Transform Techniques								
7.	16MT13831	Digital System Design and Testing Lab	-	-	4	4	2	50	50	100
8.	16MT13832	Image & Video Processing Lab	-	-	4	4	2	50	50	100
		Total:	**24**	**-**	**8**	**32**	**28**	**340**	**460**	**800**
9.	16MT13808	Research Methodology (Audit Course)	-	2	-	2	-	-	-	-

II-Semester

S. No.	Course Title	Course Title	Contact Periods per Week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
1.	16MT23801	Detection and Estimation of Signals	4	-	-	4	4	40	60	100
2.	16MT23802	Embedded System Design	4	-	-	4	4	40	60	100
3.	16MT23803	Information Theory and Coding Techniques	4	-	-	4	4	40	60	100
4.	16MT23804	Low Power CMOS VLSI Design	4	-	-	4	4	40	60	100
5.	16MT23805	Wireless Communications	4	-	-	4	4	40	60	100
6.	**Professional Elective-2**		4	-	-	4	4	40	60	100
	16MT23806	Display Technologies and Devices								
	16MT23807	Optical Communications and Networks								
	16MT23808	Real Time Systems								
	16MT23809	Speech Processing								
7.	16MT23831	Communications Lab	-	-	4	4	2	50	50	100
8.	16MT23832	Embedded Systems Lab	-	-	4	4	2	50	50	100
9.	16MT23833	Seminar	-	-	-	-	2	--	100	100
		Total:	**24**	**-**	**8**	**32**	**30**	**340**	**560**	**900**
10.	16MT23810	Intellectual Property Rights (Audit Course)	-	2	-	2	-	-	-	-

III-Semester

S. No.	Course Code	Course Title	Contact Periods per Week				Credits	Scheme of Examination Max. Marks		
			L	T	P*	Total		Internal Marks	External Marks	Total Marks
1.	16MT3MOOC	MOOC	-	-	-	-	-	-	-	-
2.	16MT33831	Project Work – Phase I	-	-	-	-	8	50	50	100
		Total:	**-**	**-**	**-**	**-**	**8**	**50**	**50**	**100**

*Fulltime Project Work

IV-Semester

S. No.	Course Code	Course Title	Contact Periods per Week				Credits	Scheme of Examination Max. Marks		
			L	T	P*	Total		Internal Marks	External Marks	Total Marks
1.	16MT43831	Project Work – Phase II	-	-	-	-	20	150	150	300
		Total:	**-**	**-**	**-**	**-**	**20**	**150**	**150**	**300**
						Grand Total:	**86**	**880**	**1220**	**2100**

*Fulltime Project Work

M. Tech. - I Semester
(16MT13801) COMPUTER NETWORKS
(Common to DECS & CMS (PE-I))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: --
A Course on Computer Networks and Wireless Communication and Networks at UG Level
COURSE DESCRIPTION:
Advanced computer networks and its architectures; Protocols & Network security; Mobile adhoc networks.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
1. Demonstrate in-depth knowledge on
   - Architectures and functioning of advanced computer networks like Ethernet, SONET/SDH, Wi-Fi, Frame Relay, ATM networks etc.
   - Protocols like IPv6, MPLS, RSVP, VoIP associated with advanced computer networks.
   - Security features associated with advanced computer networks.
2. Analyze various design issues for conducting research related to the Internet protocol (IP), Wireless LANs and ATM network technologies prominent in high performance scenario.
3. Design and develop techniques for solutions pertaining to the advanced networking technologies.
4. Formulate solutions for engineering problems pertaining to the advanced networking technologies.
5. Initiate research in advanced computer networks.
6. Apply appropriate techniques and tools to complex engineering activities in the field of advanced computer networks.
7. Contribute positively to multidisciplinary scientific research in design and development of Protocols for adhoc network architectures.

DETAILED SYLLABUS
UNIT- I: WIRED AND WIRELESS NETWORKS (10 Periods)
Introduction, Reference models- OSI, TCP/IP; Data Link Control Protocols - HDLC, Point to Point Protocol (PPP); Ethernet- Fast Ethernet, Gigabit Ethernet; Wireless LANS – Merits, topologies, Architecture – Physical Layer, MAC Layer, Frame structure, Applications; Virtual LANs.
UNIT- II: ADVANCED NETWORK ARCHITECTURES (13 Periods)
Circuit switching network - SONET/SDH; Virtual Circuit Networks – Frame Relay, ATM - Protocol Architecture, Logical Connections, ATM Cells, Transmission of ATM Cells, ATM Service Categories; Signaling Protocols - MPLS, RSVP; VPN architectures.
UNIT- III: INTERNET TRANSPORT AND APPLICATION PROTOCOLS (11 Periods)
Internet protocol - IPv6, Transport protocols – Connection Oriented protocol TCP, Connectionless protocol UDP; Congestion control in TCP, Domain Name System, Simple Mail Transfer Protocol, WWW and HTTP, Multimedia Applications – RTP, Voice Over IP.
UNIT- IV: SECURITY IN ADVANCED NETWORKS (10 Periods)
Network security, Cryptography - Symmetric Key Cryptography, Public Key Cryptography, Simple Network Management Protocol, Firewalls - Packet filtering, Digital Signature, IP Security.
UNIT- V: MOBILE AD-HOC NETWORKS (11 Periods)
Overview of Wireless Ad-Hoc Networks, Routing in Ad-Hoc Networks, Routing Protocols for Ad-Hoc Networks; Wireless Sensor Networks: Sensor Networks and Protocol Structures, Communication Energy Model, Clustering Protocols, Routing Protocols.

Total Periods: 55

TEXT BOOKS:

1. Behrouz A. Forouzan, "Data Communications and Networking", Tata McGraw-Hill, New Delhi, 4th edition, 2006
2. Nader F. Mir, Computer and Communication Networks, Pearson Education, 4th edition, 2007.
3. William Stallings, "Data and Computer Communication", Prentice hall, 9th edition, 2010

REFERENCE BOOKS:

1. Jim Kurose, Keith Ross, "Computer Networking: A Top Down Approach", Addison Wesley, 4th edition, July 2007.
2. Andrew S. Tanenbaum "Computer Networks", Pearson Education, 4th edition, 2008.

I M. Tech. – I Semester
(16MT13802) DIGITAL COMMUNICATION TECHNIQUES
(Common to DECS & CMS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: --
Course on Digital Communications at UG Level**,** Review of random Variables and Processes
COURSE DESCRIPTION:
Characterization of Communication Signals and Systems; Digital Modulation Techniques; Optimum Receivers for the Additive Gaussian Noise Channel; Spread Spectrum Technique; Multichannel and Multicarrier Systems.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
1. Demonstrate in-depth knowledge in
   - Characterization of communication signals and systems.
   - Digital modulation techniques
   - Communication over AWGN channels
   - Optimum receivers
   - Spread spectrum techniques
   - Multi-carrier communication system
2. Analyze numerical and analytical problems critically for conducting research in the field of Digital Communication Systems.
3. Solve engineering problems and arrive at optimal solutions pertaining to digital communications.
4. Apply appropriate techniques to complex engineering activities in the field of signal processing and communications.

DETAILED SYLLABUS:
UNIT I– CHARACTERIZATION OF COMMUNICATION SIGNALS AND SYSTEMS (10 periods)
Representation of Band Pass Signals and Systems–Representation of Band Pass Signals, Representation of Linear Band-Pass System, Response of a Band-Pass System to a Band-Pass Signal. Signal Space Representations – Vector Space Concepts, Signal Space Concepts, Orthogonal Expansion of Signals. Representation of Digitally Modulated Signals – Memory Less Modulation Methods – PAM Signals, Phase Modulated Signals, QAM Signals, Multidimensional Signals, Orthogonal Multidimensional Signals. Spectral Characteristics of Digitally Modulated Signals – Power Spectra of Linearly Modulated Signals.
UNIT II – DIGITAL MODULATION TECHNIQUES (11 periods)
Digital Modulation – Factors that Influence the Choice of Digital Modulation, Bandwidth and Power Spectral Density of Digital Signals. Linear Modulation Techniques – BPSK, DPSK, QPSK, OQPSK, Π/4 QPSK. Constant Envelope Modulation Techniques – MSK, GMSK, Combined Linear and Constant Envelope Modulation Techniques – M-ary PSK, M- ary QAM.
UNIT III – OPTIMUM RECEIVERS FOR THE ADDITIVE GAUSSIAN NOISE CHANNEL (10 periods)
Optimum Receiver for Signals corrupted by AWGN –Correlation demodulator, Matched Filter Demodulator, Optimum Detector. Performance of the Optimum Receiver for Memory Less Modulation – Probability of Error for Binary Modulation, M-ary Orthogonal Signals, M-ary PAM, M-ary PSK, QAM. Optimum Receiver for Signals with Random Phase in AWGN Channel – Optimum Receiver for Binary Signals, Optimum Receiver for M-ary Orthogonal Signals.
UNIT IV – SPREAD SPECTRUM TECHNIQUES (13 periods)
Introduction, Model of Spread Spectrum Digital Communication System, Direct Sequence Spread Spectrum Signals – Introduction, The Processing Gain and Jamming Margin. Applications of Direct Sequence Spread Spectrum Signals – Anti jamming Application, Low-Detectability Signal Transmission, Code Division Multiple Access. Generation of PN-Sequences, Frequency-Hopped Spread Spectrum Signals, Other Types of Spread Spectrum Signals. Detection of spread spectrum signals- Matched filter receiver, RAKE Receiver.
UNIT V –MULTICHANNEL AND MULTICARRIER SYSTEMS (10periods)
Rayleigh and Rician channels, Multichannel Digital Communications in AWGN Channels; Binary Signals, M-ary Orthogonal Signals. Multicarrier Communications; Single Carrier verses Multicarrier Modulation, Capacity of a Non ideal Linear Filter Channel, OFDM, Modulation & Demodulation in an OFDM, An FFT Algorithm Implementation of an OFDM System. OFDMA. **Total Periods: 54**

TEXT BOOKS:

1. John G. Proakis, "Digital Communications", McGraw-Hill, 4th edition, 2001.
2. Theodore S. Rappaport, "Wireless Communications", Pearson Education, 2nd edition, 2002.
3. George R. Cooper & Clare D. McGillem, "Modern Communication and Spread Spectrum", McGraw-Hill Book Company, 1986.

REFERENCE BOOKS:

1. Marvin K. Simon, Jim K Omura, Robert A. Scholtz& Barry K.Levit, "Spread Spectrum Communications", McGraw-Hill, 1st edition,1995.
2. J.Marvin, K.Simon, Sami. M.Hinedi and William C. Lindsey, "Digital Communication Techniques", PHI, 2009.

M. Tech. - I Semester
(16MT13803) DIGITAL SYSTEM DESIGN AND TESTING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:
A Course on Switching Theory and Logic Design at UG Level.
COURSE DESCRIPTION:
Design of digital systems using ROMs, PLAs, CPLDs and FPGAs; Fault diagnosis in combinational and sequential circuits; Fault modeling in programmable logic array.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Demonstrate in-depth knowledge in
   - Identifying various Faults in combinational and sequential circuits
   - Test generation algorithms
   - Programmable Logic Devices (PLDs)
   - BIST
2. Analyze complex engineering problems critically for conducting research in the field of digital system design.
3. Design of complex digital systems in combinational and sequential modes.
4. Conceptualize and solve engineering problems to obtain solutions for the design of digital machines.
5. Initiate research in digital system design and testing.
6. Apply appropriate techniques to complex engineering activities in the design of digital systems.
7. Contribute positively to multidisciplinary scientific research in design and development of Fault Diagnosis well suited for wide range of applications.

DETAILED SYLLABUS:
UNIT - I: DESIGN OF DIGITAL SYSTEMS (Periods:11)
ASM charts, Hardware description language and control sequence method, Reduction of state tables, state assignments, Design of Iterative circuits, Design of sequential circuits using ROMs, PLAs, CPLDs and FPGAs.
UNIT - II: FAULT MODELING & TEST PATTERN GENERATION (Periods:15)
Fault classes and models – Stuck at faults, bridging faults, transition and intermittent faults. Fault diagnosis of Combinational circuits by conventional methods – Path Sensitization technique, Boolean difference method, Kohavi algorithm, D - algorithm, PODEM, Random testing, transition count testing, Signature Analysis and testing for bridging faults.
UNIT - III: FAULT DIAGNOSIS IN SEQUENTIAL CIRCUITS (Periods:11)
Introduction to BIST (Built-In Self Test) concepts, Circuit Test Approach, Transition Check Approach - State identification and fault detection experiment, Machine identification, Design of fault detection experiment.
UNIT - IV: PLA MINIMIZATION AND TESTING (Periods:10)
PLA minimization-PLA folding. Fault model in PLA, Test generation and Testable PLA design.
UNIT - V: ASYNCHRONOUS SEQUENTIAL MACHINES (Periods:08)
Fundamental-mode model, The flow table, Reduction of incompletely specified Machines, races, cycles and hazards.

Total periods:55

TEXT BOOKS:

1. Charles H. Roth, Jr., "Fundamentals of Logic Design ", Cengage Learning, 5th edition, 2004.
2. N. N. Biswas, "Logic Design Theory", PHI, 1993.
3. Miron Abramovici, Melvin Breuer, Arthur Friedman, "Digital Systems Testing and Testable Design", Jaico Publishing House, 2001.

REFRENCE BOOKS:

1. Samuel C. Lee," Digital Circuits and Logic Design, PHI, 1976.
2. Norman Balabanian, Bradley Carlson, "Digital Logic Design Principles", John Wily & Sons, Inc., 2002.
3. Parag K. Lala," Fault Tolerant and Fault Testable Hardware Design", BS Publications, 1990.

M. Tech. - I Semester
(16MT13804) IMAGE & VIDEO PROCESSING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:
A Course on Digital Communications & Digital Signal Processing at UG Level

COURSE DESCRIPTION:
Image Fundamentals and its transforms; image enhancement techniques; Image compression, Image Restoration & Image Segmentation; Video Processing basics like Representation, Sampling, Motion estimation, Filtering and Compression.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Gain in-depth knowledge in
   - Image Transforms
   - Image Enhancement & Restoration Techniques
   - Image Segmentation & Compression Techniques
   - Video Processing
2. Analyze complex engineering problems critically in the domain of Image Processing for conducting research.
3. Solve engineering problems for feasible and optimal solutions in the core area of Image Processing.
4. Initiate research in image and video processing.
5. Apply appropriate tools and techniques to complex engineering activities in the field of Image Processing.
6. Contribute positively to multidisciplinary scientific research in Image Processing.

DETAILED SYLLABUS

UNIT I: FUNDAMENTALS OF IMAGE PROCESSING AND IMAGE TRANSFORMS: (10 Periods)
Fundamental steps in Image Processing, Gray scale and color Images, image sampling and quantization, **2-D Transforms:** DFT, Walsh, Hadamard, Haar, KLT, DCT.

UNIT II: IMAGE ENHANCEMENT & RESTORATION: (10 Periods)
Enhancement: Intensity transformation functions, Filters in spatial and frequency domains, histogram processing, homomorphic filtering.
Restoration: Image Degradation Model, Restoration in presence of noise only- spatial filtering, inverse filtering, Wiener filtering and Constrained least squares filtering.

UNIT III: IMAGE COMPRESSION & IMAGE SEGMENTATION: (13 Periods)
Image compression fundamentals -Redundancies, Compression models: Lossy & Lossless, Arithmetic coding, Bit plane coding, Run length coding, symbol based coding, Transform coding, fidelity criteria.
Segmentation: Fundamentals, Point, line and edge detection, Thresholding, Region based segmentation.

UNIT IV: VIDEO PROCESSING - I (11 Periods)
Analog Video, Digital Video. Time-Varying Image Formation models: Three-Dimensional Motion Models, Geometric Image Formation, Photometric Image Formation, Sampling for Analog and Digital Video, Two-Dimensional Rectangular Sampling, Two-Dimensional Periodic Sampling, Sampling on 3-D Structures, Reconstruction from Samples.

UNIT V: VIDEO PROCESSING -II (10 Periods)
Motion Estimation: 2-D Motion vs. Apparent Motion, 2-D Motion Estimation, Methods Using the Optical Flow Equation. Video filtering: motion compensated filtering, noise filtering, restoration, video compression standards.

Total periods: 54

TEXT BOOKS:

1. Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing, Pearson Education, 3rd edition, 2008.
2. A. Murat Tekalp, Digital Video Processing, Prentice-Hall, 1995.

REFERENCE BOOKS:

1. R. C. Gonzalez, R. E. Woods, Digital Image Processing, Pearson Education, 2nd edition, 2002.
2. Anil K. Jain, 'Fundamentals of Digital Image Processing', Pearson Education, Inc., 2002.

M. Tech. - I Semester
(16MT13805) MODERN DIGITAL SIGNAL PROCESSING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITE: Courses on Digital Signal Processing at UG level.
COURSE DESCRIPTION: Design of digital filter banks; Power spectral estimation; Principles of adaptive filters; Algorithms for error minimization.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Demonstrate in-depth knowledge in
   - Filter banks and Wavelets
   - Efficient power Spectral Estimation Techniques.
   - Characteristics of adaptive systems
   - Searching algorithms such as gradient and steepest descent
   - Adaptive algorithms like LMS, RLS and Kalman filtering
   - Non-linear adaptive filtering
2. Analyze complex engineering problems critically in digital filter design and the domain of adaptive filtering for conducting research.
3. Design Various Digital Filter Banks for using in Communication Systems.
4. Solve engineering problems for feasible and optimal solutions in the core areas of Multirate signal processing and Adaptive signal processing.
5. Initiate research in modern digital signal processing.
6. Applying Various Techniques related to the Linear Optimum Filters and understand their design considerations
7. Contribute positively to scientific research in signal processing, applications towards society, antennas and spectral analysis.

DETAILED SYLLABUS
UNIT-I: MULTIRATE FILTER BANKS (Periods:12)
Decimation, Interpolation, Sampling rate conversion by a rational factor I/D, Multistage Implementation of sampling rate conversion. Digital Filter Banks: Two-Channel Quadrature-Mirror Filter Bank, Elimination of aliasing, condition for Perfect Reconstruction, Polyphase form of QMF bank, Linear phase FIR QMF bank, IIR QMF bank, Perfect Reconstruction Two-Channel FIR QMF Bank .
UNIT-II: POWER SPECTRAL ESTIMATIONS (Periods:10)
Estimation of spectra from finite duration observation of signals, Non Parametric Methods: Bartlett, Welch, Blackmann & Tukey methods. Performance Characteristics of Nonparametric Power Spectrum Estimators, Parametric Methods: Relation between auto correlation & model parameters, Yule-Walker & Burg Methods, MA & ARMA models for power spectrum estimation.
UNIT III: DEVELOPMENT OF ADAPTIVE FILTER THEORY & SEARCHING THE PERFORMANCE SURFACE (Periods:10)
Introduction to Filtering, Smoothing and Prediction, Linear Optimum Filtering, Problem statement, Principle of Orthogonality - Minimum Mean Square Error, Wiener- Hopf equations, Error Performance - Minimum Mean Square Error
Searching the Performance Surface: Methods & Ideas of Gradient Search methods, Gradient Searching Algorithm & its Solution, Stability & Rate of convergence - Learning Curves.
UNIT IV: STEEPEST DESCENT ALGORITHMS, LMS ALGORITHM & APPLICATIONS (Periods:10)
Gradient Search by Newton's Method, Method of Steepest Descent, Comparison of Learning Curves.
LMS Algorithm: Overview - LMS Adaptation algorithms, Stability & Performance analysis of LMS Algorithms - LMS Gradient & Stochastic Algorithms, Convergence of LMS algorithm.
Applications: Noise cancellation, Cancellation of Echoes in long distance telephone circuits, Adaptive Beam forming.
UNIT V: RLS ALGORITHM AND KALMAN FILTERING (Periods:14)
RLS Algorithm : Matrix Inversion lemma, Exponentially weighted recursive least square algorithm, update recursion for the sum of weighted error squares, convergence analysis of RLS Algorithm, Application of RLS algorithm on Adaptive Equalization.
Kalman Filtering: Introduction, Recursive Mean Square Estimation Random variables, Statement of Kalman filtering problem, The Innovations Process, estimation of the state using the Innovations Process, Filtering, Initial conditions, Variants of the Kalman Filter. **Total periods: 56**

TEXT BOOKS:

1. John G. Proakis, Dimitris G. Manolakis, Digital signal processing, Principles, Algorithms and applications, Prentice Hall, 4th edition, 2007.
2. Simon Haykin, Adaptive Filter Theory, PE Asia, 4th edition, 2002.

REFERENCE BOOKS:

1. Bernard Widrow, Samuel D. Strearns, Adaptive Signal Processing, PE, 1985.
2. Emmanuel C Ifeacher Barrie. W. Jervis, "DSP - A Practical Approach", Pearson Education, 2nd edition, 2002.

M. Tech. I-Semester
(16MT20501) ADVANCED COMPUTER ARCHITECTURE
(PE-I)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: *A course on* "Computer Organization".

COURSE DESCRIPTION

Quantitative design and analysis, memory hierarchy design; parallel computer models and network properties; pipelining, superscalar techniques, multiprocessors and multi computers; Multi-Vector, SIMD and Multi-Core computers

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Acquire knowledge of:
   - Computational models and Computer Architectures.
   - Concepts of parallel computer models.
   - Scalable Architectures.
   - Pipelining, Superscalar processors, multiprocessors, SIMD and Multi core Computers.
2. Analyze architectures of parallel computers, sub systems and their interconnection structures.
3. Apply concepts and techniques of advanced computer architectures to solve engineering problems.
4. Conduct investigations, apply appropriate techniques to analyze and interpret data to gain advanced knowledge and solve new problems.

DETAILED SYLLABUS:

UNIT-I: FUNDAMENTALS OF QUANTITATIVE DESIGN AND ANALYSIS, MEMORY HIERARCHY DESIGN (Periods:10)

Fundamentals of Quantitative Design and Analysis: Introduction, Classes of computers, Defining Computer Architecture, Trends in technology, Trends in power and energy in ICs, Trends in cost, Dependability, Quantitative Principles of Computer Design.

Memory Hierarchy Design: Introduction, Advanced optimizations of cache performance, Memory technology and optimizations

UNIT-II: PARALLEL COMPUTER MODELS AND NETWORKS PROPERTIES (Periods:10)

Parallel Computer Models: The state of computing, Multiprocessors and multi-computers, Multi vector and SIMD computers~~,~~

P**rogram and Networks Properties:** Conditions of Parallelism, Program partitioning and scheduling, Program flow mechanisms, System interconnect architectures.

Examples: Detection of Parallelism in a program using Bernstein's conditions.

UNIT-III: PRINCIPLES OF SCALABLE PERFORMANCE AND MEMORY (Periods:12)

Principles of Scalable Performance: Performance metrics and measures, Parallel Processing applications, Speedup performance laws.

Bus, Cache and Shared memory: Bus systems, Cache memory organizations, Shared memory organizations.

UNIT-IV: PIPELINING, MULTIPROCESSORS AND MULTICOMPUTERS (Periods: 12)

Pipelining: Linear pipeline processors, nonlinear pipeline processors, Instruction pipeline design, Arithmetic pipeline design.

Multiprocessors and Multi-computers: Multiprocessor system interconnects, Cache Coherence and synchronization mechanisms.

UNIT-V: MULTI-VECTOR AND SIMD COMPUTERS, MULTI-CORE COMPUTERS (Periods: 10)

Multi-Vector and SIMD computers: Vector processing principles, Multi-vector multiprocessors, SIMD computer organizations, The Evolution of Dataflow computers

Computer Architecture of Warehouse–Scale Computers

Multi-Core computers: Multi-core organization.

Example Architectures: Intel x86 Multi core Organization **Total Periods: 54**

TEXT BOOKS:

1. Kai Hwang and Naresh Jotwani, "*Advanced Computer Architecture,*" McGraw-Hill, New Delhi, 2nd edition, 2011.
2. John L. Hennessy and David A. Patterson, "*Computer Architecture-A Quantitative Approach,*" Elsevier, 5th edition, 2012

REFERENCE BOOKS:

1. William Stallings, "*Computer Organization and Architecture-Designing for performance,*" Pearson Education, 9th edition, 2014.
2. Kai Hwang "*Advanced Computer Architecture,*" Tata McGraw-Hill, New Delhi, 1st edition, 2001.

M. Tech. -I Semester
(16MT12541) SOFT COMPUTING TECHNIQUES
(PE-I)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: --
COURSE DESCRIPTION: Artificial neural network; fuzzy logic; Genetic algorithms and Soft Computing.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
1. Demonstrate in-depth knowledge on :
   - Neural networks and fuzzy logic
   - Genetic algorithms
   - Soft Computing techniques
2. Analyze numerical and analytical problems critically to design fuzzy neural networks.
3. Demonstrate problem solving skills in designing efficient Fuzzy Algorithms.
4. Apply appropriate Genetic techniques to solve problems in the field of soft computing

DETAILED SYLLABUS:
UNIT I INTRODUCTION (Periods: 12)
Artificial neural network: Introduction, characteristics- learning methods – taxonomy – Evolution of neural networks- basic models - important technologies - applications. Fuzzy logic: Introduction - crisp sets- fuzzy sets - crisp relations and fuzzy relations: Cartesian product of relation - classical relation, fuzzy relations, tolerance and equivalence relations, non-iterative fuzzy sets. Genetic algorithm- Introduction - biological background - traditional optimization and search techniques - Genetic basic concepts.
UNIT II NEURAL NETWORKS (Periods:12)
McCulloch-Pitts neuron - linear separability - hebb network - supervised learning network: perceptron networks - adaptive linear neuron, multiple adaptive linear neuron, BPN, RBF, TDNN- associative memory network: auto-associative memory network, hetero-associative memory network, BAM, hopfield networks, iterative auto associative memory network & iterative associative memory network – unsupervised learning networks: Kohonen self organizing feature maps, LVQ – CP networks, ART network.
UNIT III FUZZY LOGIC (Periods: 10)
Membership functions: Features, fuzzification, methods of membership value assignments Defuzzification: lambda cuts - methods - fuzzy arithmetic and fuzzy measures: fuzzy arithmetic - extension principle - fuzzy measures - measures of fuzziness -fuzzy integrals - fuzzy rule base and approximate reasoning : truth values and tables, fuzzy propositions, formation of rules-decomposition of rules, aggregation of fuzzy rules, fuzzy reasoning-fuzzy inference systems-overview of fuzzy expert system-fuzzy decision making.
UNIT IV GENETIC ALGORITHM (Periods: 10)
Genetic algorithm and search space - general genetic algorithm – operators - Generational cycle - stopping condition – constraints - classification - genetic programming – multi level optimization – real life problem- advances in GA
UNIT V HYBRID SOFT COMPUTING TECHNIQUES & APPLICATIONS (Periods: 10)
Neuro-fuzzy hybrid systems - genetic neuro hybrid systems - genetic fuzzy hybrid and fuzzy genetic hybrid systems - simplified fuzzy ARTMAP - Applications: A fusion approach of multispectral images with SAR, optimization of traveling salesman problem using genetic algorithm approach, soft computing based hybrid fuzzy controllers.
TEXT BOOKS:
1. J.S.R.Jang, C.T. Sun and E.Mizutani, "*Neuro-Fuzzy and Soft Computing*", PHI / Pearson Education, 2004.
2. S.N.Sivanandam and S.N.Deepa, "*Principles of Soft Computing*", Wiley India Pvt Ltd, 2011.

REFERENCE BOOKS:
1. S.Rajasekaran and G.A.Vijayalakshmi Pai, "*Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis & Applications*", Prentice-Hall of India Pvt. Ltd., 2006.
2. George J. Klir, Ute St. Clair, Bo Yuan, "*Fuzzy Set Theory: Foundations and Applications*" Prentice Hall, 1997.
3. David E. Goldberg, "*Genetic Algorithm in Search Optimization and Machine Learning*" Pearson Education India, 2013.

M. Tech. I-Semester
(16MT13806) ASIC DESIGN
(PE-I)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:
A Course on VLSI Design at UG Level.
COURSE DESCRIPTION:
ASIC design categories; Design Libraries; Design Entry; Logic Synthesis; Simulation; Testing; Physical design flow of ASIC.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
1. Gain in-depth knowledge in
   - ASIC Design Styles.
   - ASICs Design Libraries.
   - ASICs Design Issues.
   - ASIC Construction.
2. Analyze problems critically in the field of ASIC Design.
3. Design Application Specific ICs for use in various systems.
4. Solve engineering problems and arrive at optimal solutions in pertaining to ASIC Design.
5. Initiate research in ASIC Design.
6. Apply appropriate techniques, resources and tools to engineering activities to provide appropriate Solution for the development of ASICs.
7. Contribute to multidisciplinary scientific work in the field of ASIC Design.

DETAILED SYLLABUS:
UNIT-I: INTRODUCTION TO ASICs (Periods: 10)
Types of ASICs- Full-Custom ASICs, Semicustom ASICs, Standard cell based ASICs, Gate- array based ASICs, Channeled Gate Array, Channel less Gate Array, Structured Gate Array, Programmable Logic Devices, Field-Programmable Gate Arrays, ASIC Design Flow, ASIC Cell Libraries.
UNIT-II: ASIC LIBRARY DESIGN & PROGRAMMABLE ASICs (Periods: 10)
ASIC LIBRARY DESIGN: Transistors as Resistors, Transistor Parasitic Capacitance, Logical Effort, Library cell design, Library Architecture, Gate-Array Design, Standard-Cell Design, Data path-Cell Design.
PROGRAMMABLE ASICs: Anti fuse, Static RAM, EPROM and EEPROM technology, Practical Issues, Specifications.
UNIT-III: LOW-LEVEL DESIGN ENTRY & LOGIC SYNTHESIS (Periods: 12)
LOW-LEVEL DESIGN ENTRY: Schematic Entry, Hierarchical design, The cell library, Names, Schematic Icons & Symbols, Nets, Schematic Entry for ASICs, Connections, Vectored instances and Buses, Edit-in-place, Attributes, Net list Screener, Back-Annotation.
LOGIC SYNTHESIS: A Logic-Synthesis Example**,** Verilog and Logic Synthesis, VHDL and Logic Synthesis, Finite-State Machine Synthesis, Memory Synthesis.
UNIT-IV: SIMULATION, TESTING & ASIC CONSTRUCTION (Periods: 13)
SIMULATION AND TESTING: Types of Simulation -Structural Simulation, Gate-Level Simulation, Static Timing Analysis, Formal Verification, Switch-Level Simulation, Transistor-Level Simulation, Boundary Scan Test, Faults, Fault simulation, Automatic Test-Pattern Generation.
ASIC CONSTRUCTION: Physical Design, System Partitioning, FPGA Partitioning, Partitioning Methods.
UNIT-V: FLOOR PLANNING, PLACEMENT & ROUTING (Periods: 10)
FLOOR PLANNING AND PLACEMENT: Floor planning, Placement, Physical Design Flow,
ROUTING: Global Routing, Detailed Routing, Special Routing, Circuit Extraction and DRC.
Total Periods: 55

TEXT BOOKS:
1. Micheal John Sebastian Smith, “Application - Specific Integrated Circuits”, Addison Wesley Professional, 1997.
2. L. J. Herbst, “Integrated circuit engineering”, Oxford University Press, 1996.

REFERENCE BOOKS:
1. Neil H.E. Weste, Kamran Eshraghian, “Principles of CMOS VLSI Design: A Systems Perspective”, Addison – Wesley Publication Company, 2nd Edition, 1999.
2. John P. Uyemura, “Introduction to VLSI Circuits and Systems”, Wiley, 1st Illustrated Edition, 2002.

M. Tech. - I Semester
(16MT13807)TRANSFORM TECHNIQUES
(Common to DECS & CMS)
(PE-I)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:
Course on Signal Processing at UG Level.
COURSE DESCRIPTION:
Continuous Wavelet Transforms; Discrete Wavelet Transforms; Multi Resolution Analysis; Wavelet packets; Applications of Wavelet Transforms.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Gain in-depth knowledge in
   - Multiresolution Analysis
   - Continuous wavelets
   - Discrete wavelets and Filter design.
   - Alternative Wavelets & Wavelet packets
2. Analyze complex engineering problems critically in the area of Signal Processing and communications.
3. Design, conduct experiments, analyze and interpret complex engineering problems and apply appropriate research methodologies for conducting research in Signal Processing.
4. Solve engineering problems with wide range of solutions in the areas of Biomedical Signal Processing, Image Processing, Radar Signal Processing and Communications and arrive at optimum solutions.
5. Initiate research in Transform Techniques.
6. Use appropriate techniques, resources and tools to engineering activities in the fields of Signal Processing and Communications.
7. Contribute to collaborative multidisciplinary scientific work/research by initiating research work on Data compression, Noise reduction, Communications, Image and signal Processing.

DETAILED SYLLABUS
UNIT –I: (14 Periods)
Review of Transforms:
Fourier series and Geometry- Vector space, functions and function spaces. Fourier transform, short-time Fourier transform, Walsh, Hadamard, Haar, Slant, KLT, Hilbert transforms.
Continuous Wavelet Transform:
Introduction, Continuous-Time Wavelets, Definition of the CWT, The CWT as a correlation, Constant Q-Factor Filtering Interpretation and Time-Frequency Resolution, The CWT as an operator, Inverse CWT.
UNIT –II: DISCRETE WAVELET TRANSFORM AND ORTHOGONAL WAVELET DECOMPOSITION (08 Periods)
Introduction, Approximations of vectors in nested linear vector spaces, Example of an MRA-Bases for the Approximation Subspaces and Harr Scaling Function, Bases for the Detail Subspaces and Harr Wavelet, Digital Filter Implementation of the Harr Wavelet Decomposition.
UNIT –III: MRA ORTHONORMAL WAVELETS, AND THEIR RELATIONSHIP TO FILTER BANKS (12 Periods)
Introduction, Formal Definition of an MRA, Construction of a General Orthonormal MRA, A Wavelet basis for MRA, Digital Filtering Interpretation, Examples of Orthogonal Basis Generating Wavelets, Interpreting Orthonormal MRAs for Discrete time signals, Miscellaneous issues Related to PRQMF Filter Banks, Generating Scaling Functions and Wavelets from Filter Coefficients.
UNIT-IV: ALTERNATIVE WAVELET REPRESENTATIONS (09 Periods)
Bi-orthogonal Wavelet Bases, Filtering Relationship for Bi-orthogonal Filters, Examples of Bi-orthogonal Scaling Functions and Wavelets, Two-Dimensional Wavelets, Non-separable Multidimensional Wavelets, Wavelet Packets.
UNIT–V: APPLICATIONS OF WAVELETS (11 Periods)
Wavelet De-noising, Speckle Removal, Edge Detection and Object Isolation, Image Fusion, Object Detection by Wavelet Transforms of Projections, Communication Applications-Scaling Functions as signaling pulses, Discrete Wavelet Multitone Modulation. **Total Periods: 54**

TEXT BOOKS:

1. Raghuveer M.Rao and Ajit S.Bopardikar, "*Wavelet Transforms-Introduction theory and applications*", Pearson Education, 1998.
2. Soman.K.P, Ramachandran.K.I, Resmi.N.G, "*Insight into Wavelets from theory to Practice*", PHI, 3rd edition, 2010.

REFERENCE BOOKS:

1. R. C. Gonzalez, R. E. Woods, "*Digital Image Processing*," Pearson Education, 2nd edition, 1992.
2. Jaideva C Goswami, Andrew K.Chan, "*Fundamentals of Wavelets-Theory, Algorithms and Applications*", John Wiley and sons, 1999.
3. C.Sidney Burrus, Ramesh A Gopinath and Haitao Guo, "*Introduction to Wavelets and Wavelet Transforms*", Prentice Hall, 1998.

M. Tech. - I Semester
(16MT13831) DIGITAL SYSTEM DESIGN AND TESTING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES:
A Course on Digital Design at UG Level
COURSE DESCRIPTION:
Design and simulation of digital circuits; Implementing digital circuits in FPGAs.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
1. Demonstrate advanced knowledge in
    - Behavioral system modeling: concurrency and event-driven simulation
    - Digital design modeling using various styles (behavioral, structural and dataflow)
    - Designing Combinational and sequential circuits
    - Verifying the Functionality of Designed circuits using function Simulator
    - Checking for critical path time calculation
    - Placement and routing in FPGA
    - Implement digital designs in FPGA device.
2. Conceptualize and solve problems in logic verification and timing calculation of Digital circuits.
3. Undertake projects efficiently in Digital system design to achieve optimization for high device utilization and performance in industrial needs.
4. Contribute to multidisciplinary groups in design and development of digital systems.
5. Create, develop and use modern CAD tools to analyze problems of RTL schematic, Technology schematic, and system implementation.
6. Communicate effectively in verbal and written forms.

LIST OF EXERCISES
PART- I: (Design and Simulation Experiments)
1. Simulation and Verification of Logic Gates.
2. Design and Simulation of Half adder, Serial Binary Adder, MultiPrecession Adder, Carry Look Ahead Adder and Full Adder.
3. Simulation and Verification of Decoder, MUXs, Encoder using all ModelingStyles.
4. Modeling of Flip-Flops with Synchronous and Asynchronous reset.
5. Design and Simulation of Counters- Ring Counter, Johnson Counter, andUp- Down Counter, Ripple Counter.
6. Design of a N- bit Register of Serial-in Serial-out, Serial in Parallel out,Parallel in Serial out and Parallel in Parallel Out.
7. Design of Sequence Detector (Finite State Machine- Mealy and Moore Machines)
8. 4- Bit Multiplier, Divider. (for 4-Bit Operand)
9. Design ALU to Perform – ADD, SUB, AND-OR, 1's and 2's COMPLIMENT, Multiplication, Division.

10. Design of RAM/ROM

PART-II: (Implementation Steps for Experiments in Part-I)
1. Verification of the Functionality of the circuit using function Simulators.
2. Timing Simulator for Critical Path time Calculation.
3. Synthesis of Digital Circuit.
4. Place and Router Techniques for FPGA's like Xilinx, Altera, Cypress, etc.,
5. Implementation of Design using FPGA and CPLD Devices.

Total Time Slots: 14

REQUIRED SOFTWARE TOOLS:
1. Mentor Graphic tools/Cadence tools/ Synopsys's tools.(220 nm Technology and Above)
2. Xilinx ISE 10.1i and above for FPGA/CPLDS.

REFERENCE BOOKS:

1. John F. Wakerly, "Digital Design: Principles and Practices", Prentice Hall, 3rd edition, 2000.
2. Digital System Design Lab Manual.

M.Tech. – I Semester
(16MT13832) IMAGE & VIDEO PROCESSING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PREREQUISITE:
A course on Image & Video Processing
COURSE DESCRIPTION: Fundamentals of images, image transforms, enhancement, restoration, image compression and coding and video processing.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Demonstrate knowledge in
   - Image Transforms
   - Image Enhancement & Restoration Techniques
   - Image Segmentation & Compression Techniques
   - Video Processing
2. Understand various applications of image processing in industry, Medicine, and defense.
3. Solve engineering problems for feasible and optimal solutions in the core area of Image and video Processing.
4. Initiate research in image and video processing.
5. Acquire an appreciation for the Image and video processing issues and techniques and be able to apply these techniques to real world problems.
6. Contribute positively to multidisciplinary scientific research in Image and video Processing.
7. Communicate effectively in verbal and written forms.

List of Exercises

1. Point processing in spatial domain
   a. Negation of an image
   b. Thresholding of an image
   c. Contrast Stretching of an image
2. Geometric transformations.
   a. Image rotation
   b. Scaling
   c. Translation
3. Logical operations on Digital Image
   a. AND
   b. NAND
   c. OR
   d. NOR
   e. NOT
4. Histogram Equalization and Specification
5. Filtering in spatial domain
   a. smoothing
   b. sharpening
6. Filtering in frequency domain
   a. Low pass filter
   b. High pass filter
7. Edge Detection using derivative filter mask
   a. Prewitt
   b. Sobel
   c. Laplacian
8. Image compression using transform techniques.
9. Zooming and shrinking operations on images
10. Morphological operations on images
11. Representation of Digital video: Read, Write, View Videos and conversion of videos in different formats.

12. Video to frame and frame to Video conversion.

Total Time Slots: 12

Required Software Tools:

1. MATLAB with image processing and computer vision tool box

REFERENCE BOOKS:

1. Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing, 3rd edition, Pearson Education, 2008.
2. A. Murat Tekalp, Digital Video Processing, Prentice-Hall, 1995.

M. Tech. – I Semester
(16MT13808) RESEARCH METHODOLOGY
(Common to all M. Tech. Programs)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	-	2	-	-

PREREQUISITES: --

COURSE DESCRIPTION:
Overview of Research, research problem and design, various research designs, data collection methods, statistical methods for research, importance of research reports and its types.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Acquire in-depth knowledge on
   - Research design and conducting research
   - Various data collection methods
   - Statistical methods in research
   - Report writing techniques.
2. Analyze various research design issues for conducting research in core or allied areas.
3. Formulate solutions for engineering problems by conducting research effectively in the core or allied areas.
4. Carryout literature survey and apply research methodologies for the development of scientific/technological knowledge in one or more domains of engineering.
5. Select and Apply appropriate techniques and tools to complex engineering activities in their respective fields.
6. Write effective research reports.
7. Develop attitude for lifelong learning to do research.
8. Develop professional code of conduct and ethics of research.

DETAILED SYLLABUS:

Unit-I: Introduction to Research Methodology (Periods: 5)
Objectives and Motivation of Research, Types of Research, Research Approaches, Research Process, Criteria of good Research, Defining and Formulating the Research Problem, Problem Selection, Necessity of Defining the Problem, Techniques involved in Defining a Problem.

Unit-II: Research Problem Design and Data Collection Methods (Periods: 7)
Features of Good Design, Research Design Concepts, Different Research Designs, Different Methods of Data Collection, Data preparation: Processing Operations, Types of Analysis.

Unit-III: Statistics in Research (Periods: 6)
Review of Statistical Techniques - Mean, Median, Mode, Geometric and Harmonic Mean, Standard Deviation, Measure of Asymmetry, ANOVA, Regression analysis.

Unit-IV: Hypothesis Testing (Periods: 7)
Normal Distribution, Properties of Normal Distribution, Basic Concepts of Testing of Hypothesis, Hypothesis Testing Procedure, Hypothesis Testing: t-Distribution, Chi-Square Test as a Test of Goodness of Fit.

Unit-V: Interpretation and Report Writing (Periods: 3)
Interpretation – Techniques and Precautions, Report Writing – Significance, Stages, Layout, Types of reports, Precautions in Writing Reports.

Total Periods: 28

TEXT BOOK:

1. C.R. Kothari, "*Research Methodology: Methods and Techniques*," New Age International Publishers, New Delhi, 2nd Revised Edition, 2004.

REFERENCE BOOKS:

1. Ranjit Kumar, "*Research Methodology: A step-by-step guide for beginners*," Sage South Asia, 3rd ed., 2011.
2. R. Panneerselvam, "Research Methodology," PHI learning Pvt. Ltd., 2009

M. Tech. -II Semester
(16MT23801) DETECTION AND ESTIMATION OF SIGNALS
(Common to DECS & CMS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:
A Course on Probability and Stochastic Processes at UG Level
COURSE DESCRIPTION:
Decision criteria for single and multiple observations; Estimation techniques; Properties of estimators; parameter Estimation.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
1. Demonstrate advanced knowledge in
    - Different decision criteria
    - Estimation techniques and their properties
    - Selection of a good estimator for the given specifications.
    - Kalman Filter
    - Statistical estimation of parameters
2. Analyze complex engineering problems critically for conducting research in the field of signal detection and estimation.
3. Design optimum filters for solving problems in the field of Communications.
4. Solve engineering problems to obtain solutions for the design of optimum receivers.
5. Initiate research in detection and estimation of signals.
6. Apply appropriate techniques, resources to complex engineering activities in the field of Communications.
7. Contribute to multidisciplinary scientific work in the field of Communications and Radar Systems.

DETAILED SYLLABUS
UNIT– I: Detection Theory (12 Periods)
Binary Decisions: Single observation–Maximum-likelihood decision criterion, Neyman-Pearson criterion, Receiver operating characteristics, Probability-of-error criterion, Bayes risk criterion, Min-max criterion.

UNIT – II: Binary Decisions: Multiple Observations (11 Periods)
Vector observations, the general Gaussian Problem, Waveform Observation in Additive Gaussian Noise, The Integrating Optimum Receiver, Matched Filter Receiver.

UNIT -III: Estimation Theory (12 Periods)
Maximum-likelihood estimation, Bayes estimation criterion - Mean Square Error Criterion, Uniform Cost Function, Absolute-Value Cost Function. Linear minimum-Variance and Least Squares Method, Estimation in the presence of Gaussian noise - Linear observation, Non-linear estimation.

UNIT – IV: Properties of Estimators (**10 Periods)**
Bias, Efficiency, Cramer-Rao bound, Asymptotic properties, Sensitivity and error analysis.

UNIT–V: State Estimation & Statistical Estimation of Parameters (10 periods)
State Estimation: Prediction, Kalman filter, Problem solving.
Statistical Estimation of Parameters: Concept of sufficient statistics, Exponential families of Distributions, Exponential families and Maximum likelihood estimation, uniformly minimum-variance unbiased estimation.

Total periods: 55

TEXT BOOKS:

1. James L.Melsa & David L.Cohn, "Decision and Estimation Theory", McGraw-Hill, 1978.
2. Steven M. Kay, "Statistical Signal Processing Vol. 1: Estimation Theory, Prentice Hall, 1993, Vol. 2: Detection Theory", Prentice Hall Inc., 1998.

REFERENCE BOOKS:

1. Harry L. Van Trees, "Detection, Estimation and Modulation Theory", Part 1, John Wiley & Sons Inc. 1968.
2. Jerry M. Mendel, "Lessons in Estimation Theory for Signal Processing, Communication and Control", Prentice Hall Inc., 1995.
3. Sophocles J.Orfanidis, "Optimum Signal Processing", McGraw-Hill, 2nd edition, 1988.

M. Tech. - II Semester

(16MT23802) EMBEDDED SYSTEM DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:
Courses on Digital Logic Design and Programming using 'C' language at UG Level

COURSE DESCRIPTION: Embedded Hardware Challenges and Choice; Real Time Interfacing; Software Architectures; Programming Concepts and Language support; Operating System Concepts; Development Tools; System Design Concepts.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Demonstrate in-depth knowledge in
    - Embedded Hardware
    - Software Architectures
    - Embedded Programming Languages
    - Embedded Development Tools
    - Operating System concepts
    - Design Techniques
2. Analyze critically and resolve the issues pertaining to the selection of Hardware, Software architecture, Development tools, operating system and system components from the available lot
3. Solve complex engineering problems in embedded domain with societal impact.
4. Contribute positively in designing and developing solutions with embedded Systems with open mindedness, objectivity and rational approach.
5. Initiate research in Embedded system design.
6. Model embedded systems with chosen set of Hardware, development tools with an understanding of their limitations
7. Apply reasoning and demonstrate skills to take up inter disciplinary research in embedded domain

DETAILED SYLLABUS

UNIT- I:An Introduction to Embedded Systems (10 Periods)
Embedded systems-definition, how are they different, Challenges in Embedded Computing System Design. Processor Embedded into a System, Selection Process, Hardware Units and Devices in a System, Exemplary Embedded Systems, Embedded System-On-Chip (SOC) and use of VLSI Circuit Design Technology, Classification of Embedded Systems

UNIT- II (12 Periods)
Processor Architectures, Memory Organization and Real World Interfacing: Advanced Architectures, Processor and Memory Organization, Performance Metrics, Memory-Types, Maps and Addresses. Processor and Memory Selection

Survey of Software Architectures: Round- Robin, Round- Robin with Interrupts, Function-Queue Scheduling, Real-Time Operating System Architectures, Selecting Architecture.

UNIT- III: Programming Concepts and Embedded Programming in C, C++ and JAVA: (11 Periods)
Software Programming in Assembly language (ALP) and in High-Level language 'C', C Program Elements- Header, Source Files and Pre processor Directives, Macros and Functions, Data Types, Data Structures, Modifiers, Statements, Loops and Pointers. Object-Oriented Programming, Embedded Programming in C++, Java

UNIT- IV: Processes and Operating Systems (11 Periods)
Introduction, Multiple Tasks and Processes, Pre-emptive RTOS, Priority Based Scheduling, Inter process Communication Mechanisms, Evaluating OS Performance, Power Management and Optimization for Processes.

UNIT- V (11 Periods)
Embedded Software Development Tools: Host and Target Machines, Linkers/Locators for Embedded Software, Getting Software into the Target System.

System Design Techniques: Introduction, Design Methodologies, Requirement Analysis, Specifications, System Analysis and Architecture Design. **Total Periods: 55**

TEXT BOOKS:

1. Rajkamal, "Embedded systems: Architecture, Programming and Design", TMH, 2nd edition, 2008.
2. Wayne wolf, "Computers as a component: principles of embedded computing system design", Morgan Kaufmann Publishers, 2nd edition, 2008.
3. David E. Simon, "An embedded software primer", Pearson Education, 2008

REFERENCE BOOKS:

1. Arnold S Burger, "Embedded Systems Design: An Introduction to Processes, Tools, and Techniques", Taylor & Francis, 2001.
2. Steve Heath, Butterworth Heinenann, "Embedded systems design: Real world design", Newton mass USA 2002.

M. Tech. - II Semester

(16MT23803) INFORMATION THEORY AND CODING TECHNIQUES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:
A Course on Digital Communications at UG Level

COURSE DESCRIPTION:
Information theory; Channel capacity; Channel coding techniques – Linear block codes, Cyclic codes, Convolutional codes; Reed-Solomon and Turbo codes.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Demonstrate knowledge in
   - Various aspects of source and channel coding techniques
   - Channel capacity
   - Performance evaluation of various source coding techniques
2. Analyze complex engineering problems critically in the domain of information, source encoding.
3. Design encoder, Syndrome circuits to solve complex engineering problems.
4. Conceptualize and Solve engineering problems for feasible and optimal solutions in the core area of information theory and coding techniques.
5. Initiate research in information theory and coding techniques.
6. Contribute positively to multidisciplinary scientific research in communications with objectivity and rational analysis.

DETAILED SYLLABUS

UNIT I: INTRODUCTION (11 periods)

Entropy: Discrete stationary sources, Markov sources, Entropy of a discrete Random variable- Joint, conditional, relative entropy, Mutual Information and conditional mutual information. Chain rules for entropy, relative entropy and mutual information, Differential Entropy- Joint, relative, conditional differential entropy and Mutual information.

Loss less Source coding: Uniquely decodable codes, Instantaneous codes, Kraft's inequality, optimal codes, Huffman code, Shannon's Source Coding Theorem.

UNIT II: CHANNEL CAPACITY (10 periods)

Capacity computation for some simple channels, Channel Coding Theorem, Fano's inequality and the converse to the Coding Theorem, Equality in the converse to the coding theorem, The joint source Channel Coding Theorem, The Gaussian channels- Capacity calculation for Band limited Gaussian channels, Parallel Gaussian Channels, Capacity of channels with colored Gaussian noise.

UNIT III: CHANNEL CODING-1 (09 periods)

Linear Block Codes: Introduction to Linear block codes, Generator Matrix, Systematic Linear Block codes, , Parity Check Matrix, Syndrome testing, Error correction, Decoder Implementation of Linear Block Codes, Error Detecting and correcting capability of Linear Block codes.

UNIT IV: CHANNEL CODING-2 (13periods)

Cyclic Codes: Algebraic Structure of Cyclic Codes, Binary Cyclic Code Properties, Encoding in Systematic Form, Systematic Encoding with an (n - k)-Stage Shift Register, Error Detection with an (n - k)-Stage Shift Register, Well-Known Block Codes-Hamming Codes, Extended Golay Code, BCH Codes.

Convolutional Codes: Convolution Encoding, Convolutional Encoder Representation, Formulation of the Convolutional Decoding Problem, Properties of Convolutional Codes, Sequential Decoding,

UNIT V: CHANNEL CODING-3 (13periods)

Reed-Solomon Codes- Reed-Solomon Error Probability, Finite Fields, Reed-Solomon Encoding, Reed-Solomon Decoding, Interleaving and Concatenated Codes- Block Interleaving, Convolutional Interleaving, Concatenated Codes. Coding and Interleaving Applied to the Compact Disc Digital Audio System- CIRC Encoding, CIRC Decoding. Turbo Codes-Turbo Code Concepts, Encoding with Recursive Systematic Codes, Feedback Decoder, The MAP Decoding Algorithm.

Total periods:56

TEXT BOOKS:

1. Thomas M. Cover and Joy A. Thomas, Elements of Information Theory, John Wiley & Sons, 1st edition, 1999.
2. Bernard sklar, "Digital Communications – Fundamental and Application", Pearson Education, 2nd edition, 2009.

REFERENCE BOOKS:

1. Robert Gallager, Information Theory and Reliable Communication, John Wiley & Sons, 1st edition, 1968.
2. John G. Proakis, "Digital Communications", Mc. Graw Hill Publication, 5th edition, 2008.
3. Shulin and Daniel. Costello, Jr., "Error Control Coding–Fundamentals and Applications", Prentice Hall, 2nd edition, 2002.

M. Tech.- II Semester
(16MT23804) LOW POWER CMOS VLSI DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:
A Course on VLSI Design at UG Level.

COURSE DESCRIPTION:
Needs For Low Power VLSI Chips; Principles Of Low Power Design; Simulation and Probabilistic Analysis of Low Power; Logic and Circuit Analysis; Special Techniques Of Low Power Design, Performance Management of an Architecture or a System.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Demonstrate advanced knowledge in
   - Design of logic Circuits for low power Requirements
   - Power Estimation of Analysis
   - Low power architecture & Systems
   - Low Power Techniques
2. Analyze complex problems critically in the domain of low power CMOS Circuit, effects and issues of devices, for conducting research in VLSI Design.
3. Solve engineering problems with wide range of solutions of low power design challenges, tradeoff between area, speed and power requirements.
4. Apply appropriate research methodologies in Low power CMOS devices of complex engineering activities in the field of VLSI Design.
5. Apply appropriate techniques, Resources and tools in, evaluating electrical properties of low power CMOS devices based on second order effects.
6. Contribute positively to multidisciplinary scientific research work in the design and development of Ultra Low power Integrated Circuits suited for wide range of applications.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO LOW POWER VLSI DESIGN (Periods: 10)

Needs For Low Power VLSI Chips, Charging And Discharging Capacitances Short Circuit Current In CMOS, CMOS Leakage Current, Static Current, Basic Principles Of Low Power Design, Low Power Figure Of Merits.

UNIT-II: (Periods: 10)

Simulation Power Analysis:
Spice Circuit Simulation, Discrete Transistor Modeling And Analysis, Gate Level Logic Simulation, Architecture Level Analysis, Data Correlation Analysis, Monto Carlo Simulation.

Probabilistic Power Analysis:
Random Logic Signals, Probability and frequency, Probabilistic Power Analysis Techniques, Signal Entropy.

UNIT-III: (Periods: 15)

Circuit Analysis:
Transistor and Gate Sizing, Equivalent Pin Ordering, Network Restructuring and Reorganization, Special latches and Flip flops, Low Power Digital Cell Library, Adjustable Device threshold Voltage.

Logic Analysis:
Gate Reorganization, Signal Gating, Logic Encoding, State Machine Encoding, Pre computation Logic.

UNIT-IV: SPECIAL TECHNIQUES (Periods: 10)

Power Reduction in Clock Networks, CMOS Floating Node, Low Power Bus, Delay Balancing, Low Power Techniques for SRAM.

UNIT-V: ARCHITECTURE AND SYSTEM (Periods: 10)

Power And Performance Management, Switching Activity Reduction, Parallel Architecture with Voltage Reduction, Flow Graph Transformation.

Total Periods: 55

TEXT BOOK:

1. Gary Yeap, "Practical Low-Power Digital VLSI Design," Springer Publication, 1998.

REFERENCE BOOK:

1. Kaushik Roy, Sharat Prasad, "Low-Power CMOS VLSI Circuit Design", Wiley Student Edition, 2000.

M. Tech.-II Semester
(16MT23805) WIRELESS COMMUNICATIONS
(Common to DECS & CMS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A Course on Digital Communications at UG Level.

COURSE DESCRIPTION:
Introduction to cellular wireless communication; Radio propagation in mobile atmosphere; Equalization along with Diversity techniques; several access techniques; Introduction to wireless networking; Multicarrier modulation techniques.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:
1. Demonstrate advanced knowledge in
   - Cellular systems and wireless standards
   - Radio wave propagation in wireless environment
   - Equalization and diversity techniques
   - Multiple access techniques and networking
   - Multicarrier modulation
2. Analyze complex engineering problems critically for conducting research in wireless systems.
3. Design a Digital Communication System/ Subsystem for societal needs.
4. Solve engineering problems with wide range of solutions in wireless communications.
5. Apply appropriate techniques to engineering activities in the field of wireless communications.

DETAILED SYLLABUS

UNIT-I: INTRODUCTION TO WIRELESS COMMUNICATION SYSTEMS AND CELLULAR CONCEPT (Periods:11)
Evolution of Mobile Radio Communication Systems, Examples of Wireless Communication Systems, 1G, 2G, 2.5G,3G and 4G Wireless Cellular Networks and Standards, Frequency Reuse Concept, Channel Assignment Strategies, Interference and System Capacity, Trunking and Grade of Service, Improving Coverage and Capacity in Cellular Systems-cell splitting and sectoring. Problem solving.

UNIT – II: MOBILE RADIO PROPAGATION (Periods:11)
Large Scale Path Loss: Introduction, Free Space Propagation Model, Relating Power to Electric field, Propagation Mechanisms – Reflection, Diffraction, and Scattering. Practical Budget Design using Path Loss Models, Outdoor and Indoor Propagation Models. Problem solving.
Small Scale Fading and Multipath: Small Scale Multipath Propagation, Impulse Response Model of a Multipath Channel, Small Scale Multipath Measurements, Parameters of Mobile Channels, Types of Small Scale Fading (all variations*)* Statistical Models– Clarke's Model for Flat Fading, and Jake's Model. Problem solving.

UNIT -III: EQUALIZATION & DIVERSITY TECHNIQUES (Periods:11)
Equalization: Introduction, Survey of Equalization Techniques, Linear and Non-linear Equalizers – Linear Transversal Equalizer, Decision Feedback Equalizer (DFE). Algorithms for Adaptive Equalization – Zero Forcing, LMS, and RLS. Problem solving.
Diversity Techniques: Realization of Independent Fading Paths, Receiver Diversity – System Model, Selection Combining, Threshold Combining, Maximal Ratio Combining, and Equal Gain Combining, Rake receiver. Transmit Diversity–Channel known at Transmitter, Channel unknown at Transmitter – the Alamouti Scheme, analysis.

UNIT–IV: MULTIPLE ACCESS TECHNIQUES & NETWORKING (Periods:11)
Introduction to Multiple Access: FDMA, TDMA, CDMA, SDMA, Packet Radio- Pure ALOHA, Slotted ALOHA, CSMA, and Reservation protocols. Capacity of Cellular Systems- Cellular CDMA. Problem Solving.
Introduction to Wireless Networking: Introduction to Wireless Networks, Differences between Wireless and Fixed Telephone Networks, Development of Wireless Networks, Traffic Routing in Wireless Networks, Wireless Data Services, Common Channel Signaling.

UNIT – V: MULTICARRIER MODULATION (Periods:11)
Data Transmission using Multiple Carriers, Multicarrier Modulation with Overlapping Sub channels, Discrete Implementation of Multicarrier Modulation –
DFT and its properties, The Cyclic Prefix, Orthogonal Frequency Division Multiplexing (OFDM), Matrix Representation of OFDM, Vector Coding. Challenges in Multicarrier Systems. Problem solving.
MIMO and multicarrier modulation: Narrowband MIMO model-parallel decomposition of MIMO channel-MIMO channel capacity-MIMO diversity gain –data transmission using multiple carriers multicarrier modulation with overlapping sub channels-mitigation of subcarrier fading.

Total periods: 55

TEXT BOOKS:

1. T. S. Rappaport, "Wireless Communications, Principles and Practice," Prentice Hall, 2nd edition, 2002.
2. Andrea Goldsmith, "Wireless Communications," Cambridge University Press, 2005.

REFERENCE BOOKS:

1. David Tse, Pramod Viswanath, "Fundamentals of Wireless Communications," Cambridge University Press, 2006.
2. Dr. KamiloFeher, "Wireless Digital Communications," Prentice Hall, 1995.
3. Raj Pandya, "Mobile and Personal Communication Systems and Services," Prentice Hall of India, 2002.
4. William C.Y. Lee, "Wireless and Cellular Telecommunications," McGraw-Hill, 3rd edition, 2006.

M. Tech. -II Semester
(16MT23806) DISPLAY TECHNOLOGIES AND DEVICES
(PE-II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:
A Course on Semiconductor Devices and Circuits at UG Level.

COURSE DESCRIPTION:
Introduction to display optics, Inorganic display technologies; Measurements of display systems; Characteristics of liquid crystal display, thin film transistor, Active matrix LCD and organic LED Displays.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Gain in-depth knowledge in
   - Display Optics
   - Display Technologies
   - Display Measurements.
2. Analyze problems in Measurements of parameters in display systems.
3. Conceptualize and implement various displays to address complex engineering problems for wide range of solutions in different display technologies.
4. Apply appropriate tools, models and technologies to enhance visualization in display Devices.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO DISPLAY OPTICS (Periods: 10)
Light, Modulation of Light, Human vision and perception for display – Performance of the Human Visual system, Red -Green-Blue (RGB) color gamut, chromaticity, energy transfer, energy absorption, optical emission, Luminescence, Photoluminescence(PL), Cathodo-luminescence (CL), Electroluminescence (EL).

UNIT-II: INORGANIC DISPLAY TECHNOLOGY (Periods: 12)
Cathode-ray tube (CRT) display, flat-panel display; field emission display (FED), plasma display panel (PDP), semiconductor light-emitting diode (LED) display Projection Displays, Near-to-Eye Displays.

UNIT-III: DISPLAY MEASUREMENTS (Periods: 10)
Measurement Equipment, Display Measurement System, Photometry, Evaluation Parameters, Photometric Measurements, Photometric Variation, Colorimetry, Operative Characteristics, Colorimetric Measurements, Solid Color Control and Gray Patch Control.

UNIT-IV: LIQUID CRYSTAL Displays AND TFT (Periods: 12)
Liquid Crystal – Liquid Crystal Materials, Liquid Crystal Alignment, Isotropic, Nematic and Smectic phases, Twisted Nematic cell, In-plane switching, Fringe Filed switching.
Thin film transistors (TFT) – Basic Concepts of Crystallized semiconductor Materials, Disordered Semiconductors, TFT Characteristics.

UNIT-V: AMLCD and OLED (Periods: 11)
Active matrix liquid crystal display (AMLCD) - structure of AMLCD, Operating Principles of AMLCD, drive circuit, addressing method, fabrication of AMLCD, Performance characteristics.
Organic light emitting diode (OLED), organic semiconductor, device structure and performance, electrical and optical Characteristics of OLEDs.

Total Periods: 55

TEXT BOOKS:

1. John Wilson and John Hawkes, "Optoelectronics: An Introduction", Prentice Hall, 3rd edition, 1998.
2. Jiun-Haw Lee, david N.Liu, Shin-Tson Wu, "Introduction to Flat Panel Displays", John Wiley & Sons, 2008.
3. Matthew S.brennesholtz, Edward H.stupp, "Projection Displays", John Wiley & Sons, 2008.

REFERENCE BOOKS:

1. Willem den Boer, "Active Matrix Liquid Crystal Displays", Elsevier, 2005.
2. Jan Kalinowski, "Organic Light-Emitting Diodes", Marcel Dekker, 2005.
3. David Armitage, Ian Underwood and ShinTson Wu, "Introduction to Microdisplays", John Wiley & Sons Ltd, 2006.
4. Robert L.Myers, "Display Interfaces: Fundamentals and Standards", John Wiley & sons, 2003.

M. Tech. -II Semester
(16MT23807) OPTICAL COMMUNICATIONS AND NETWORKS
(PE-II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: --

COURSE DESCRIPTION:

Non linear properties of fibers; characteristics of fiber materials; optical cable design and connectors; optical components; modulation and demodulation schemes; error detecting and correcting codes; optical network management and control.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate Knowledge in
   - Linear and Non-linear Characteristics of Optical fiber.
   - Fiber design considerations.
   - Minimization of Losses in Cable design.
   - Understanding the operation of advanced fiber optic components.
   - Modulation and demodulation techniques.
   - Access networks.
   - Network Control and Management.
2. Analyze complex engineering problems critically in the domain of optical communication for conducting research.
3. Design of optical cable and transmission layer in the field of optical Communications.
4. Solve engineering problems related to optical communication to meet societal and industrial needs.
5. Apply appropriate techniques to complex engineering activities in the field of optical communications.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION (Periods:11)

Evolution of fiber types, guiding properties of fibers, cross talk between fibers, coupled modes and mode mixing, dispersion properties of fibers, nonlinear effects of optical fibers- SRS, SBS, intensity dependent refractive index. Characterizations of materials for fibers, fiber preform preparation- Soot deposition, MCVD. Fiber drawing and control, roles of coating and jacketing.

UNIT II: OPTICAL CABLE DESIGN (Periods:10)

Fiber design considerations-Fiber diameter, Cladding thickness, Low and high bit rate systems. Design objectives and cable structures, Fiber splicing- fiber end preparation, single and array splices, measurement of splicing effects. Optical fiber connectors-The role of connectors, Connector alignment techniques.

UNIT-III: FIBER OPTIC COMPONENTS FOR COMMUNICATION AND NETWORKING (Periods:15)

Couplers, Isolators and Circulators, Multiplexers & filters- Bragg Gratings, Fabry-Perot Filters, Mach-Zehnder Interferometers, Arrayed Waveguide Grating, Acousto-Optic Tunable Filter, High Channel Count Multiplexer Architectures. Optical Amplifiers- Erbium Doped Fiber amplifiers, Raman amplifiers, Transmitters- LED, Lasers, Direct and External Modulation, Detectors- Photo detectors. Optical Switches – Large Optical Switches. Wavelength Converters – Optoelectronic Approach, Optical gating.

UNIT-IV: MODULATION AND DEMODULATION (Periods:8)

Signal formats for Modulation, Subcarrier Modulation and Multiplexing, Optical Modulations – Duo binary, Single Side Band and Multilevel Schemes, Demodulation- Ideal and Practical receivers, Bit Error Rates, Coherent Detection, Timing Recovery and Equalization, Reed-Solomon Codes for Error Detection and Correction.

UNIT-V: OPTICAL NETWORKS & MANAGEMENT (Periods:10)

Access Networks - architecture overview, Enhanced HFC, Fiber to the curb (FTTC). Photonic packet switching - OTDM, Synchronization. Deployment considerations - Designing the transmission layer using SDM, TDM, WDM, Unidirectional versus Bidirectional WDM Systems.

Control and Management- Network Management functions, Performance and fault management, Configuration Management, Optical Safety. **Total Periods: 54**

TEXT BOOKS:

1. S. E. Miller, A. G. Chynoweth, "Optical Fiber Telecommunication", 1979.
2. Rajiv Ramaswamy, Kumar N. Sivaranjan and Galen H. Sasaki, "Optical Networks", Elsevier, 3rd edition, 2010.

REFERENCE BOOKS:

1. Govind P. Agarwal "Fiber–Optic Communication Systems", Wiley India, 3rd edition, 2002.
2. Gerd Kaiser, "Optical Fiber Communication", McGraw Hill, 4th edition, 2008.
3. John. M. Senior, "Optical fiber communications: Principles and Practice", Pearson, 3rd edition, 2010

M. Tech. -II Semester
(16MT23808) REAL TIME SYSTEMS
(PE-II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:
Courses on Digital system design, Operating systems and embedded systems.

COURSE DESCRIPTION:
Real time system reference model; Real time scheduling approaches; Fault tolerant real time systems; Real time operating system concepts; Commercial RTOS.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Demonstrate advanced knowledge in
   - Characterizing Real Time Systems
   - Various Scheduling approaches
   - Fault tolerant techniques
   - Real Time Operating System Services
2. Analyze critically various Operating Systems using Contemporary bench marks.
3. Consider trade-offs in Real Time System designing to solve engineering problems to exhibit specific behavior, given a set of performance goals and technology.
4. Familiarize with fault tolerant and scheduling techniques to overcome ever increasing embedded system design complexity combined with reduced time-to-market window to revolutionize embedded system design process.
5. Initiate research in Real Time Systems.
6. Explore tools and derive pseudo code using RTOS, for developing efficient embedded Systems.
7. Carry out multidisciplinary research in designing RTOS based systems.

DETAILED SYLLABUS:

UNIT-I: REAL TIME SYSTEMS (Periods: 10)
Hard Vs Soft Real Time Systems, a Reference Model of Real Time Systems- Processors and Resources, Temporal Parameters of Real Time Workload, Periodic Task Model, Precedence Constraints and Data Dependency. Functional Parameters, Resource Parameters of Jobs and Parameters of Resources, Scheduling hierarchy.

UNIT-II: APPROACHES TO REAL TIME SCHEDULING (Periods: 10)
Clock Driven, Weighted Round Robin, Priority Driven, Dynamic Vs Static Systems, Effective Release Times and Dead Lines, Optimality and Non-optimality of EDF and LST algorithms, Challenges in Validating Timing Constraints in Priority Driven Systems, Offline Vs Online Scheduling.

UNIT-III: (Periods: 12)
Scheduling Real Time Tasks in Multiprocessor and Distributed Systems: Multiprocessor task allocation, Dynamic allocation of tasks, Fault tolerant scheduling of tasks, Clocks in distributed Real Time Systems.

Fault Tolerance Techniques: Introduction, Failures- Causes, Types, Detection. Fault and Error Containment, Redundancy- Hardware, Software, Time. Integrated Failure Handling.

UNIT-IV: OPERATING SYSTEMS (Periods: 12)
Overview- Threads and Tasks, the Kernel. Time Services and Scheduling Mechanisms, Basic Operating System Functions- Communication and Synchronization, Event Notification and Software Interrupt Memory Management, I/O and Networking. Processor Reserves and Resource Kernel, Capabilities of Commercial Real Time Operating Systems.

UNIT-V: COMMERCIAL REAL TIME OPERATING SYSTEMS (Periods: 12)
UNIX as RTOS - non preemptive kernel, Dynamic Priority levels and deficiencies. UNIX based Real Time Operating Systems - Extension to UNIX kernel, Host Target Approach, Preemption Point Approach, Self host systems. Windows as RTOS- features of Windows NT, Shortcomings, Windows NT vs UNIX. POSIX - Open software, Genesis of POSIX, Overview of POSIX, Real Time POSIX standard. Survey of Contemporary Real Time Operating Systems- PSOS, VRTX, VXworks, QNX, µC/OS-II, RT Linux, Lynx, Windows CE. Bench-marking Real Time Systems. **Total Periods: 56**

TEXT BOOKS:

1. Jane W.S. Liu, "Real Time Systems", Pearson Education, 1st edition, April 2000.
2. C. M. Krishna, Kang G Shin, "Real Time Systems", McGraw-Hill Higher education, 1997.
3. Rajib Mall, "Real Time Systems-Theory and Practice", Pearson Education India, 1st edition, Nov.2012.

REFERENCE BOOKS:

1. Phillip A. Laplante and Seppo J. Ovaska, "Real-Time Systems Design and Analysis: Tools for the Practitioner", Wiley-IEEE Press, 4th edition, Nov. 2011.
2. Hermann Kopetz, "Real-Time Systems: Design Principles for Distributed Embedded Applications ", Springer; 2nd edition, 2011.

M. Tech. - II Semester
(16MT23809) SPEECH PROCESSING
(Common to DECS & CMS)
(PE-II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: Courses on Signals & Systems and Digital Signal Processing in UG

COURSE DESCRIPTION:

Acoustic theory of speech production; Models for speech signals and speech processing systems; Mathematical analysis of speech signals - homomorphic and LPC models; Speech and speaker recognition systems.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate in-depth knowledge in
   - Digital model representation of speech signal
   - LPC analysis
   - Homomorphic models
2. Analyze complex engineering problems critically for conducting research in speech signal processing.
3. Solve engineering problems using efficient algorithms for feasible and optimal solutions in Speech signal processing field.
4. Initiate research in speech signal processing.
5. Apply speech and speaker verification techniques to complex engineering activities in the field of speech processing.
6. Contribute to scientific research in Speech and speaker identification and verification systems with objectivity and rational analysis.

DETAILED SYLLABUS:

UNIT-I: DIGITAL MODEL FOR THE SPEECH SIGNAL (Periods:13)

The process of speech production - the mechanism of speech production, acoustic phonetics. The Acoustic theory of speech production- sound propagation, uniform lossless tubes, Effect of losses in the vocal tract, Effect of radiation at the lips, Vocal tract transfer functions for vowels, the effect of nasal coupling, Excitation of sound in the vocal tract. Digital model for speech signals.

UNIT - II : TIME DOMAIN MODELS FOR SPEECH PROCESSING (Periods:10)

Introduction, Window considerations, Short time energy and average magnitude, Short time average zero crossing rate, Speech vs silence discrimination using Average energy and zero crossing, Pitch period estimation using parallel processing approach, The short time autocorrelation function, The short time average magnitude difference function, Pitch period estimation using the autocorrelation function.

UNIT-III: HOMOMORPHIC SPEECH PROCESSING (Periods:09)

Homomorphic systems for convolution – properties of the complex Cepstrum, computational considerations. The complex Cepstrum of speech, pitch detection, formant estimation, Homomorphic vocoder.

UNIT-IV : LINEAR PREDICTIVE CODING OF SPEECH (Periods:12)

Basic principles of linear predictive analysis – Auto correlation method, The covariance method. Computation of the gain for the model, solution of LPC Equations – Cholesky Decomposition solution for the covariance method. Durbin's Recursive solution for the autocorrelation equations. Comparison between methods of solutions of LPC analysis equations. Applications of LPC parameters – Pitch detection using LPC parameters, Formant analysis using LPC parameters.

UNIT-V: SPEECH AND SPEAKER RECOGNITION SYSTEMS (Periods:08)

Speaker recognition system-speaker verification system, speaker identification systems.
Speech recognition system- isolated digit recognition system, continuous digit recognition system, LPC distance measure.

Total periods: 52

TEXT BOOKS:

1. L R Rabiner and SW Schafer, "*Digital processing of speech signal*s", Pearson Education, 2006.
2. LR Rabiner, BH Juang, B Yegnanarayana, "*Fundamentals of Speech Recognition*", Pearson Education, 1993.

REFERENCE BOOKS:

1. Thomas F Quateri, "*Discrete time speech signal processing*", Pearson edition, 2006.
2. Ben Gold & Nelson Morgan, "*Speech & audio signal processing*", wiley, 2006.
3. Douglas O Shaughnessy, "*Speech Communications*", Oxford university press, 2nd edition, 2000.

. Tech. - II SEMESTER
(16MT23831) COMMUNICATIONS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

RE-REQUISITES: Simulation Lab at UG Level

COURSE DESCRIPTION:
Design and simulation of communication systems - QPSK communication system over AWGN channel, Baseband Direct Sequence Spread Spectrum (DS/SS) System; Generation of different density and distribution functions; Generation of maximal and Gold code sequences.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Demonsrate Knowledge in
   - Generation of Maximal and Gold Sequences & verification of their properties.
   - Design of communication system for band limited channels for Zero ISI.
   - Evaluating the performance of QPSK over AWGN Channel and Rayleigh Fading Channels.
   - Simulation of Code matched filter in Spread Spectrum Communication System.
   - Simulation of baseband Direct Sequence Spread Spectrum (DS/SS) System.
   - Performance evaluation of RAKE Receiver over Slow Fading Channel.
   - Simulation of Rayleigh Fading Channel Using Either Clarke's Model or Jake's Model for different Doppler Spreads.
2. Analyze engineering problems for feasible and optimal solutions in the core area of communication.
3. Design of Matched filter for spread spectrum communications.
4. Use MATLAB Toolbox to simulate complex engineering activities in the field of communication.
5. Demonstrate knowledge and understanding of engineering principles to execute the Projects effectively in the field of communications.

LIST OF EXERCISES:

1. Generation of discrete time independent and identically distributed (IID) random processes with different distributions (Bernoulli, Binomial, Geometric, Poisson, Uniform, Gaussian, Exponential, Laplacian, Rayleigh, Rician). (1 time slot)
2. Communication system Design for Band limited Channels: System design for Zero ISI. (2 time slots)
3. Equalization of Multipath Channel using LMS or RLS Algorithms. (1 time slot)
4. Performance Evaluation QPSK communication system over AWGN channel. (1 time slot)
5. Generation of Maximal sequences & Gold codes and verification of their correlation properties. (2 time slots)
6. Design and simulation of code matched filter in spread spectrum communication system. (1 time slot)
7. Design and simulation of baseband Direct Sequence Spread Spectrum (DS/SS) System. (1 time slot)
8. Simulation of Rayleigh Fading Channel Using Either Clarke's Model or Jake's Model for different Doppler Spreads (Ex. 50 Hz and 100 Hz). (2 time slots)
9. Performance Evaluation of RAKE Receiver over Slow Fading Channel. (2 time slots)
10. Performance Evaluation of QPSK System over Rayleigh Fading Channel. (1 time slots)

Total Time Slots: 14

Tools:
Numerical Computing Environments–GNU Octave or MATLAB or any other equivalent tool

REFERENCE BOOKS:

1. W.H. Tranter, K. Sam Shanmugham, T.S. Rappaport, and K.L. Kosbar, *Principles of Communication System Simulation with Wireless Applications,* Pearson, 2004.
2. J.G. Proakis, and M. Salehi, *Contemporary Communication Systems using MATLAB,* Book ware Companion Series, 2006.
3. John G. Proakis, "DIGITAL COMMUNICATIONS", McGraw Hill, 4th edition, 2001.

M. Tech. – II Semester
(16MT23832) EMBEDDED SYSTEMS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES: Digital Logic Design, C-Programming, Embedded System Design Courses at UG Level

COURSEDESCRIPTION: MSP430 Programming; Timers; Interrupts; Parallel and Serial Ports; ADC; SPI; Applications

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Demonstrate knowledge in on-chip resources available in MSP430 Based microcontrollers such as: Parallel Ports, Timers, ADC, Serial ports.
2. Analyze critically various on-chip resources, programming alternatives towards efficient system design.
3. Solve complex engineering problems in embedded domain.
4. Design embedded systems using microcontrollers such as the MSP430.
5. Initiate research in embedded system design.
6. Contribute positively to multidisciplinary scientific research in Embedded domain.
7. Communicate effectively in verbal and written forms.

List of Experiments:

1. Study of MSP430 based Development Environment (1 Slot)
2. Read input from switch and Automatic control/flash LED (software delay)(1 Slot)
3. Digital input and Output using parallel ports (1 Slots)
4. Watchdog timer as interval Timer (1 Slots)
5. Timer Application: Measurement in capture mode and output in continuous mode (2 Slots)
6. Setting real time clock: state machines (1 Slots)
7. Configuring and usage of interrupts (1 Slot)
8. Measurement of frequency (1 slot)
9. Generation of precise frequency (1 Slot)
10. PWM Generator (1 Slot)
11. SPI with USI and USCI (2 Slots)
12. ADC (1 Slot)

Total Time Slots: 14

TEXT BOOK:

1. Chris Nagy, "Embedded Systems Design using the TI MSP430 Series", Embedded Technology Series, Newness Imprint, Elsevier Publications, 2003

REFERENCE BOOK:

1. John Davies, "MSP430 Microcontroller Basics", Newness Imprint, Elsevier Publications, 1st edition, Aug. 2008

M. Tech. -II Semester
(16MT23833) SEMINAR

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
--	100	100	--	--	--	2

PRE-REQUISITES:--

COURSE DESCRIPTION:
Identification of seminar topic; literature survey; preparation of technical report and presentation.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate capacity to identify an advanced topic for seminar in core and allied areas.
2. Extract information pertinent to the topic through literature survey.
3. Comprehend extracted information through analysis and synthesis critically on the topic.
4. Plan, organize, prepare and present effective written and oral technical report on the topic.
5. Adapt to independent and reflective learning for sustainable professional growth in Digital Electronics and Communication Systems.
6. Contribute to multidisciplinary scientific work in the field of Digital Electronics and Communication Systems.
7. Understand ethical responsibility towards environment and society in the field of Digital Electronics and Communication Systems.
8. Engage in lifelong learning for development of technical competence in the field of Digital Electronics and Communication Systems.

M. Tech. – II Semester
(16MT23810) INTELLECTUAL PROPERTY RIGHTS
(Common to all M. Tech. Programs)
(Audit Course)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	-	2	-	-

PRE-REQUISITES: --

COURSE DESCRIPTION:

Introduction to Intellectual Property; Trade Marks; Law of Copy Rights; Law of Patents; Trade Secrets; Unfair Competition; New Development of Intellectual Property.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate in-depth knowledge on
   - Intellectual Property
   - Trade Marks & Secrets
   - Law of Copy Rights, Patents
   - New development of Intellectual Property
2. Analyze the different forms of infringement of intellectual property rights.
3. Solve problems pertaining to Intellectual Property Rights.
4. Stimulate research zeal for patenting of an idea or product.
5. Write effective reports required for filing patents.
6. Develop life-long learning capabilities.
7. Develop awareness of the relevance and impact of IP Law on their academic and professional lives.
8. Develop attitude for reflective learning.

DETAILED SYLLABUS:

UNIT - I: Introduction to Intellectual property (Periods:5)

Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT - II: Trade Marks: (Periods:5)

Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT - III: Law of copy rights: (Periods:6)

Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT - IV: Trade Secrets: (Periods:6)

Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.

Unfair competition: Misappropriation right of publicity, False advertising.

UNIT - V: New development of intellectual property: (Periods:6)

New developments in trade mark law; copy right law, patent law, intellectual property audits.
International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

Total Periods: 28

REFERENCE BOOKS:

1. Deborah, E. Bouchoux, *Intellectual property right*, Cengage learning.
2. Prabuddha ganguli, *Intellectual property right - Unleashing the knowledge economy*, Tata Mc Graw Hill Publishing Company Ltd.

M. Tech. -III & IV Semester
(16MT33831 & 16MT43831) PROJECT WORK

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
200	200	400	-	-	-	28

PRE-REQUISITES:--

COURSE DESCRIPTION:

Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Writing of thesis and presentation.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate capacity to identify an advanced topic for project work in core and allied areas.
2. Extract information pertinent to the topic through literature survey.
3. Comprehend extracted information through analysis and synthesis critically on the topic.
4. Solve engineering problems pertinent to the chosen topic for feasible solutions.
5. Use the techniques, skills and modern engineering tools necessary for project work.
6. Do time and cost analysis on the project.
7. Plan, prepare and present effective written and oral technical report on the topic.
8. Adapt to independent and reflective learning for sustainable professional growth.
9. Contribute to multidisciplinary scientific work in the field of Digital Electronics and Communication Systems
10. Understand ethical responsibility towards environment and society in the field of Digital Electronics and Communication Systems.
11. Engage lifelong learning for development of technical competence in the field of Digital Electronics and Communication Systems.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)

Sree Sainath Nagar, Tirupati – 517 102.

SVEC16 M. Tech. VLSI
Course Structure

I-Semester

S. No.	Course Code	Course Title	Contact Periods per Week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
1.	16MT15701	Analog IC Design	4	-	-	4	4	40	60	100
2.	16MT15702	Computational Methods in Microelectronics	4	-	-	4	4	40	60	100
3.	16MT15703	Device Modeling	4	-	-	4	4	40	60	100
4.	16MT15704	Digital IC Design	4	-	-	4	4	40	60	100
5.	16MT15705	IC Fabrication	4	-	-	4	4	40	60	100
6.	***Professional Elective-1***		4	-	-	4	4	40	60	100
	16MT23808	Real Time Systems								
	16MT15706	Advanced Digital Signal Processing								
	16MT15707	FPGA Architectures and Applications								
	16MT15708	RFIC Design								
7.	16MT15731	Analog IC Design Lab	-	-	4	4	2	50	50	100
8.	16MT15732	Digital IC Design Lab	-	-	4	4	2	50	50	100
		Total:	**24**	**-**	**8**	**32**	**28**	**340**	**460**	**800**
9.	16MT13808	Research Methodology (Audit Course)	-	2	-	2	-	-	-	-

II-Semester

S. No.	Course Code	Course Title	Contact Periods per Week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
1.	16MT25701	Low Power VLSI Design	4	-	-	4	4	40	60	100
2.	16MT25702	Mixed Signal Design	4	-	-	4	4	40	60	100
3.	16MT25703	Nanoelectronics	4	-	-	4	4	40	60	100
4.	16MT25704	Physical Design Automation	4	-	-	4	4	40	60	100
5.	16MT25705	Testing and Testability	4	-	-	4	4	40	60	100
6.	***Professional Elective-2***		4	-	-	4	4	40	60	100
	16MT13806	ASIC Design								
	16MT25707	Co-Design								
	16MT25708	System-on-Chip Design and Verification								
	16MT25709	Wireless Sensor Networks								
7.	16MT25731	Mixed Signal and Physical Design Automation Lab	-	-	4	4	2	50	50	100
8.	16MT25732	Nanoelectronics Lab	-	-	4	4	2	50	50	100
9.	16MT25733	Seminar	-	-	-	-	2	--	100	100
		Total:	**24**	**-**	**8**	**32**	**30**	**340**	**560**	**900**
10.	16MT23810	Intellectual Property Rights (Audit Course)	-	2	-	2	-	-	-	-

III-Semester

S. No.	Course Code	Course Title	Contact Periods per Week				Credits	Scheme of Examination Max. Marks		
			L	T	P*	Total		Internal Marks	External Marks	Total Marks
1.	16MT3MOOC	MOOC	-	-	-	-	-	-	-	-
2.	16MT35731	Project Work – Phase I	-	-	-	-	8	50	50	100
		Total:	**-**	**-**	**-**	**-**	**8**	**50**	**50**	**100**

*Fulltime Project Work

IV-Semester

S. No.	Course Code	Course Title	Contact Periods per Week				Credits	Scheme of Examination Max. Marks		
			L	T	P*	Total		Internal Marks	External Marks	Total Marks
1.	16MT45731	Project Work – Phase II	-	-	-	-	20	150	150	300
		Total:	**-**	**-**	**-**	**-**	**20**	**150**	**150**	**300**
						Grand Total:	**86**	**880**	**1220**	**2100**

*Fulltime Project Work

M. Tech. - I SEMESTER
(16MT15701) ANALOG IC DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITE:

Courses on Semiconductor Devices and Circuits and VLSI design at UG Level.

COURSE DESCRIPTION:

MOS Device physics; Characteristics of amplifiers; Feedback circuits and operational amplifiers; Stability and frequency compensation of operational amplifiers; Nonlinear Analog circuits & other applications

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate in-depth knowledge in
   - Sub threshold and Short Channel effects.
   - Current Mirrors.
   - Frequency response and Noise Characteristics of Amplifier.
   - Effect of Loading in Feedback Circuits.
   - One stage operational Amplifiers.
   - Ring Oscillator.
2. Analyze complex engineering problems critically in the domain of analog IC design for conducting research.
3. Design analog integrated Circuits for societal needs.
4. Develop Skills to solve engineering problems for feasible and optimal solutions in the core area of analog ICs.
5. Initiate research work on Reusable Design for the development of analog IC design.
6. Apply appropriate technique to implement accurate models for devices.

Detailed Syllabus:

Unit-I: Basic MOS Device Physics and Single Stage Amplifiers (Periods: 15)

Basic MOS Device Physics: General Considerations, MOS I/V Characteristics, Second-Order Effects.

Single Stage Amplifiers: Basic Concepts, Common-Source Stage, Source follower, Common Gate Stage, Cascode Stage, Differential Amplifiers-Single Ended and Differential Operation, Basic Differential Pair. Passive and Active Current Mirrors.

Unit-II: Frequency Response and Noise Characteristics of Amplifiers (Periods: 08)

Frequency Response-General Considerations, Common-Source Stage, Source follower, Common Gate Stage, Cascode Stage, Differential pair.

Noise-Statistical Characteristics of Noise, Noise in Single Stage Amplifiers, Noise in Differential Pairs.

Unit-III: Feedback Circuits and Operational Amplifiers (Periods: 12)

Feedback Circuits - General considerations, Feedback Topologies, Effect of Loading, Effect of Feedback on Noise.

Operational Amplifiers - General considerations, One-stage Op Amps, Two - stage Op Amps, Gain Boosting, Input range limitations, slew rate, power supply rejection, Noise in Op Amps.

Unit-IV: Stability & Frequency Compensation and Bandgap References (Periods:10)

Stability & Frequency Compensation: General considerations, Multi pole Systems, Phase Margin, Frequency Compensation, Compensation of Two-Stage Op Amps.

Bandgap References: Supply-Independent Biasing, Temperature-independent References, PTAT Current Generation, Constant - Gm Biasing, Speed and Noise Issues.

Unit-V: Nonlinear Analog circuits & other applications (Periods: 10)

Sampling Switches, Switched-Capacitor Amplifiers, Switched capacitor integrator, Ring oscillators, Simple PLL.

Total Periods: 55

TEXT BOOK:

1. Behzad Razavi, “Design of Analog CMOS Integrated Circuit”, Tata McGraw-Hill, 14th Reprint 2008.

REFERENCE BOOKS:

1. D.A. John & Ken Martin, “Analog Integrated Circuit Design”, John Wiley & Sons, 1997.
2. Philip Allen & Douglas Holberg, “CMOS Analog Circuit Design”, Oxford University Press, 2002.

M. Tech. - I Semester
(16MT15702) COMPUTATIONAL METHODS IN MICROELECTRONICS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:
A Course on Mathematics at UG Level.

COURSE DESCRIPTION:
Linear and Nonlinear Systems modeling; Approximation; Interpolation; Curve Fitting; Numerical Integration; Finite Difference Techniques; Initial Value problems; Energy Methods and Minimization; Finite Element Methods; Dynamic methods; Method of Characteristics; Finite Volume Methods; Grid Generation and Error Estimation; Device and Process Simulation; Layout and Yield estimation algorithms; Symbolic analysis and Synthesis of Analog ICs.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Gain in-depth knowledge in
   - Computation Tools.
   - FDM, FEM, FVM.
   - Grid Generation.
   - Refinement Algorithms.
   - Errors in Meshing.
   - Application to device and process simulation.
2. Analyze the errors of Computational tools and judge independently the best suited Tool for fast Computation of simulation for conducting research in CAD Tools design.
3. Develop skills to solve problems of Meshing, Grid Generation to improve speed and accuracy of CAD Tools.
4. Initiate research work on designing methods to obtain accurate solutions.
5. Apply appropriate techniques, resources and tools to model devices for engineering activities to obtain fast and accurate designs.

DETAILED SYLLABUS:

UNIT I: BASIC COMPUTATION TOOLS (Periods: 15)
Linear systems and matrices – matrix formalities, condition of matrix systems, techniques for matrix solution, mixed boundary condition. Nonlinear Systems – scalar equations, matrix equations. Approximation, interpolation, curve fitting, Numerical Integration.

UNIT II:COMPUTATIONAL TOOLS FOR APPLICATIONS (Periods: 09)
Finite difference techniques, Initial Value problems, Energy Methods and Minimization, finite Element methods, dynamic methods in applied mechanics.

UNIT III: ADVANCED COMPUTATIONAL TOOLS (Periods: 08)
Method of characteristics – classification of partial Differential equations, Investigations in Engineering, Finite volume methods – Direct Analysis.

UNIT IV: GRID GENERATION AND ERROR ESTIMATES (Periods: 12)
Grid generation, Triangulation, errors and mesh Selection, Refinement Algorithms, Mesh Redistribution, Moving Grids.

UNIT V: APPLICATIONS TO DEVICE AND PROCESS SIMULATION (Periods: 11)
Applications to device and process simulation, Layout algorithms, Yield estimation algorithms, Symbolic analysis and Synthesis of Analog ICs.

Total periods: 55

TEXT BOOKS:

1. Herbert Koenig, “Modern Computational methods”, CRC Press, 1988.
2. Graham F. Carey, “Computational Grids: generations, adaptation & Solution Strategies”, CRC Press, 1997.
3. Naveed A. Sherwani, “Algorithms for VLSI Physical Design Automation”, Kluwer Academic Publishers, 1993.

REFERENCE BOOK:

1. L.Pallage, R.Rohrer and C.Visweswaraiah, “Electronic Circuit and System Simulation Methods”, McGraw Hill, 1995.

M. Tech. - I Semester
(16MT15703) DEVICE MODELING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:
A Course on Semiconductor Devices and Circuits at UG Level

COURSE OUTCOMES:
After successful completion of the course, students will be able to:
1. Gain in-depth knowledge in
   - Static and Dynamic Characteristics
   - Threshold Variations
   - Effects of MOS Layers
   - Modeling at low and High Frequencies.
2. Analyze complex engineering problems critically for conducting research in MOS device structures.
3. Solve engineering problems with wide range of solutions in different MOSFET technologies.
4. Initiate research methodologies in Modeling and Simulation of complex engineering activities in the field of VLSI Design at Circuit Level Implementation.
5. Apply appropriate techniques, resources and tools to engineering activities in modeling MOS structures.
6. Contribute positively to multidisciplinary scientific research in design and development of Integrated Circuits suited for wide range of applications.

DETAILED SYLLABUS:

UNIT-I **(Periods: 12)**
Basic Device Physics-I:
Two Terminal MOS Structure: Flat-band voltage, Potential balance & charge balance, Effect of Gate-substrate voltage on surface condition, Inversion, Small signal capacitance; C-V Characteristics.
Three Terminal MOS Structure: Contacting the inversion layer, Body effect, Regions of inversion, Pinch-off voltage.

UNIT-II **(Periods: 14)**
Basic Device Physics-II:
Four Terminal MOS Transistor: Transistor regions of operation, general charge sheet models, regions of inversion in terms of terminal voltage, strong inversion, weak inversion, moderate inversion, interpolation models, effective mobility, temperature effects, breakdown p-channel MOS FET, enhancement and depletion type, model parameter values, model accuracy .

UNIT-III **(Periods: 14)**
MOS Transistor with Ion-Implanted Channels: Enhancement of nMOS, Depletion nMOS, Enhancement pMOS.
Small dimension effects: Channel length modulation, barrier lowering, two dimensional charge sharing and threshold voltage, punch-through, carrier velocity saturation, hot carrier effects, scaling, effects of surface and drain series resistance, effects due to thin oxides and high doping. Sub threshold regions, Short channel effects.

UNIT-IV **(Periods: 07)**
MOS Transistor in Dynamic Operation: Large Signal modeling: Quasi static operation, Terminal currents in Quasi static operation, Evaluation of Charges in Quasi static operation, Transit time under DC conditions, Limitations of Quasi static Model, Non Quasi static Analysis.

UNIT-V **(Periods: 08)**
Small Signal Modeling for Low, Medium And High Frequencies: low, Medium frequency small signal model for the intrinsic part, Small signal model for Extrinsic Part, A complete Quasi static Model, Y-Parameter models, Non Quasi static Models. **Total Periods: 55**

TEXT BOOK:
1. Y. Tsividis, “Operations and Modeling of the MOS Transistor”, Oxford university Press, 3rd edition, 2012.

REFERENCE BOOKS:
1. Trond Ytterdal, Yuhua Cheng and Tor Fjeldly “Device Modeling for Analog and RF CMOS Circuit Design” Wiley Publication, 2003.
2. Donald A Neamen and Dhrubes Biswas “Semiconductor Physics and Devices” Special Indian Edition, 4th edition, 2012.

M. Tech. I - Semester
(16MT15704) DIGITAL IC DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:
A Course on Digital IC Applications and VLSI Design at UG Level.

COURSE DESCRIPTION:
Introduction to MOS transistors; Characteristics of CMOS digital circuits; Transistor sizing; memory design; Design strategies; Design of subsystems.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Gain in-depth knowledge in
   - Static and dynamic characteristics of CMOS.
   - Alternative CMOS Logics
   - Transistor sizing
   - Adders Design
   - Design rules to develop layouts
   - Estimation of Delay and Power
2. Analyze complex engineering problems critically in the domain of CMOS Digital Integrated Circuits for conducting research.
3. Solve engineering problems for feasible and optimal solutions in the core area of CMOS Digital ICs.
4. Initiate research in Digital IC Applications.
5. Apply the Digital CMOS techniques for usage of modern CAD tools and their Limitations.
6. Contribute to multidisciplinary scientific work in the field of modern digital circuits like processor, memory designs.

DETAILED SYLLABUS:

UNIT I – CMOS INVERTER CHARACTERSTICS AND DESIGN STYLES (11 periods)
MOS INVERTERS: Introduction, Definitions and Properties, Static CMOS Inverter, Static and Dynamic Power Dissipation, CMOS inverter delay time definitions and calculations
DESIGNINGCOMBINATIONAL LOGIC GATES in CMOS: Introduction, Static CMOS Design, Dynamic CMOS Design, Domino and NORA logic, Power Consumption in CMOS Gates.

UNIT II – DESIGNING SEQUENTIAL LOGIC GATES in CMOS (12 periods)
Introduction, Static Sequential Circuits, Dynamic Sequential Circuits, Non-Bistable Sequential Circuit, Logic Style for Pipelined Structures.
Timing Issues in Digital Circuits: Introduction, Clock Skew and Sequential Circuit Performance, Clock Generation and Synchronization.

UNIT III – HIGH SPEED NETWORK AND MEMORY DESIGN (11 periods)
Methods of Logical Effort for transistor sizing -Power consumption in CMOS Gates, Low power CMOS design. CMOS Memory design – SRAM, DRAM.

UNIT IV – SUBSYSTEM DESIGN PROCESS (11 periods)
General arrangement of 4-bit Arithmetic Processor, Design of 4-bit shifter, Design of ALU sub-system, Implementing ALU functions with an adder, Multipliers, modified Booth's algorithm.

UNIT V – DESIGN METHODOLOGY AND TOOLS (10 periods)
Introduction, Structured Design Strategies, Design Methods, Design Flows, Design Economics, Data Sheets and Documentation.

Total Periods: 55

TEXT BOOKS:

1. Jan M Rabaey, "Digital Integrated Circuits", Pearson Education, 2nd Edition, 2003.
2. Sung-Mo Kang & Yusuf Leblebici, "CMOS Digital Integrated Circuits" McGraw Hill, 3rd edition, 2003.
3. Kamran Eshranghian, Douglas A. Puknell and Sholeh Eshranghian "Essential of VLSI Circuits and Systems", PHI, 1st edition, 2005.
4. Neil H. E. Weste, David Money Harris, "CMOS VLSI Design-A Circuit and Systems Perspective", Pearson Education, 4th Edition, 2011.

REFERENCE BOOKS:

1. Eugene D. Fabricus, "Introduction to VLSI Design", McGraw-Hill International Edition, 1990.
2. John P. Uyemura, "Introduction to VLSI Circuits and Systems", John Wiley & Sons, 2002.

M. Tech. - I Semester
(16MT15705) IC FABRICATION

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:
A Course on Engineering Physics, Engineering Chemistry, Material Science, VLSI Design at UG Level
COURSE DESCRIPTION:
IC Fabrication process - Crystal growth, Wafer preparation, Epitaxial growth, Oxidation, Lithography, Etching, Deposition, Ion- Implantation, Metallization and Packaging of VLSI devices.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
1. Demonstrate in-depth knowledge in
   - Wafer preparation.
   - Lithography and Etching.
   - Diffusion process.
   - Assembly Techniques and Packaging.
2. Analyze IC fabrication methodologies and evaluate component effects on IC design for VLSI and ULSI domain.
3. Solve engineering problems by proposing potential solutions leading to better IC chip designs.
4. Initiate research in IC fabrication
5. Contribute to multidisciplinary scientific work in the field of Low power IC Fabrication.
6. Apply appropriate techniques to complex engineering activities in the field of VLSI Technology.

DETAILED SYLLABUS
UNIT-I: CRYSTAL GROWTH, WAFER PREPARATION, EPITARY AND OXIDATION (13 Periods)
Clean room and safety requirements, Electronic grade silicon, Czochralski crystal growing, silicon shaping, Vapour phase Epitaxy, Molecular beam epitaxy, Epitaxial Evaluation, Growth mechanism and kinetics, Thin oxides, Oxidation Techniques and systems, Oxide properties, Redistribution of dopants at interface, Oxidation of polysilicon, Oxidation induced effects.
UNIT- II: LITHOGRAPHY AND REACTIVE PLASMA ETCHING (12 Periods)
Mask Making, Optical lithography, Electron lithography, X-ray lithography, Ion lithography, Plasma properties, Feature size control and Anisotropic Etch mechanism, Properties of Etch Processes, Reactive plasma etching Techniques and Equipments, Specific Etch Processes.
UNIT- III: DEPOSITION, DIFFUSION, ION IMPLANTATION (10 Periods)
Deposition process, polysilicon, Plasma Assisted deposition, models of diffusion in solids, Fick's one dimensional diffusion equation, Atomic diffusion mechanism, measurement techniques, Range theory, Implantation equipment, Annealing, Shallow junctions, High Energy Implantation.
UNIT- IV: METALLIZATION (10 Periods)
Metallization applications, Metallization choices, Physical Vapor Deposition, Patterning, Metallization problems, New role of metallization, Metallization systems, sputtering, problems associated with Al – Cu interconnect, Comparison of RC delay of Polysilicon.
UNIT- V: ANALYTICAL, ASSEMBLY TECHNIQUES & PACKAGING OF VLSI DEVICES (10 periods)
Analytical beams, Beams specimen interaction, Chemical methods, package types, packing design considerations, VLSI assembly technology, Package Fabrication Technology.

Total periods: 55

TEXT BOOKS:
1. S. M. Sze "VLSI Technology", Tata McGraw -Hill, 2nd edition, 1988.
2. Sorab. K. Gandhi "VLSI Fabrication and Principles", John Wiley & Sons, 2nd Edition, 1994.

REFERENCES BOOKS:
1. Amar Mukherjee "Introduction to NMOS & CMOS VLSI system Design", Prentice Hall, 1st Edition, 1986.
2. Mccanny and J.C.White "VLSI Technology and design", Academic Press, 1987.
3. Dasgupta "VLSI Technology", Pearson Education Pvt Ltd, 2001.

M.Tech. – I Semester
(16MT23808) REAL TIME SYSTEMS
(PE-I)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:
Courses on Digital system design, Operating systems and embedded systems.

COURSE DESCRIPTION:
Real time system reference model; Real time scheduling approaches; Fault tolerant real time systems; Real time operating system concepts; Commercial RTOS.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Demonstrate advanced knowledge in
   - Characterizing Real Time Systems
   - Various Scheduling approaches
   - Fault tolerant techniques
   - Real Time Operating System Services
2. Analyze critically various Operating Systems using Contemporary bench marks.
3. Consider trade-offs in Real Time System designing to solve engineering problems to exhibit specific behavior, given a set of performance goals and technology.
4. Familiarize with fault tolerant and scheduling techniques to overcome ever increasing embedded system design complexity combined with reduced time-to-market window to revolutionize embedded system design process.
5. Initiate research in Real Time Systems.
6. Explore tools and derive pseudo code using RTOS, for developing efficient embedded Systems.
7. Carry out multidisciplinary research in designing RTOS based systems.

DETAILED SYLLABUS:

UNIT-I: REAL TIME SYSTEMS (Periods: 10)
Hard Vs Soft Real Time Systems, a Reference Model of Real Time Systems- Processors and Resources, Temporal Parameters of Real Time Workload, Periodic Task Model, Precedence Constraints and Data Dependency. Functional Parameters, Resource Parameters of Jobs and Parameters of Resources, Scheduling hierarchy.

UNIT-II: APPROACHES TO REAL TIME SCHEDULING (Periods: 10)
Clock Driven, Weighted Round Robin, Priority Driven, Dynamic Vs Static Systems, Effective Release Times and Dead Lines, Optimality and Non-optimality of EDF and LST algorithms, Challenges in Validating Timing Constraints in Priority Driven Systems, Offline Vs Online Scheduling.

UNIT-III: (Periods: 12)
Scheduling Real Time Tasks in Multiprocessor and Distributed Systems: Multiprocessor task allocation, Dynamic allocation of tasks, Fault tolerant scheduling of tasks, Clocks in distributed Real Time Systems.

Fault Tolerance Techniques: Introduction, Failures- Causes, Types, Detection. Fault and Error Containment, Redundancy- Hardware, Software, Time. Integrated Failure Handling.

UNIT-IV: OPERATING SYSTEMS (Periods: 12)
Overview- Threads and Tasks, the Kernel. Time Services and Scheduling Mechanisms, Basic Operating System Functions- Communication and Synchronization, Event Notification and Software Interrupt Memory Management, I/O and Networking. Processor Reserves and Resource Kernel, Capabilities of Commercial Real Time Operating Systems.

UNIT-V: COMMERCIAL REAL TIME OPERATING SYSTEMS (Periods: 12)
UNIX as RTOS - non preemptive kernel, Dynamic Priority levels and deficiencies. UNIX based Real Time Operating Systems - Extension to UNIX kernel, Host Target Approach, Preemption Point Approach, Self host systems. Windows as RTOS- features of Windows NT, Shortcomings, Windows NT vs UNIX. POSIX - Open software, Genesis of POSIX, Overview of POSIX, Real Time POSIX standard. Survey of Contemporary Real Time Operating Systems- PSOS, VRTX, VXworks, QNX, µC/OS-II, RT Linux, Lynx, Windows CE. Bench-marking Real Time Systems. **Total Periods: 56**

TEXT BOOKS:

1. Jane W.S. Liu, “Real Time Systems”, Pearson Education, 1st edition, April 2000.
2. C. M. Krishna, Kang G Shin, “Real Time Systems”, McGraw-Hill Higher education, 1997.
3. Rajib Mall, “Real Time Systems-Theory and Practice”, Pearson Education India, 1st edition, Nov.2012.

REFERENCE BOOKS:

1. Phillip A. Laplante and Seppo J. Ovaska, “Real-Time Systems Design and Analysis: Tools for the Practitioner”, Wiley-IEEE Press, 4th edition, Nov. 2011.
2. Hermann Kopetz, “Real-Time Systems: Design Principles for Distributed Embedded Applications “, Springer; 2nd edition, 2011.

I M. Tech. – I Semester
(16MT15706) ADVANCED DIGITAL SIGNAL PROCESSING
(Common to VLSI (PE – I) & CMS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: Courses on Digital Signal Processing at UG level

COURSE DESCRIPTION:

Digital filter banks; Parametric and Non-Parametric Power Spectrum Estimation methods; computationally efficient algorithms; Applications of DSP.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Gain in-depth knowledge in
   - Filter banks and Wavelets
   - Linear Prediction
   - Efficient power Spectral Estimation Techniques
   - Applications of Multirate signal processing
2. Analyze complex engineering problems critically in the field of Signal Processing.
3. Design optimum filters, multirate DSP systems and computationally efficient DSP algorithms for societal needs.
4. Solve engineering problems for feasible and optimal solutions in the field of digital signal processing.
5. Initiate research in advanced digital signal processing.
6. Learn and apply appropriate techniques, including prediction and modeling to complex engineering activities with an understanding of the limitations.
7. Contribute to scientific research in Radar signal processing ,Inter disciplinary areas like Speech and Image processing and Remote sensing with objectivity and rational analysis.

DETAILED SYLLABUS:

UNIT-I: MULTIRATE FILTER BANKS (Periods:12)

Decimation, Interpolation, Sampling rate conversion by a rational factor I/D, Multistage Implementation of sampling rate conversion. **Digital Filter Banks**: Two-Channel Quadrature-Mirror Filter Bank, Elimination of aliasing, condition for Perfect Reconstruction, Polyphase form of QMF bank, Linear phase FIR QMF bank, IIR QMF bank, Perfect Reconstruction Two-Channel FIR QMF Bank.

UNIT-II: POWER SPECTRAL ESTIMATIONS (Periods:12)

Estimation of spectra from finite duration observation of signals.

Non-Parametric Methods: Bartlett, Welch, Blackman & Tukey methods. Performance Characteristics of Non-parametric Power Spectrum Estimators, Computational Requirements of Non-parametric Power Spectrum Estimates.

Parametric Methods of Power Spectral Estimation:

Auto correlation & Its Properties, Relationship between auto correlation & model parameters, Yule-Walker & Burg Methods, MA & ARMA models for power spectrum estimation.

UNIT-III: LINEAR PREDICTION (Periods:10)

Forward and Backward Linear Prediction – Forward Linear Prediction, Backward Linear Prediction, Optimum reflection coefficients for the Lattice Forward and Backward Predictors. Solution of the Normal Equations: Levinson Durbin Algorithm, Schur Algorithm. Properties of Linear Prediction Filters.

UNIT-IV: DSP ALGORITHMS (Periods:10)

Fast DFT algorithms based on Index mapping, Sliding Discrete Fourier Transform, DFT Computation Over a narrow Frequency Band, Split Radix FFT, Linear filtering approach to Computation of DFT using Chirp Z-Transform.

UNIT-V: APPLICATIONS OF DIGITAL SIGNAL PROCESSING (Periods:11)

Digital cellular mobile telephony, Adaptive telephone echo cancellation, High quality A/D conversion for digital Audio, Efficient D/A conversion in compact hi-fi systems, Acquisition of high quality data, Multirate narrow band digital filtering, High resolution narrow band spectral analysis.

Total periods: 55

TEXT BOOKS:

1. John G. Proakis, Dimitris G. Manolakis, *Digital signal processing, principles, Algorithms and applications,* Prentice Hall, 4th edition, 2007.
2. Sanjit K Mitra, "*Digital signal processing, A computer base approach",* McGraw-Hill Higher Education, 4th edition, 2011.

REFERENCE BOOKS:

1. Emmanuel C Ifeacher Barrie. W. Jervis, "*DSP-A Practical Approach*", Pearson Education, 2nd edition, 2002.
2. A.V. Oppenheim and R.W. Schaffer, "*Discrete Time Signal Processing",* PHI, 2nd edition, 2006.

M. Tech. – I Semester
(16MT15707) FPGA ARCHITECTURES & APPLICATIONS
(PE - I)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:
A Course on VLSI Design at UG Level.
COURSE DESCRIPTION:
Fundamentals of Programmable devices; Logic Implementation using PLDs and FPGAs.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Demonstrate advanced knowledge in
   - Programmable Logic Devices
   - Different FPGA Architectures
   - Digital Implementation using FPGA
   - FPGA Applications
2. Analyze complex problems critically for digital implementation issues, to conduct research in Digital VLSI Design.
3. Solve engineering problems with wide range of solutions in FPGA Implementation.
4. Initiate research methodologies in Modeling, Simulation and Implementation of complex engineering applications in the field of Digital Design at different levels of abstraction.
5. Apply appropriate techniques, Resources and tools in, Modeling complex engineering applications with an understanding of limitations.
6. Contribute to multidisciplinary scientific work in the field of FPGA Devices.

DETAILED SYLLABUS
UNIT–I: **Programmable logic Devices** **(Periods: 08)**
Programmable logic Devices: ROM, PLA, PAL, CPLD, FPGA Features, Architectures and Programming, Applications and Implementation of MSI circuits using Programmable logic Devices.
UNIT – II: FPGAs **(Periods: 12)**
Field Programmable Gate Arrays- Logic blocks, routing architecture, design flow, technology mapping for FPGAs, Case studies Xilinx XC4000 & ALTERA's FLEX 8000/10000 FPGAs, Introduction to advanced FPGAs-Xilinx Virtex and ALTERA Stratix
UNIT -III: **(Periods: 14)**
Finite State Machines (FSM): Top Down Design, State Transition Table, State assignments for FPGAs, Realization of state machine charts using PAL, Alternative realization for state machine charts using microprogramming, linked state machine, encoded state machine.
FSM Architectures: Architectures centered around non registered PLDs, Design of state machines centered around shift registers, One Hot state machine, Petrinets for state machines-Basic concepts and properties, Finite State Machine-Case study.
UNIT – IV: System Level Design: **(Periods: 12)**
Controller, data path designing, Functional partition, Digital front end digital design tools for FPGAs. System level design using mentor graphics/Xilinx EDA tool (FPGA Advantage/Xilinx ISE), Design flow using FPGAs.
UNIT – V: Case studies **(Periods: 09)**
Design considerations using FPGAs of parallel adder cell, parallel adder sequential circuits, counters, multiplexers, parallel controllers

Total periods: 55

TEXT BOOKS:

1. Stephen M. Trimberger, "Field Programmable Gate Array Technology", Kluwer Academic Publications, 1994.
2. Richard F. Tinder, "Engineering Digital Design", Academic Press, 2nd edition, 2000.
3. Charles H. Roth, "Fundamentals of logic design", Thomson/Brooks/Cole, 5th edition, 2004.

REFERENCE BOOKS:

1. Pak K. Chan & Samiha Mourad, "Digital Design Using Field Programmable Gate Array", PTR Prentice Hall, 1st edition, 1994.
2. Stephen D. Brown, Robert J. Francis, Jonathan Rose, Zvonko G. Vranesic, "Field Programmable Gate Array", Kluwer Academic Publishers, 1st edition, 1992.

M. Tech. – I Semester
(16MT15708) RFIC DESIGN
(PE - I)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES:
A Course on Analog IC Design at UG Level/ PG Level.

COURSE DESCRIPTION:
Basic Concepts of RF Circuits; Transceiver Architectures; Low Noise Amplifier; Mixers; Oscillators; Power Amplifiers and Phased Locked Loops.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Demonstrate in-depth knowledge in RFIC
   - Basic Concepts.
   - Transceiver Architectures.
   - Low Noise Amplifiers.
   - Mixers.
   - Voltage Controlled Oscillators.
   - Phase Locked Loop.
   - Power Amplifiers.
2. Analyze the problems in Radio Frequency Integrated Circuits.
3. Solve problems in transceiver architectures.
4. Initiate research work on designing RF systems for the wireless communications.
5. Apply appropriate techniques to overcome problem of non-idealities in the design of RFIC circuits, Implement various techniques to arrive at Efficient Designs of RFIC Circuits and Model techniques for Linearization of devices used in RFICs.

DETAILED SYLLABUS

UNIT – I: BASIC CONCEPTS IN RF DESIGN (Periods: 07)
Introduction to RF Design, Units in RF design, Time Variance and Nonlinearity, Effects of nonlinearity, random processes and Noise, Definitions of sensitivity and dynamic range, Passive impedance transformation, Scattering parameters.

UNIT – II: TRANSCEIVER ARCHITECTURES (Periods: 14)
General considerations, Receiver Architectures-Basic Heterodyne receivers, Modern heterodyne receivers, Direct conversion receivers, Image-Reject receivers, Low-IF receivers. Transmitter Architectures-Direct Conversion transmitters, Modern direct conversion Transmitters, Heterodyne Transmitters, Other Transmitter Architectures.

UNIT -III: LNA AND MIXERS (Periods: 10)
General considerations, Problem of input matching, Low Noise Amplifiers design in various topologies, Gain Switching, Band Switching, Mixers-General considerations, Passive down conversion mixers, Active down conversion mixers, Up conversion mixers.

UNIT – IV: OSCILLATORS (Periods: 10)
Performance parameters, Basic principles, Cross coupled oscillator, Three point oscillators, Voltage Controlled Oscillators, LC VCOs with wide tuning range, phase noise, Mathematical model of VCOS, Quadrature Oscillators.

UNIT – V: PLL AND POWER AMPLIFIER (Periods: 14)
PLLS-Phase detector, Type-I PLLs, Type-II PLLs, PFD/CP Non-idealities, Phase noise in PLLs, Loop Bandwidth. Power Amplifiers-General considerations, Classification of power amplifiers, High- Efficiency power amplifiers, Cascode output stages, Large signal impedance matching, Linearization techniques, Polar Modulation, Outphasing.

Total periods: 55

TEXT BOOK:

1. Behzad Razavi, "RF Microelectronics", PTR Prentice-Hall, 2nd edition, 1998.

REFERENCE BOOKS:

1. Thomas H. Lee, "The Design of CMOS Radio-Frequency Integrated Circuits", Cambridge University Press, 2nd edition, 1998.
2. R. Jacob Baker, Harry W. Li, D.E. Boyce, "CMOS Circuit Design, Layout and Simulation", Wiley, 1997.

M. Tech. - I Semester
(16MT15731) ANALOG IC DESIGN LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	--	--	4	2

PRE-REQUISITES:
A Course on Linear IC Applications at UG Level.

COURSE DESCRIPTION:
Modeling and simulation of analog circuits using SPICE.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Demonstrate knowledge in design of analog circuits.
2. Exhibit skills in SPICE Coding and verification of analog circuits.
3. Solve problems in Modeling and analysis of MOSFETs and OPAMPs.
4. Develop Skills to solve problems of design and analysis of analog circuits.
5. Initiate research in analog IC design.
6. Able to use CAD Tools to arrive at an optimized solution for analog signal design.
7. Contribute positively to multidisciplinary scientific research in design and development of Analog Integrated Circuits to solve problems arising in Integrated circuit Technology.
8. Communicate effectively in Verbal and written form of designs developed.

LIST OF EXERCISES:
Modeling and simulation of Analog Circuits using SPICE

1. Study of MOS Characteristics and Characterization.
2. Design and Simulation of single ended and differential Amplifiers.
3. Design and Simulation of Single Stage Amplifiers (Common Source, Source Follower, Common Gate Amplifier).
4. Design and Simulation of Single Stage Amplifiers (Cascode Amplifier, Folded Cascode Amplifier).
5. Design and Simulation of a Differential Amplifier (with Resistive Load, Current Source Biasing).
6. Design and Simulation of Basic Current Mirror, Cascode Current Mirror and Active Current mirrors.
7. Analysis of Frequency response of various amplifiers (Common Source, Source Follower, Cascode, Differential Amplifier.
8. Design/Simulation/Layout of Telescopic Operational Amplifier/ Folded Cascode Operational Amplifier.
9. Design and Simulation of Switched Capacitor.
10. Design and Simulation of various types of first and second order active filters and its applications.
11. Design and Simulation of full wave precision rectifier using opamp.
12. Design and simulation of basic applications based on opamp.

Total Time Slots: 12

REQUIRED SOFTWARE TOOL:
1. Cadence/Synopsys/Mentor graphics Tools.

REFERENCE BOOKS:

1. B. Razavi, Design of Analog CMOS Integrated Circuits, McGraw Hill, 2001.
2. Ken Martin, Analog Integrated Circuit Design, Wiley Publications, 2002.
3. Analog IC Design Lab manual.

M. Tech. - I Semester
(16MT15732) DIGITAL IC DESIGN LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	--	--	4	2

PRE-REQUISITES:
A Course on Digital IC Applications at UG Level.

COURSE DESCRIPTION:
Modeling, Simulation, Synthesis and Implementation of digital circuits using HDLs;

COURSE OUTCOMES:
After successful completion of the course, students will be able to:
1. Demonstrate advanced knowledge in design of digital circuits.
2. Exhibit analytical skills in
   - Behavioral system modeling: concurrency and event-driven simulation.
   - Digital design modeling using various styles (behavioral, structural and dataflow)
   - Designing Combinational and sequential circuits
   - Verifying the Functionality of Designed circuits using function Simulator
   - Checking for critical path time calculation
   - Placement and routing in FPGA
   - Implement digital designs on FPGA device for conducting research in the field of Digital Circuits.
3. Conceptualize and Solve problems in logic verification and timing calculation of Digital circuits.
4. Initiate research in digital IC design.
5. Acquire research skills in the domain of Digital Systems.
6. Create, develop and use modern CAD tools to analyze problems of RTL, Technology schematic, and system implementation.
7. Contribute positively to multidisciplinary scientific research in design and development of Digital Integrated Circuits to solve problems arising in Integrated circuit Technology.
8. Communicate effectively in Verbal and written forms for the designs developed.

LIST OF EXERCISES:

Modeling and Functional Simulation of the following digital circuits (with XilinX tools) using Verilog Hardware Description Languages

Part–I: Combinational Logic: Basic Gates, Multiplexer, Comparator, Adder/ Substractor, Multipliers, Decoders, Address decoders, parity generator, ALU

Part–II: Sequential Logic: D-Latch, D-Flip Flop, JK-Flip Flop, Registers, Ripple Counters, Synchronous Counters, Shift Registers (serial-to-parallel, parallel-to-serial), Cyclic Encoder / Decoder.

Part–III: Memories and State Machines: Read Only Memory (ROM), Random Access Memory (RAM), Mealy State Machine, Moore State Machine, Arithmetic Multipliers using FSMs

Part-IV: FPGA System Design: Demonstration of FPGA and CPLD Boards, Demonstration of Digital design using FPGAs and CPLDs. Implementation of Mini-Project on FPGA/CPLD

Total Time Slots: 12

REQUIRED SOFTWARE TOOL:
1. Xilinx10.1 ISE and Above for FPGA.

REFERENCE BOOKS:

1. Jan M. Rabaey, Anantha Chandrakasan, & Borivoje Nikolic, “Digital Integrated Circuits – A design perspective”, Prentice Hall, 3rd Edition, 2008.
2. Digital IC Design Lab manual.

M. Tech. – I Semester
(16MT13808) RESEARCH METHODOLOGY
(Common to all M. Tech. Programs)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	-	2	-	-

PREREQUISITES: --

COURSE DESCRIPTION:

Overview of Research, research problem and design, various research designs, data collection methods, statistical methods for research, importance of research reports and its types.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Acquire in-depth knowledge on
   a. Research design and conducting research
   b. Various data collection methods
   c. Statistical methods in research
   d. Report writing techniques.
2. Analyze various research design issues for conducting research in core or allied areas.
3. Formulate solutions for engineering problems by conducting research effectively in the core or allied areas.
4. Carryout literature survey and apply research methodologies for the development of scientific/technological knowledge in one or more domains of engineering.
5. Select and Apply appropriate techniques and tools to complex engineering activities in their respective fields.
6. Write effective research reports.
7. Develop attitude for lifelong learning to do research.
8. Develop professional code of conduct and ethics of research.

DETAILED SYLLABUS:

Unit-I: Introduction to Research Methodology (Periods: 5)

Objectives and Motivation of Research, Types of Research, Research Approaches, Research Process, Criteria of good Research, Defining and Formulating the Research Problem, Problem Selection, Necessity of Defining the Problem, Techniques involved in Defining a Problem.

Unit-II: Research Problem Design and Data Collection Methods (Periods: 7)

Features of Good Design, Research Design Concepts, Different Research Designs, Different Methods of Data Collection, Data preparation: Processing Operations, Types of Analysis.

Unit-III: Statistics in Research (Periods:6)

Review of Statistical Techniques - Mean, Median, Mode, Geometric and Harmonic Mean, Standard Deviation, Measure of Asymmetry, ANOVA, Regression analysis.

Unit-IV: Hypothesis Testing (Periods: 7)

Normal Distribution, Properties of Normal Distribution, Basic Concepts of Testing of Hypothesis, Hypothesis Testing Procedure, Hypothesis Testing: t-Distribution, Chi-Square Test as a Test of Goodness of Fit.

Unit-V: Interpretation and Report Writing (Periods: 3)

Interpretation – Techniques and Precautions, Report Writing – Significance, Stages, Layout, Types of reports, Precautions in Writing Reports.

Total Periods: 28

TEXT BOOK:

1. C.R. Kothari, "*Research Methodology: Methods and Techniques*," New Age International Publishers, New Delhi, 2nd Revised Edition, 2004.

REFERENCE BOOKS:

1. Ranjit Kumar, "*Research Methodology: A step-by-step guide for beginners*," Sage South Asia, 3rd ed., 2011.
2. R. Panneerselvam, "Research Methodology," PHI learning Pvt. Ltd., 2009

M. Tech. – II Semester
(16MT25701) LOW POWER VLSI DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITE:
A Course on VLSI Design at UG Level.
COURSE DESCRIPTION:
Low Power Design Limitations; SOI and MOS/BICMOS Processes; Deep submicron processes; Integration/Isolation Considerations; CMOS/Bi-CMOS and Advanced Bi-CMOS Logic Gates; Design and Quality Measures of Low Power Latches & Flip-Flops; Special Low Power Techniques.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
1. Demonstrate in-depth knowledge in
    - Limitations of Low Power Design.
    - SOI Technology.
    - BiCMOS Processes.
    - MOSFET and BJT Behavior and Modeling.
    - BiCMOS Logic Gates Design.
    - Special low power techniques.
1. Analyze the low power BiCMOS circuits, the effects of devices and judge independently the best suited device for fabrication of smart devices for conducting research in ULSI design.
3. Solve problems of Low power design challenges, tradeoff between area, speed and power requirements.
4. Initiate research in low power VLSI design.
5. Apply appropriate techniques, resources and tools to engineering Activities in low power VLSI circuits.
6. Contribute to multidisciplinary scientific work in the field of low power Circuits.

DETAILED SYLLABUS:
UNIT –I: LOW POWER DESIGN AND AN OVER VIEW (Periods: 14)
Introduction to low- voltage low power design, limitations, Silicon-on-Insulator.
MOS/BiCMOS Processes: Bi-CMOS processes, Integration and Isolation considerations, Integrated Analog/Digital CMOS Process.
UNIT –II: LOW-VOLTAGE/LOW POWER CMOS/ BICMOS PROCESSES (Periods: 11)
Deep submicron processes, SOI CMOS, lateral BJT on SOI, future trends and directions of CMOS/Bi-CMOS processes.
UNIT-III: CMOS AND BI-CMOS LOGIC GATES (Periods: 12)
Conventional CMOS and Bi-CMOS logic gates, Performance Evaluation.
Low-Voltage Low-Power Logic Circuits: Comparison of advanced Bi-CMOS Digital circuits. ESD-free Bi-CMOS.
UNIT-IV: LOW POWER LATCHES AND FLIP FLOPS (Periods: 11)
Evolution of Latches and Flip flops-quality measures for latches and Flip flops, Design perspective.
UNIT – V: SPECIAL TECHNIQUES (Periods: 07)
Power Reduction in Clock Networks, CMOS Floating Node,Low Power Bus, Delay Balancing, Low Power Techniques for SRAM.

Total Periods: 55

TEXT BOOKS:

1. Yeo Rofail/ Gohl (3 Authors), “CMOS/BiCMOS ULSI low voltage, low power”, Pearson Education Asia, 1st Indian reprint, 2002.
2. Gary K. Yeap, “Practical Low Power Digital VLSI Design”, KAP, 2002.

REFERENCE BOOKS:

1. Douglas A. Pucknell, Kamran Eshraghian, “Basic VLSI Design”, Prentice Hall, 3rd Illustrated Edition, 1994.
2. J. Rabaey, “Digital Integrated circuits: A Design perspective”, Pearson Education, 2nd Edition, 2003.

M. Tech. - II Semester
(16MT25702) MIXED SIGNAL DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:
A Course on Analog Design at UG Level.
COURSE DESCRIPTION:
Switched capacitor circuits - analysis and application; Design and characterization of Phase locked loops; Data converters – types; Design for different sampling rates.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Gain in-depth knowledge in
    - Switched Capacitor Circuits
    - PLL
    - Data Converters – ADC and DAC
2. Analyze complex engineering problems critically for conducting research in Data Converters for Communication Systems.
3. Solve engineering problems with wide range of solutions to increase Data Rate of ADC and DAC.
4. Design a mixed signal system/subsystem for societal needs.
5. Initiate research in mixed signal design.
6. Apply appropriate techniques, resources and tools to engineering activities in development of Data Converters.
7. Contribute positively to multidisciplinary scientific research in design and development of Mixed Integrated Circuits suited for wide range of applications.

DETAILED SYLLABUS:
UNIT -I: SWITCHED CAPACITOR CIRCUITS (Periods: 14)
Introduction to analog VLSI and mixed signal issues in CMOS technologies,Trade-offs in mixed signal design,Introduction to Switched Capacitor circuits- basic building blocks, Operation and Analysis, Non-idealeffects in switched capacitor circuits, Switched capacitor integrators first order filters, Switch sharing,Biquad filters.
UNIT -II: PHASED LOCK LOOP (PLL) (Periods: 10)
Basic PLL topology, Dynamics of simple PLL, Charge pump PLLs-Lock acquisition, Phase/Frequency detector and charge pump, Basic charge pump PLL, Non-ideal effects in PLLs-PFD/CP non-idealities, Jitter in PLLs, Delay locked loops, applications.
UNIT -III: DATA CONVERTER FUNDAMENTALS (Periods: 15)
DC and dynamic specifications, Quantization noise, performance limitations,Nyquist rate D/A converters- Decoder based Converters, Binary-Scaled converters, Thermometer-code converters, Hybrid converters.
UNIT -IV: NYQUIST RATE A/D CONVERTERS (Periods: 07)
Successive approximation converters, Flash converter, Two-step A/D converters, Interpolating A/D Converters, Folding A/D converters, Pipelined A/D converters, Time-Interleaved Converters.
UNIT -V: OVERSAMPLING CONVERTERS (Periods: 09)
Noise shaping modulators, Decimating filters and interpolating filters, Higher order modulators, Delta sigma modulators with multibit quantizers, Delta sigma D/A.

Total Periods: 55

TEXT BOOKS:

1. David A. Johns,Ken Martin, “Analog Integrated Circuit Design”, Wiley Student Edition, 1997.
2. Behzad Razavi, “Design of Analog CMOS Integrated Circuits”, Tata McGraw Hill Edition, 2001.
3. Philip E. Allen and Douglas R. Holberg, “CMOS Analog Circuit Design”, Oxford University Press, 3rd Edition, 2012.

REFERENCE BOOKS:

1. Rudy Van De Plassche, “CMOS Integrated Analog-to-Digital and Digital-to-Analog converters”, Springer US, 2nd Illustrated Edition, 2003.
2. Richard Schreier, “Understanding Delta-Sigma Data converters”, Wiley Interscience, 1st Edition, 2004.
3. R. Jacob Baker, “CMOS Mixed-Signal Circuit Design”, John Wiley & Sons, 2002.

M.Tech. - II Semester
(16MT25703) NANOELECTRONICS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES:
Courses on Basic Engineering Physics, Basic Engineering Chemistry and Electronic Devices at UG level.
COUSRE DESCRIPTION:
Introduction to wave particle nature and mechanics; Crystal structure of semiconducting material; Material for nanoelectronics; Different techniques of nanostructure fabrication; Nanostructure Characterization; Electron transport mechanism.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
1. Demonstrate advanced knowledge in
   - wave particle nature, wave mechanics,
   - crystal structure of semiconducting material
   - different techniques of nanostructure fabrication,
   - characterization of the nanostructure and electron in well
2. Analyze
   - Crystal structure of nanomaterials
   - Nanostructure based device
3. Design and develop new nanodevices for advanced technological applications.
4. Efficiently solve complex problems in the field of nanoelectronics.
5. Involve and resolve the future research challenges in the fields related to Nanoelectronics.
6. Contribute to multidisciplinary research in biotechnology, MEMS, other nanotechnology fields.

DETAILED SYLLABUS:
UNIT I -PARTICLES AND WAVE MECHANICS (periods: 10)
Introduction classical particles, classical waves, wave–particle duality, Wave mechanics, Schrodinger wave equation, wave mechanics of particles, atoms and atomic orbital's.
UNIT II - MATRIAL FOR NANOELECTRONICS (periods: 10)
Introduction, Semiconductors, Crystal structure and Crystal lattices: bonding in crystals, Electron energy bands, Semiconductor heterostructures, Lattice-matched and pseudomorphic heterostructure, Organic semiconductors, Carbon nanomaterials: nanotubes and fullerenes.
UNIT III - FABRICATION AND CHARACTERISATION OF NANOSTRUCTURES (periods: 12)
Bulk crystal and heterostructure growth, Nanolithography, etching, and other means for fabrication of nanostructures and nanodevices, Characterization techniques of nanostructures, Spontaneous formation and ordering of nanostructures, Nanocrystals and nanoclusters, Methods of nanotube growth, Chemical and biological methods for nanoscale fabrication, Fabrication of nanoelectromechanical systems.
UNIT IV - ELECTRON TRANSPORT AND TRADITIONAL LOW-DIMENSIONAL STRUCTURES (periods: 10)
Electron Transport In Nanostructures
Introduction, Time and length scales of the electrons in solids, Statistics of the electrons in solids and nanostructures, The density of states of electrons in nanostructures, Electron transport in nanostructures.
Electrons In Traditional Low-Dimensional Structures
Introduction, Electrons in quantum wells, Electrons in quantum wires, Electrons in quantum dots.
UNIT V -NANOELECTRONIC DEVICES (periods: 13)
General Properties, Resonant Tunneling Diode, Operating Principle and Technology,
Applications in High Frequency and Digital Electronic, Circuits and Comparison with Competitive Devices, Quantum Cascade Laser, Operating Principle and Structure, Quantum Cascade Lasers in Sensing and Ultrafast Free, Space Communication Applications, Single Electron Transistor, Operating Principle, Technology, Applications, Carbon Nanotube Devices Structure and Technology, Carbon Nanotube Transistors. **Total Periods: 55**

TEXT BOOKS:
1. V. Mitin, V. Kochelap, M. Stroscio, "Introduction to Nanoelectronics", Cambridge University Press (2008).
2. W.R.Fahrner, "Nanotechnology and Nanoelectronics – Materials, Devices, Measurement Techniques", Springer-Verlag Berlin, Germany (2005).

REFERENCE BOOKS:
1. Supriyo Datta, "Lessons from Nanoelectronics: A New Perspective on Transport", World Scientific Publishing Co. Pte. Ltd. 5 Toh Tuck Link, Singapore 596224, Vol. 1, (2012).
2. Bhushan, Bharat, "Springer Handbook of Nanotechnology", 2nd edition, 2006.

M. Tech. – II Semester
(16MT25704) PHYSICAL DESIGN AUTOMATION

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:
A Course on VLSI Design and Digital IC Design at UG Level.
COURSE DESCRIPTION:
Basics of VLSI design; Layout optimization; Simulation and synthesis; Physical design of FPGAs and MCMs.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
1. Demonstrate in-depth knowledge in
   - Algorithmic graph theory
   - Tractable and Intractable problems
   - Layout compaction such as floor planning, placement and routing
   - Binary-Decision diagrams
   - Simulation and Synthesis in High level abstraction
   - FPGA and MCM technologies
2. Analyze problems arising in circuit implementation.
3. Design an Integrated circuit with high level synthesis.
4. Solve engineering problems and arrive at optimal solutions pertaining to design automation.
5. Initiate research in physical design automation.
6. Apply appropriate techniques to Model and Simulate complex engineering designs using FPGA and MCM's.
7. Contribute positively to multidisciplinary applications in the design and development of Integrated Circuits.
8. Understand ethical responsibility towards environment and society in the development of automated designs.

DETAILED SYLLABUS
UNIT–I: INTRODUCTION TO VLSI DESIGN METHODOLOGIES (Periods: 10)
Introduction to VLSI Design automation tools, Introduction to algorithmic graph theory, Computational Complexity, Tractable and Intractable problems, Combinational optimization.
UNIT – II: LAYOUT COMPACTION (Periods: 12)
Design rules, problem formulation, algorithms for constraint graph compaction, placement & partitioning algorithms. Floor planning concepts- shape functions and floor plan sizing, types of routing problems.
UNIT -III: SIMULATION AND SYNTHESIS (Periods: 10)
Gate Level Modeling and Simulation, Switch Level Modeling and Simulation.
Basic issues and Terminology, Binary-Decision diagrams, Two-Level logic Synthesis.
UNIT – IV: HIGH LEVEL SYNTHESIS (Periods: 11)
Hardware modeling, internal representation of the input algorithm, allocation, assignment and scheduling algorithms, ASAP scheduling, Mobility based scheduling, list scheduling & force-directed scheduling.
UNIT–V: PHYSICAL DESIGN AUTOMATION OF FPGAs & MCMs (Periods: 12)
FPGA technologies, Physical Design cycle for FPGAs, partitioning and Routing for segmented and staggered Models, MCM technologies, MCM physical design cycle, Partitioning, Placement-Chip Array based and Full Custom Approaches, Routing, Maze routing, Multiple stage routing, Routing and Programmable MCMs.

Total Periods: 55

TEXT BOOKS:
1. S.H.Gerez, "Algorithms for VLSI Design Automation", John Wiley & Sons Pvt. Ltd, 2nd Edition, 1999.
2. Naveed Sherwani, "Algorithms for VLSI Physical Design Automation", Springer International Edition, 3rd edition, 2005.

REFERENCE BOOKS:
1. Hill & Peterson, "Computer Aided Logical Design with Emphasis on VLSI", John Wiley & Sons Pvt. Ltd, 4th edition, 1993.
2. Wayne Wolf, "Modern VLSI Design Systems on silicon", Pearson Education Asia, 2nd Edition, 1998.

M. Tech. - II Semester
(16MT25705) TESTING AND TESTABILITY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITE:
A Course on Digital Logic Design at UG Level.

COURSE DESCRIPTION:
Design for testability; Fault modeling and simulation; Test analysis for digital circuits; Design strategies for testability.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Demonstrate advanced knowledge in
   - The basic faults that occur in digital systems
   - Testing of stuck at faults for digital circuits
   - Design for testability
2. Analyze testing issues in the field of digital system design critically for Conducting Research.
3. Solve engineering problems by modeling different faults for fault free Simulation in Digital circuits.
4. Apply appropriate research methodologies to develop New testing Strategies for digital and mixed signal circuits and systems.
5. Apply appropriate techniques, Resources and tools in, Modeling to Complex Engineering activities with an understanding of the limitations.
6. Contribute to multidisciplinary scientific work in the field of testing of Stuck at Faults for digital circuits.

DETAILED SYLLABUS:

UNIT –I: INTRODUTION TO TEST AND DESIGN FOR TESTABILITY (Periods: 13)
Modeling-Modeling Digital Circuits at Logic Level, Register Level and Structural Models. Level of Modeling, Logic Simulation- Types of Simulation, Delay Models, Element Evaluation, Hazard Detection, Gate Level Event Driven Simulation.

UNIT–II: FAULT MODELLING (Periods: 09)
Logic Fault Models, Fault Detection and Redundancy, Fault Equivalence and Fault Location, Fault Dominance, the Single Stuck-Fault Model, The Multiple Stuck-Fault Model.

UNIT-III: FAULT SIMULATION (Periods: 07)
Applications, General Fault Simulation Techniques, Fault Simulation for Combinational Circuits, Fault Sampling.

UNIT-IV: TESTING FOR SINGLE STUCK FAULTS (Periods: 12)
ATG for SSSFs in Combinational Circuits and Sequential Circuits, Testing for bridging faults, Functional Testing With Specific Fault Models, Vector Simulation- ATPG Vectors, Formats Compaction and Compression, Selecting ATPG Tool.

UNIT–V: DESIGN FOR TESTABILITY (Periods: 14)
Testability Trade Offs, Techniques, Scan Architectures and Testing, Controllability and Observability by means of Scan Registers, Generic Scan-Based Designs, Full Serial Integrated Scan, Storage Cells for Scan Designs, Board-Level and System-Level DFT Approaches, Boundary Scans Standards, Compression Techniques, Different Techniques, Syndrome Testing and Signature Analysis, Introduction to BIST Concepts.

Total periods: 55

TEXT BOOKS:

1. MironAbramovici, Melvin A. Breur, Arthur D.Friedman, “Digital Systems Testing and Testable Design”, Wiley, 1st Edition, 1994.
2. Alfred L. Crouch, “Design for Test for Digital ICs & Embedded Core Systems”, Prentice Hall PTR, 1st Reprint Edition, 1999.

REFERENCE BOOK:

1. Robert J.Feugate, Jr., Steven M.McIntyre, “Introduction to VLSI Testing”, Prentice Hall, 1st Illustrated Edition,1998.

M. Tech. – II Semester
(16MT13806) ASIC DESIGN
(PE-II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES:
A Course on VLSI Design at UG Level.
COURSE DESCRIPTION:
ASIC design categories; Design Libraries; Design Entry; Logic Synthesis; Simulation; Testing; Physical design flow of ASIC.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
1. Gain in-depth knowledge in
   - ASIC Design Styles.
   - ASICs Design Libraries.
   - ASICs Design Issues.
   - ASIC Construction.
2. Analyze problems critically in the field of ASIC Design.
3. Design Application Specific ICs for use in various systems.
4. Solve engineering problems and arrive at optimal solutions in pertaining to ASIC Design.
5. Initiate research in ASIC Design.
6. Apply appropriate techniques, resources and tools to engineering activities to provide appropriate Solution for the development of ASICs.
7. Contribute to multidisciplinary scientific work in the field of ASIC Design.

DETAILED SYLLABUS:
UNIT-I: INTRODUCTION TO ASICs (Periods: 10)
Types of ASICs- Full-Custom ASICs, Semicustom ASICs, Standard cell based ASICs, Gate- array based ASICs, Channeled Gate Array, Channel less Gate Array, Structured Gate Array, Programmable Logic Devices, Field-Programmable Gate Arrays, ASIC Design Flow, ASIC Cell Libraries.
UNIT-II: ASIC LIBRARY DESIGN & PROGRAMMABLE ASICs (Periods: 10)
ASIC LIBRARY DESIGN: Transistors as Resistors, Transistor Parasitic Capacitance, Logical Effort, Library cell design, Library Architecture, Gate-Array Design, Standard-Cell Design, Data path-Cell Design.
PROGRAMMABLE ASICs: Anti fuse, Static RAM, EPROM and EEPROM technology, Practical Issues, Specifications.
UNIT-III: LOW-LEVEL DESIGN ENTRY & LOGIC SYNTHESIS (Periods: 12)
LOW-LEVEL DESIGN ENTRY: Schematic Entry, Hierarchical design, The cell library, Names, Schematic Icons & Symbols, Nets, Schematic Entry for ASICs, Connections, Vectored instances and Buses, Edit-in-place, Attributes, Net list Screener, Back-Annotation.
LOGIC SYNTHESIS: A Logic-Synthesis Example**,** Verilog and Logic Synthesis, VHDL and Logic Synthesis, Finite-State Machine Synthesis, Memory Synthesis.
UNIT-IV: SIMULATION, TESTING & ASIC CONSTRUCTION (Periods: 13)
SIMULATION AND TESTING: Types of Simulation -Structural Simulation, Gate-Level Simulation, Static Timing Analysis, Formal Verification, Switch-Level Simulation, Transistor-Level Simulation, Boundary Scan Test, Faults, Fault simulation, Automatic Test-Pattern Generation.
ASIC CONSTRUCTION: Physical Design, System Partitioning, FPGA Partitioning, Partitioning Methods.
UNIT-V: FLOOR PLANNING, PLACEMENT & ROUTING (Periods: 10)
FLOOR PLANNING AND PLACEMENT: Floor planning, Placement, Physical Design Flow, **ROUTING:** Global Routing, Detailed Routing, Special Routing, Circuit Extraction and DRC.
Total Periods: 55

TEXT BOOKS:
1. Micheal John Sebastian Smith, “Application - Specific Integrated Circuits”, Addison Wesley Professional, 1997.
2. L. J. Herbst, “Integrated circuit engineering”, Oxford University Press, 1996.
REFERENCE BOOKS:
1. Neil H.E. Weste, Kamran Eshraghian, “Principles of CMOS VLSI Design: A Systems Perspective”, Addison – Wesley Publication Company, 2nd Edition, 1999.
2. John P. Uyemura, “Introduction to VLSI Circuits and Systems”, Wiley, 1st Illustrated Edition, 2002.

M. Tech. – II Semester
(16MT25707) CO – DESIGN
(PE – II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:
Courses on Computer Architecture, Digital Design, Software Design, and Embedded Systems.
COURSE DESCRIPTION:
Issues and Algorithms in CO- Design; Prototyping and its Emulation on Target Architectures; Compilation Techniques; Design Specification; Verification Tools for Embedded Processor Architectures; System- Level Languages with its Specification and Design.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
1. Demonstrate advanced knowledge in
   - Various design steps starting from system specifications to hardware/software implementation
   - Process optimization techniques while considering various design decisions
2. Analyze complex problems critically in the domains of case studies using contemporary high-level methods, for conducting research in VLSI Design.
3. Solve engineering problems by considering trade-offs in the way hardware and software components of a system work together to exhibit a specific behavior for given a set of performance goals and technology with wide range of solutions in Real time embedded system design.
4. Apply appropriate research methodologies in Modeling and Simulation of complex engineering activities in the field of Real time embedded system design.
5. Apply appropriate techniques, Resources and tools in, Modeling to complex engineering activities with an understanding of the limitations
6. Contribute to multidisciplinary scientific work in the field of Real time embedded system design.
7. Understand ethical responsibility towards environment and society in the field of Real time embedded system design.

DETAILED SYLLABUS
UNIT–I: (Periods: 13)
CO-Design Issues: Co-design Models, Architectures, Languages, a Generic Co-design Methodology
Co-Synthesis Algorithms: Architectural Models, Hardware/Software Partitioning, Distributed System Co-Synthesis
UNIT – II: (Periods: 08)
Prototyping and Emulation: Prototyping and emulation techniques, prototyping and emulation environments, future developments in emulation and prototyping
Target Architectures- I: Architecture Specialization techniques, System Communication infrastructure
UNIT -III: Target Architectures – II: (Periods: 07)
Target Architecture and Application System classes, Architecture for control dominated systems- 8051. Architectures for High performance control, Architecture for Data dominated systems- ADSP21060, TMS320C. Mixed Systems and Less Specialized Systems
UNIT – IV: (Periods: 14)
Compilation Techniques and Tools for Embedded Processor Architectures: Modern embedded architectures, embedded software development needs, compilation technologies, Practical consideration in a compiler development environment.
Design Specification and Verification: Design, co-design, the co-design computational model, concurrency, coordinating concurrent computations, interfacing components, Verification- Design verification and implementation verification, verification tools and interface verification.
UNIT–V: (Periods: 13)
Languages for System- Level Specification and Design: System Level Specification, Design Representation for System Level Synthesis, System Level Specification Languages, Heterogeneous Specifications and Multi Language Co-simulation- Concepts for Multi-language design , Co-simulation models.
The Cosyma Systems: Overview, Architecture- design flow and user interaction. Partitioning, Synthesis
Lycos System: Introduction, Partitioning and Design Space Exploration

Total periods: 55

TEXT BOOK:

1. Jorgen Staunstrup, Wayne Wolf, “Hardware / Software Co- Design Principles and Practice”, Springer US, 2010.

REFERENCE BOOK:

1. Felice Balarin, .et .al, “Hardware-Software Co-Design of Embedded Systems: The POLIS Approach” Springer Science & Business Media, 2012.

M. Tech. - II SEMESTER
(16MT25708) SYSTEM-ON-CHIP DESIGN AND VERIFICATION
(PE – II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITE:
Courses on Embedded systems and VLSI design.
COURSE DESCRIPTION:
System on Chip Design Process; System level Design Issues; Test Strategies; Macro Design and Verification; Reusable Macros; System on Chip Verification; Communication Architectures for SoCs.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
1. Demonstrate in-depth knowledge in
    - System on Chip Design Processes.
    - Macro Level Design.
    - Verification Techniques.
    - On-Chip Communication Architectures.
    - Bus Functional Model based Verification.
2. Analyze the problems in SoC Design for Low Power Architecture Design.
3. Develop Skills to solve problems of Reusable Macros.
4. Initiate research work on Reusable Design for the development of SoC Architectures.
5. Implement various Verification techniques to arrive at Efficient Designs of SoC Architectures.

DETAILED SYLLABUS:
Unit-I: System on Chip Design Process (Periods: 08)
A canonical SoC Design, SoC Design flow- waterfall vs spiral, top down vs Bottom up. Specification requirement, Types of Specification, System Design process, System level design issues - Soft IP Vs Hard IP, Design for timing closure - Logic design issues, Verification strategy, Onchip buses and interfaces, Design for Low Power, Manufacturing test strategies.
Unit-II: Macro Design Process (Periods: 08)
Overview of IP Design, planning and Specification, Macro Design and Verification, Soft Macro Productization, Developing hard macros - Design issues for hard macros, Model Development for Hard Macros. System Integration with reusable Macros.
Unit-III: SoC Verification - I (Periods: 14)
Technology Challenges, Verification technology options, Verification methodology, Testbench Creation, Testbench Migration, Verification languages, Verification IP Reuse, Verification approaches, Verification and Device Test, Verification plans, Bluetooth SoC.
System level verification – System Design, System Verification.
Block level verification – IP Blocks, Block Details of Bluethooth SoC, Lint Checking, Formal Model Checking, Functional Verification/Simulation, Protocol Checking, Directed Random Testing, Code Coverage Analysis.
Unit-IV: SoC Verification - II (Periods: 15)
Hardware/Software Co-verification- HW/SW Co-verification Environment, Emulation, soft or virtual Prototypes, Co-verification, UART Co-verification, Rapid Prototype Systems, Software Testing. Static netlist verification, Physical Verification and Design Signoff, Introduction to VMM (Verification Methodology Manual), OVM(Open Verification Methodology) and UVM (Universal Verification Methodology).
Unit-V: Design of Communication Architectures for SoCs (Periods: 10)
On chip communication architectures, System level analysis for designing communication, Design space exploration, Adaptive communication architectures - Communication architecture tuners. Communication architectures for energy/battery efficient systems. Introduction to bus functional models and bus functional model based verification. **Total Periods: 55**

TEXT BOOKS:
1. Michael Keating, Pierre Bricaud, “Reuse Methodology manual for System-On-A-Chip Designs”, Kluwer Academic Publishers, 2nd Edition, 2002.
2. Prakash Rashinkar, Peter Paterson, Leena Singh, “SoC Verification Methodology and Techniques”, Kluwer Academic Publishers, 2002.
3. Ahmed Amine Jerraya, Wayne Wolf, “Multiprocessor Systems-on-chips”, Morgan Kaufmann Publishers, 2005.

REFERENCE BOOKS:
1. William K. Lam, “Hardware Design Verification: Simulation and Formal Method based Approaches”, Prentice Hall Professional Technical Reference, 2005.
2. Farzad Nekoogar, Faranak Nekoogar, “From ASICs to SOCs: A Practical Approach”, Prentice Hall Professional, 2003.

M. Tech. -II Semester
(16MT25709) WIRELESS SENSOR NETWORKS
(Common to VLSI & CMS)
(PE-II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: --
A Course on Computer Networks and Wireless Communication and Networks at UG Level.

COURSE DESCRIPTION:
WSN architecture, types, Quality measures of wireless channels, various MAC protocols, Sensor deployment and routing related protocols, congestion control in WSNs.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Gain in-depth knowledge in
   - Wireless Sensor Networks
   - Physical layer
   - Data link layer
   - Network layer
   - Transport layer
2. Analyze various design issues for conducting research related to Datalink, network and transport protocols of wireless sensor network architecture.
3. Design and develop feasible and optimal solutions for societal use.
4. Solve complex engineering problems pertaining to the field of wireless sensor networks.

DETAILED SYLLABUS

UNIT – I: Introduction To Wireless Sensor Networks (10 Periods)
Challenges for wireless sensor networks, Comparison of sensor network with ad hoc network, Single node architecture - Hardware components, energy consumption of sensor nodes. Network architecture: Sensor network scenarios - types of sources and sinks, single hop versus multi-hop networks, multiple sinks and sources. Design principles for wireless sensor networks.

UNIT – II: Physical Layer (10 Periods)
Introduction, wireless channel and communication fundamentals – frequency allocation, modulation and demodulation, wave propagation effects and noise, channels models, spread spectrum communication, packet transmission and synchronization, quality of wireless channels and measures for improvement. Physical layer and transceiver design consideration in wireless sensor networks - Energy usage profile, choice of modulation, Power Management .

UNIT -III: Data Link Layer (16 Periods)
MAC protocols: fundamentals of wireless MAC protocols - Requirements and design constraints for wireless MAC protocols, Important classes of MAC protocols, MAC protocols for wireless sensor networks. Low duty cycle protocols and wakeup concepts - Sparse topology and energy management (STEM), S-MAC, Wakeup radio concepts. Contention-based protocols - CSMA protocols, PAMAS. Schedule-based protocols - SMAC, BMAC, Traffic-adaptive medium access protocol (TRAMA). Link Layer protocols – fundamentals task and requirements, error control - Causes and characteristics of transmission errors, ARQ techniques, FEC techniques, Hybrid schemes, Power control

UNIT – IV: Network Layer (10 Periods)
Gossiping and agent-based uni-cast forwarding - Basic idea, Randomized forwarding. Energy-efficient unicast, Broadcast and multicast - Source-based tree protocols, Shared, core-based tree protocols, Mesh-based protocols. geographic routing - Basics of position-based routing, Geocasting. Mobile nodes - Mobile sinks, Mobile data collectors, Mobile regions. Data centric and content-based networking - Introduction, Data-centric routing, Data aggregation.

UNIT – V: Transport Layer (09 Periods)
The transport layer and QoS in wireless sensor networks - Quality of service/reliabilitym, Transport protocols. Coverage and deployment - Sensing models, Coverage measures, Uniform random deployments: Poisson point processes, Coverage of random deployments: Boolean sensing model, general sensing model, Coverage determination, Coverage of grid deployments. Reliable data transport, Single packet delivery - Using a single path, Multiple paths, Multiple receivers. Congestion control and rate control - Congestion situations in sensor networks, Mechanisms for congestion detection and handling, Protocols with rate control, The CODA congestion-control framework.

Total periods: 55

TEXT BOOK:

1. Holger Karl, Andreas willig “Protocol and Architecture for Wireless Sensor Networks”, John wiley publication, Oct 2007.

REFERENCE BOOKS:

1. Fengzhao, Leonidas, Guibas, “Wireless Sensor Networks: an information processing approach – publication, Elsevier,2004.
2. Edgar H .Callaway,”Wireless Sensor Networks: Architecture and protocol”, 1st Edition, CRC press 2003.
3. C.S.Raghavendra Krishna, M.Sivalingam and Taribznati, “Wireless Sensor Networks”, Springer publication, 2006.

M.Tech. – II Semester
(16MT25731) MIXED SIGNAL AND PHYSICAL DESIGN AUTOMATION LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PREREQUISITE:
A course on Circuit Level Design and Layouts.

COURSE DESCRIPTION:
Design and Verification of Analog and Mixed Signal Circuits.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:
1. Demonstrate advanced knowledge in backend and frontend design.
2. Exhibit analytical skills in
   - Backend Design - Schematic or SPICE Entry, Simulation, Layout, DRC, PEX, Post Layout Simulation.
   - Frontend Design - HDL Design Entry, Logic Simulation, RTL Logic Synthesis, Post Synthesis Timing Simulation, Partition, Floorplanning, Place & Route, Compaction, Verification, Design for Testability, Static Timing Analysis, Power Analysis.
3. Solve problems in physical design cycle, functional verification, timing and Power Analysis of Digital circuits.
4. Initiate research in the field of mixed signal and physical design automation.
5. Develop Skills to solve problems of layout design and build solutions for optimizing design for area, power and speed.
6. Use CAD Tools to arrive at an optimized solution for mixed signal design.
7. Contribute positively to multidisciplinary scientific research in design and development of Mixed/Analog Integrated Circuits to solve problems arising in physical design and Integrated circuit Technology.
8. Communicate effectively in Verbal and written form of designs developed.

LIST OF EXERCISES:
Mentor Graphic tools / Cadence tools / Synopsis tools

1. **Backend Design** **(4 Slots)**
   Schematic Entry, Simulation, Layout, DRC, PEX, Post Layout Simulation of CMOS Logic Gates, Combinational Circuits (Adders, Encoders, Decoders, Multiplexers, Demultiplexers, etc), Sequential Circuits(Flip Flops, Registers, counters),Biquad Filter, PLL, VCO and ADC/DAC.

2. **Frontend/Semicustom Design** **(4 Slots)**
   HDL Design Entry, Logic Simulation, RTL Logic Synthesis, Post Synthesis TimingSimulation, Place & Route, Design for Testability, Static Timing Analysis, PowerAnalysis of Combinational and Sequential Circuits(Application Oriented designs – MAC Unit, FIR and IIR Filters, Traffic Light Controller, FSM based Control applications, etc).

3. **Physical Design Automation** **(4 Slots)**
   Graph Algorithms, Partitioning Algorithms, Floorplanning Algorithms, Routing Algorithms.

Total Time Slots: 12

Required Software Tools:
1. Mentor Graphic tools / Cadence tools / Synopsis tools/MAGMA/MAGIC. (220 nm Technology and Above)
2. Xilinx ISE 10.1i and Above for FPGA/CPLDS.

REFERENCE BOOKS:

1. Mixed Signal Laboratory Manual

M.Tech. - II Semester
(16MT25732) NANOELECTRONICS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	--	--	4	2

PRE-REQUISITES:
A course on Circuit Level Design

COUSRE DESCRIPTION:
Demonstration of the lab; Design, fabrication and verification of the nanoelectronic devices.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Demonstrate advanced knowledge in
    - Clean room,
    - Substrate preparation
    - Device fabrication
    - Device characterization
    - Device verification
2. Able to analyze
    - Nanostructure of the Devices
    - New material and Device characterization
3. Think laterally to get involved efficiently in research field of nanoelectronics.
4. Efficiently solve complex problem in the design of nanoelectronic devices.
5. Design and develop new nanodevice for advance technological application.
6. Use tools for verifying developed nanodevices.
7. Communicate effectively in verbal and written form for the experiments.
8. Utilize and implement the practical knowledge in multidiscipline areas.

LIST OF EXERCISES:

Demonstration, fabrication and characterization of nano devices (8 Slots)

1. Clean room demonstration
2. Clean bench demonstration
3. Demonstration of substrate
4. Cleaning of substrate
5. Deposition of filter by sol-gel method
6. Deposition of thermal evaporation
7. Device fabrication
8. Device characterization

Verification of fabricated devices (4 Slots)

9. Verification of device characteristics using MATLAB
10. Verification of device characteristics using COMSOL.
11.

Total Time Slots: 12

REFERENCE BOOKS:

1. Nanoelectronics Lab Manual

M. Tech. - II Semester
(16MT25733) SEMINAR

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	100	100	-	-	-	2

PRE-REQUISITES: --

COURSE DESCRIPTION:
Identification of seminar topic; literature survey; preparation of technical report and presentation.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:
1. Demonstrate knowledge to identify an advanced topic for seminar in core and allied areas of VLSI.

2. Extract and analyze information pertinent to the topic through literature survey.

3. Comprehend extracted information through analysis and synthesis critically.

4. Plan, prepare and present effective written and oral technical report on the work done.

5. Develop enthusiasm and commitment to engage in lifelong learning for technical competence in the field of VLSI.

6. Consider and assess the impact of the seminar topic outcome on environment and society.

7. Undertake corrective measures for both the technical and ethical mistakes.

M. Tech. – II Semester
(16MT23810) INTELLECTUAL PROPERTY RIGHTS
(Common to all M. Tech. Programs)
(Audit Course)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	-	2	-	-

PRE-REQUISITES: --
COURSE DESCRIPTION:
Introduction to Intellectual Property; Trade Marks; Law of Copy Rights; Law of Patents; Trade Secrets; Unfair Competition; New Development of Intellectual Property.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:
1. Demonstrate in-depth knowledge on
   - Intellectual Property
   - Trade Marks & Secrets
   - Law of Copy Rights, Patents
   - New development of Intellectual Property
2. Analyze the different forms of infringement of intellectual property rights.
3. Solve problems pertaining to Intellectual Property Rights.
4. Stimulate research zeal for patenting of an idea or product.
5. Write effective reports required for filing patents.
6. Develop life-long learning capabilities.
7. Develop awareness of the relevance and impact of IP Law on their academic and professional lives.
8. Develop attitude for reflective learning.

DETAILED SYLLABUS:

UNIT - I: Introduction to Intellectual property **(Periods:5)**
Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.
UNIT - II: Trade Marks: **(Periods:5)**
Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.
UNIT - III: Law of copy rights: **(Periods:6)**
Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.
Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer
UNIT - IV: Trade Secrets: **(Periods:6)**
Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.
Unfair competition: Misappropriation right of publicity, False advertising.
UNIT - V: New development of intellectual property: **(Periods:6)**
New developments in trade mark law; copy right law, patent law, intellectual property audits.
International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

Total Periods: 28

REFERENCE BOOKS:

1. Deborah, E. Bouchoux, *Intellectual property right*, Cengage learning.
2. Prabuddha ganguli, *Intellectual property right - Unleashing the knowledge economy*, Tata Mc Graw Hill Publishing Company Ltd.

M. Tech. - III & IV Semester
(16MT35731 & 16MT45731)PROJECT WORK

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
200	200	400	-	-	-	28

PRE-REQUISITES:--

COURSE DESCRIPTION:
Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Writing of thesis and presentation.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:
1. Demonstrate capacity to identify an advanced topic for project work in core and allied areas.
2. Extract information pertinent to the topic through literature survey.
3. Comprehend extracted information through analysis and synthesis critically on the topic.
4. Solve engineering problems pertinent to the chosen topic for feasible solutions.
5. Use the techniques, skills and modern engineering tools necessary for project work.
6. Do time and cost analysis on the project.
7. Plan, prepare and present effective written and oral technical report on the topic.
8. Adapt to independent and reflective learning for sustainable professional growth.
9. Contribute to multidisciplinary scientific work in the field of VLSI.
10. Understand ethical responsibility towards environment and society in the field of VLSI.
11. Engage lifelong learning for development of technical competence in the field of VLSI.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)

Sree Sainath Nagar, Tirupati – 517 102.

SVEC16
M. Tech. (Communication Systems)
Course Structure

I-Semester

S. No	Course Code	Course Title	Contact Periods per Week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
1.	16MT15706	Advanced Digital Signal Processing	4	-	-	4	4	40	60	100
2.	16MT13802	Digital Communication Techniques	4	-	-	4	4	40	60	100
3.	16MT23803	Information Theory and Coding Techniques	4	-	-	4	4	40	60	100
4.	16MT23807	Optical Communications and Networks	4	-	-	4	4	40	60	100
5.	16MT16101	RF Circuit Design	4	-	-	4	4	40	60	100
6.		***Professional Elective-1***	4	-	-	4	4	40	60	100
	16MT13801	Computer Networks								
	16MT16102	Digital Satellite Communications								
	16MT16103	Software Defined Radio								
	16MT13807	Transform Techniques								
7.	16MT16131	Communications Lab - I	-	-	4	4	2	50	50	100
8.	16MT16132	RF Circuits & Optical Communications lab	-	-	4	4	2	50	50	100
		Total:	**24**	**-**	**8**	**32**	**28**	**340**	**460**	**800**
9.	16MT13808	Research Methodology (Audit Course)	-	2	-	2	-	-	-	-

II-Semester

S. No.	Course Code	Course Title	Contact Periods per Week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
1.	16MT26101	Adaptive Signal Processing	4	-	-	4	4	40	60	100
2.	16MT23801	Detection and Estimation of Signals	4	-	-	4	4	40	60	100
3.	16MT13804	Image & Video Processing	4	-	-	4	4	40	60	100
4.	16MT26102	Smart Antennas	4	-	-	4	4	40	60	100
5.	16MT23805	Wireless Communications	4	-	-	4	4	40	60	100
6.		***Professional Elective-2***	4	-	-	4	4	40	60	100
	16MT26103	EMI/ EMC								
	16MT26104	Radar Signal Processing								
	16MT23809	Speech Processing								
	16MT25709	Wireless Sensor Networks								
7.	16MT26131	Communications Lab - II	-	-	4	4	2	50	50	100
8.	16MT13832	Image & Video Processing Lab	-	-	4	4	2	50	50	100
9.	16MT26133	Seminar	-	-	-	-	2	--	100	100
		Total:	**24**	**-**	**8**	**32**	**30**	**340**	**560**	**900**
10.	16MT23810	Intellectual Property Rights (Audit Course)	-	2	-	2	-	-	-	-

III-Semester

S. No.	Course Code	Course Title	Contact Periods per Week				Credits	Scheme of Examination Max. Marks		
			L	T	P*	Total		Internal Marks	External Marks	Total Marks
1.	16MT3MOOC	MOOC	-	-	-	-	-	-	-	-
2.	16MT36131	Project Work – Phase I	-	-	-	-	8	50	50	100
		Total:	**-**	**-**	**-**	**-**	**8**	**50**	**50**	**100**

*Fulltime Project Work

IV-Semester

S. No.	Course Code	Course Title	Contact Periods per Week				Credits	Scheme of Examination Max. Marks		
			L	T	P*	Total		Internal Marks	External Marks	Total Marks
1.	16MT46131	Project Work – Phase II	-	-	-	-	20	150	150	300
		Total:	**-**	**-**	**-**	**-**	**20**	**150**	**150**	**300**
						Grand Total:	**86**	**880**	**1220**	**2100**

*Fulltime Project Work

I M. Tech.– I Semester
(16MT15706) ADVANCED DIGITAL SIGNAL PROCESSING
(Common to CMS & VLSI (PE – I))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Courses on Digital Signal Processing at UG level

COURSE DESCRIPTION:

Digital filter banks; Parametric and Non-Parametric Power Spectrum Estimation methods; computationally efficient algorithms; Applications of DSP.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Gain in-depth knowledge in
   - Filter banks and Wavelets
   - Linear Prediction
   - Efficient power Spectral Estimation Techniques
   - Applications of Multirate signal processing
2. Analyze complex engineering problems critically in the field of Signal Processing.
3. Design optimum filters, multirate DSP systems and computationally efficient DSP algorithms for societal needs.
4. Solve engineering problems for feasible and optimal solutions in the field of digital signal processing.
5. Initiate research in advanced digital signal processing.
6. Learn and apply appropriate techniques, including prediction and modeling to complex engineering activities with an understanding of the limitations.
7. Contribute to scientific research in Radar signal processing ,Inter disciplinary areas like Speech and Image processing and Remote sensing with objectivity and rational analysis.

DETAILED SYLLABUS:

UNIT-I: MULTIRATE FILTER BANKS (Periods:12)

Decimation, Interpolation, Sampling rate conversion by a rational factor I/D, Multistage Implementation of sampling rate conversion. **Digital Filter Banks**: Two-Channel Quadrature-Mirror Filter Bank, Elimination of aliasing, condition for Perfect Reconstruction, Polyphase form of QMF bank, Linear phase FIR QMF bank, IIR QMF bank, Perfect Reconstruction Two-Channel FIR QMF Bank.

UNIT-II: POWER SPECTRAL ESTIMATIONS (Periods:12)

Estimation of spectra from finite duration observation of signals.

Non-Parametric Methods: Bartlett, Welch, Blackman & Tukey methods. Performance Characteristics of Non-parametric Power Spectrum Estimators, Computational Requirements of Non-parametric Power Spectrum Estimates.

Parametric Methods of Power Spectral Estimation:

Auto correlation & Its Properties, Relationship between auto correlation & model parameters, Yule-Walker & Burg Methods, MA & ARMA models for power spectrum estimation.

UNIT-III: LINEAR PREDICTION (Periods:10)

Forward and Backward Linear Prediction – Forward Linear Prediction, Backward Linear Prediction, Optimum reflection coefficients for the Lattice Forward and Backward Predictors. Solution of the Normal Equations: Levinson Durbin Algorithm, Schur Algorithm. Properties of Linear Prediction Filters.

UNIT-IV: DSP ALGORITHMS (Periods:10)

Fast DFT algorithms based on Index mapping, Sliding Discrete Fourier Transform, DFT Computation Over a narrow Frequency Band, Split Radix FFT, Linear filtering approach to Computation of DFT using Chirp Z-Transform.

UNIT-V: APPLICATIONS OF DIGITAL SIGNAL PROCESSING (Periods:11)

Digital cellular mobile telephony, Adaptive telephone echo cancellation, High quality A/D conversion for digital Audio, Efficient D/A conversion in compact hi-fi systems, Acquisition of high quality data, Multirate narrow band digital filtering, High resolution narrow band spectral analysis.

Total periods: 55

TEXT BOOKS:

1. John G. Proakis, Dimitris G. Manolakis, *Digital signal processing, principles, Algorithms and applications,* Prentice Hall, 4th edition, 2007.
2. Sanjit K Mitra, "*Digital signal processing, A computer base approach",* McGraw-Hill Higher Education, 4th edition, 2011.

REFERENCE BOOKS:

1. Emmanuel C Ifeacher Barrie. W. Jervis, "*DSP-A Practical Approach*", Pearson Education, 2nd edition, 2002.
2. A.V. Oppenheim and R.W. Schaffer, "*Discrete Time Signal Processing",* PHI, 2nd edition, 2006.

I M. Tech. – I Semester
(16MT13802) DIGITAL COMMUNICATION TECHNIQUES
(Common to CMS & DECS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: --
Course on Digital Communications at UG Level**,** Review of random Variables and Processes

COURSE DESCRIPTION:
Characterization of Communication Signals and Systems; Digital Modulation Techniques; Optimum Receivers for the Additive Gaussian Noise Channel; Spread Spectrum Technique; Multichannel and Multicarrier Systems.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Demonstrate in-depth knowledge in
   - Characterization of communication signals and systems.
   - Digital modulation techniques
   - Communication over AWGN channels
   - Optimum receivers
   - Spread spectrum techniques
   - Multi-carrier communication system
2. Analyze numerical and analytical problems critically for conducting research in the field of Digital Communication Systems.
3. Solve engineering problems and arrive at optimal solutions pertaining to digital communications.
4. Apply appropriate techniques to complex engineering activities in the field of signal processing and communications.

DETAILED SYLLABUS:

UNIT I– CHARACTERIZATION OF COMMUNICATION SIGNALS AND SYSTEMS (10 periods)
Representation of Band Pass Signals and Systems–Representation of Band Pass Signals, Representation of Linear Band-Pass System, Response of a Band-Pass System to a Band-Pass Signal. Signal Space Representations – Vector Space Concepts, Signal Space Concepts, Orthogonal Expansion of Signals. Representation of Digitally Modulated Signals – Memory Less Modulation Methods – PAM Signals, Phase Modulated Signals, QAM Signals, Multidimensional Signals, Orthogonal Multidimensional Signals. Spectral Characteristics of Digitally Modulated Signals – Power Spectra of Linearly Modulated Signals.

UNIT II – DIGITAL MODULATION TECHNIQUES (11 periods)
Digital Modulation – Factors that Influence the Choice of Digital Modulation, Bandwidth and Power Spectral Density of Digital Signals. Linear Modulation Techniques – BPSK, DPSK, QPSK, OQPSK, Π/4 QPSK. Constant Envelope Modulation Techniques – MSK, GMSK, Combined Linear and Constant Envelope Modulation Techniques – M-ary PSK, M- ary QAM.

UNIT III – OPTIMUM RECEIVERS FOR THE ADDITIVE GAUSSIAN NOISE CHANNEL (10 periods)
Optimum Receiver for Signals corrupted by AWGN –Correlation demodulator, Matched Filter Demodulator, Optimum Detector. Performance of the Optimum Receiver for Memory Less Modulation – Probability of Error for Binary Modulation, M-ary Orthogonal Signals, M-ary PAM, M-ary PSK, QAM. Optimum Receiver for Signals with Random Phase in AWGN Channel – Optimum Receiver for Binary Signals, Optimum Receiver for M-ary Orthogonal Signals.

UNIT IV – SPREAD SPECTRUM TECHNIQUES (13 periods)
Introduction, Model of Spread Spectrum Digital Communication System, Direct Sequence Spread Spectrum Signals – Introduction, The Processing Gain and Jamming Margin. Applications of Direct Sequence Spread Spectrum Signals – Anti jamming Application, Low-Detectability Signal Transmission, Code Division Multiple Access. Generation of PN-Sequences, Frequency-Hopped Spread Spectrum Signals, Other Types of Spread Spectrum Signals. Detection of spread spectrum signals- Matched filter receiver, RAKE Receiver.

UNIT V –MULTICHANNEL AND MULTICARRIER SYSTEMS (10periods)
Rayleigh and Rician channels, Multichannel Digital Communications in AWGN Channels; Binary Signals, M-ary Orthogonal Signals. Multicarrier Communications; Single Carrier verses Multicarrier Modulation, Capacity of a Non ideal Linear Filter Channel, OFDM, Modulation & Demodulation in an OFDM, An FFT Algorithm Implementation of an OFDM System. OFDMA.
Total Periods: 54

TEXT BOOKS:

1. John G. Proakis, “Digital Communications”, McGraw-Hill, 4th edition, 2001.
2. Theodore S. Rappaport, “Wireless Communications”, Pearson Education, 2nd edition, 2002.
3. George R. Cooper & Clare D. McGillem, “Modern Communication and Spread Spectrum”, McGraw-Hill Book Company, 1986.

REFERENCE BOOKS:

1. Marvin K. Simon, Jim K Omura, Robert A. Scholtz& Barry K.Levit, “Spread Spectrum Communications”, McGraw-Hill, 1st edition,1995.
2. J.Marvin, K.Simon, Sami. M.Hinedi and William C. Lindsey, “Digital Communication Techniques”, PHI, 2009.

M. Tech. - I Semester
(16MT23803) INFORMATION THEORY AND CODING TECHNIQUES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES:
A Course on Digital Communications at UG Level
COURSE DESCRIPTION:
Information theory; Channel capacity; Channel coding techniques – Linear block codes, Cyclic codes, Convolutional codes; Reed-Solomon and Turbo codes.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
1. Demonstrate knowledge in
   - Various aspects of source and channel coding techniques
   - Channel capacity
   - Performance evaluation of various source coding techniques
2. Analyze complex engineering problems critically in the domain of information, source encoding.
3. Design encoder, Syndrome circuits to solve complex engineering problems.
4. Conceptualize and Solve engineering problems for feasible and optimal solutions in the core area of information theory and coding techniques.
5. Initiate research in information theory and coding techniques.
6. Contribute positively to multidisciplinary scientific research in communications with objectivity and rational analysis.

DETAILED SYLLABUS
UNIT I: INTRODUCTION (11 periods)
Entropy: Discrete stationary sources, Markov sources, Entropy of a discrete Random variable- Joint, conditional, relative entropy, Mutual Information and conditional mutual information. Chain rules for entropy, relative entropy and mutual information, Differential Entropy- Joint, relative, conditional differential entropy and Mutual information.
Loss less Source coding: Uniquely decodable codes, Instantaneous codes, Kraft's inequality, optimal codes, Huffman code, Shannon's Source Coding Theorem.
UNIT II: CHANNEL CAPACITY (10 periods)
Capacity computation for some simple channels, Channel Coding Theorem, Fano's inequality and the converse to the Coding Theorem, Equality in the converse to the coding theorem, The joint source Channel Coding Theorem, The Gaussian channels- Capacity calculation for Band limited Gaussian channels, Parallel Gaussian Channels, Capacity of channels with colored Gaussian noise.
UNIT III: CHANNEL CODING-1 (09 periods)
Linear Block Codes: Introduction to Linear block codes, Generator Matrix, Systematic Linear Block codes, , Parity Check Matrix, Syndrome testing, Error correction, Decoder Implementation of Linear Block Codes, Error Detecting and correcting capability of Linear Block codes.
UNIT IV: CHANNEL CODING-2 (13periods)
Cyclic Codes: Algebraic Structure of Cyclic Codes, Binary Cyclic Code Properties, Encoding in Systematic Form, Systematic Encoding with an (n - k)-Stage Shift Register, Error Detection with an (n - k)-Stage Shift Register, Well-Known Block Codes-Hamming Codes, Extended Golay Code, BCH Codes.
Convolutional Codes: Convolution Encoding, Convolutional Encoder Representation, Formulation of the Convolutional Decoding Problem, Properties of Convolutional Codes, Sequential Decoding,
UNIT V: CHANNEL CODING-3 (13periods)
Reed-Solomon Codes- Reed-Solomon Error Probability, Finite Fields, Reed-Solomon Encoding, Reed-Solomon Decoding, Interleaving and Concatenated Codes- Block Interleaving, Convolutional Interleaving, Concatenated Codes. Coding and Interleaving Applied to the Compact Disc Digital Audio System- CIRC Encoding, CIRC Decoding. Turbo Codes-Turbo Code Concepts, Encoding with Recursive Systematic Codes, Feedback Decoder, The MAP Decoding Algorithm. **Total periods:56**

TEXT BOOKS:

1. Thomas M. Cover and Joy A. Thomas, Elements of Information Theory, John Wiley & Sons, 1st edition, 1999.
2. Bernard sklar, "Digital Communications – Fundamental and Application", Pearson Education, 2nd edition, 2009.

REFERENCE BOOKS:

1. Robert Gallager, Information Theory and Reliable Communication, John Wiley & Sons, 1st edition, 1968.
2. John G. Proakis, "Digital Communications", Mc. Graw Hill Publication, 5th edition, 2008.
3. Shulin and Daniel. Costello, Jr., "Error Control Coding–Fundamentals and Applications", Prentice Hall, 2nd edition, 2002.

M. Tech. - I Semester

(16MT23807) OPTICAL COMMUNICATIONS AND NETWORKS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: --

COURSE DESCRIPTION:

Non linear properties of fibers; characteristics of fiber materials; optical cable design and connectors; optical components; modulation and demodulation schemes; error detecting and correcting codes; optical network management and control.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate Knowledge in
   - Linear and Non-linear Characteristics of Optical fiber.
   - Fiber design considerations.
   - Minimization of Losses in Cable design.
   - Understanding the operation of advanced fiber optic components.
   - Modulation and demodulation techniques.
   - Access networks.
   - Network Control and Management.
2. Analyze complex engineering problems critically in the domain of optical communication for conducting research.
3. Design of optical cable and transmission layer in the field of optical Communications.
4. Solve engineering problems related to optical communication to meet societal and industrial needs.
5. Apply appropriate techniques to complex engineering activities in the field of optical communications.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION (Periods:11)

Evolution of fiber types, guiding properties of fibers, cross talk between fibers, coupled modes and mode mixing, dispersion properties of fibers, nonlinear effects of optical fibers- SRS, SBS, intensity dependent refractive index. Characterizations of materials for fibers, fiber preform preparation- Soot deposition, MCVD. Fiber drawing and control, roles of coating and jacketing.

UNIT II: OPTICAL CABLE DESIGN (Periods:10)

Fiber design considerations-Fiber diameter, Cladding thickness, Low and high bit rate systems. Design objectives and cable structures, Fiber splicing- fiber end preparation, single and array splices, measurement of splicing effects. Optical fiber connectors-The role of connectors, Connector alignment techniques.

UNIT-III: FIBER OPTIC COMPONENTS FOR COMMUNICATION AND NETWORKING (Periods:15)

Couplers, Isolators and Circulators, Multiplexers & filters- Bragg Gratings, Fabry-Perot Filters, Mach-Zehnder Interferometers, Arrayed Waveguide Grating, Acousto-Optic Tunable Filter, High Channel Count Multiplexer Architectures. Optical Amplifiers- Erbium Doped Fiber amplifiers, Raman amplifiers, Transmitters- LED, Lasers, Direct and External Modulation, Detectors- Photo detectors. Optical Switches – Large Optical Switches. Wavelength Converters – Optoelectronic Approach, Optical gating.

UNIT-IV: MODULATION AND DEMODULATION (Periods:8)

Signal formats for Modulation, Subcarrier Modulation and Multiplexing, Optical Modulations – Duo binary, Single Side Band and Multilevel Schemes, Demodulation- Ideal and Practical receivers, Bit Error Rates, Coherent Detection, Timing Recovery and Equalization, Reed-Solomon Codes for Error Detection and Correction.

UNIT-V: OPTICAL NETWORKS & MANAGEMENT (Periods:10)

Access Networks - architecture overview, Enhanced HFC, Fiber to the curb (FTTC). Photonic packet switching - OTDM, Synchronization. Deployment considerations - Designing the transmission layer using SDM, TDM, WDM, Unidirectional versus Bidirectional WDM Systems.

Control and Management- Network Management functions, Performance and fault management, Configuration Management, Optical Safety.

Total Periods: 54

TEXT BOOKS:

1. S. E. Miller, A. G. Chynoweth, "Optical Fiber Telecommunication", 1979.Rajiv Ramaswamy, Kumar N. Sivaranjan and Galen H. Sasaki, "Optical Networks", Elsevier, 3rd edition, 2010.

REFERENCE BOOKS:

1. Govind P. Agarwal "Fiber–Optic Communication Systems", Wiley India, 3rd edition, 2002.
2. Gerd Kaiser, "Optical Fiber Communication", McGraw Hill, 4th edition, 2008.
3. John. M. Senior, "Optical fiber communications: Principles and Practice", Pearson, 3rd edition, 2010

M. Tech. - I Semester
(16MT16101) RF CIRCUIT DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES:
Concept of Basic Electronics and Wave Theory at UG level
COURSE DESCRIPTION:
Fundamental concepts of transmission line theory; RF Electronics; high frequency circuit behavior; design of tuning and matching networks; RF Passive and active components; RF Transistor amplifier design; Oscillators and RF Mixers.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
1. Demonstrate in-depth knowledge in
   - RF Electronics
   - Transmission line analysis
   - Matching and biasing networks
   - RF Passive and Active components
   - RF Transistor amplifier design
   - Oscillators and RF Mixers.
2. Analyze complex problems critically in the domains of RF field, RF Passive and Active components as well as a smart antenna techniques in the field of RF Circuits.
3. Design RF circuits for use in various systems as per societal needs.
4. Solve engineering problems to arrive at optimal solutions in compliance with public health and safety, societal and environmental factors in the core areas of RF Circuit design.
5. Apply appropriate techniques to complex engineering activities in the field of wireless communication systems and allied areas.
6. Understand ethical responsibility towards environment and society in the field of microwave and wireless systems.

DETAILED SYLLABUS
UNIT – I: INTRODUCTION TO RF ELECTRONICS **(10 Periods)**
The Electromagnetic Spectrum, units and Physical Constants, Microwave bands, RF behavior of Passive components: Tuned resonant circuits, Vectors, Inductors and Capacitors. Voltage and Current in capacitor circuits, Tuned RF / IF Transformers.
UNIT – II: TRANSMISSION LINE ANALYSIS (**14 Periods)**
Examples of transmission lines, Transmission line equations and Biasing: Kirchoffs voltage and current law representation, Traveling voltage and current waves, General Impedance definition, lossless transmission line model. Micro Strip Transmission Lines, Special Termination Conditions, sourced and Loaded Transmission Lines.
Single And Multiport Networks: The Smith Chart, Interconnectivity networks, Network properties and Applications, Scattering Parameters.
UNIT -III: MATCHING AND BIASING NETWORKS **(13 Periods)**
Impedance matching using discrete components, Micro strip line matching networks, Amplifier classes of Operation and Biasing networks.
RF Passive & Active Components: Filter Basics, Lumped filter design, Distributed Filter Design, Diplexer Filters, Crystal and Saw filters, Active Filters, Tunable filters. Power Combiners / Dividers: Directional Couplers, Hybrid Couplers, Isolators. RF Diodes: BJTs, FETs, HEMTs and Models.
UNIT – IV: RF TRANSISTOR AMPLIFIER DESIGN **(09 Periods)**
Characteristics of Amplifiers, Amplifier Circuit Configurations, Amplifier Matching Basics, Distortion and noise products, Stability Considerations, Small Signal amplifier design, Power amplifier design, MMIC amplifiers, Broadband High Power multistage amplifiers, Low noise amplifiers, VGA Amplifiers.
UNIT – V: OSCILLATORS and Mixers **(11 Periods)**
Oscillator basics, Low phase noise oscillator design, High frequency Oscillator configuration, LC Oscillators, VCOs, Crystal Oscillators, PLL Synthesizer, and Direct Digital Synthesizer.
RF Mixers: Basic characteristics of a mixer, Active mixers, Image Reject and Harmonic mixers, Frequency domain considerations. **Total periods: 57**

TEXT BOOKS:

1. Reinhold Ludwing, Pavel Bretchko, "*RF Circuit design: Theory and applications*", Pearson Education ,2000.
2. Joseph Carr, "*Secrets of RF Design*", Tata McGraw Hill Publications, 3rd edition, 2004.

REFERENCE BOOKS:

1. Devendra K. Misra, "*Radio Frequency and Microwave Communication Circuits Analysis and Design*", Wiley Student Edition, John Wiley & Sons, 2nd edition, July 2004.
2. Christopher Bowick, "*RF Circuit Design*", Newnes, 1982.
3. Mathew M.Radmanesh, "*Radio frequency and microwave electronics*", Prentice Hall PTR, 2001.

M. Tech. - I Semester
(16MT13801) COMPUTER NETWORKS
(Common to CMS (PE – I) & DECS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: --
A Course on Computer Networks and Wireless Communication and Networks at UG Level

COURSE DESCRIPTION:
Advanced computer networks and its architectures; Protocols & Network security; Mobile adhoc networks.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Demonstrate in-depth knowledge on
   - Architectures and functioning of advanced computer networks like Ethernet, SONET/SDH, Wi-Fi, Frame Relay, ATM networks etc.
   - Protocols like IPv6, MPLS, RSVP, VoIP associated with advanced computer networks.
   - Security features associated with advanced computer networks.
2. Analyze various design issues for conducting research related to the Internet protocol (IP), Wireless LANs and ATM network technologies prominent in high performance scenario.
3. Design and develop techniques for solutions pertaining to the advanced networking technologies.
4. Formulate solutions for engineering problems pertaining to the advanced networking technologies.
5. Initiate research in advanced computer networks.
6. Apply appropriate techniques and tools to complex engineering activities in the field of advanced computer networks.
7. Contribute positively to multidisciplinary scientific research in design and development of Protocols for adhoc network architectures.

DETAILED SYLLABUS

UNIT- I: WIRED AND WIRELESS NETWORKS (10 Periods)
Introduction, Reference models- OSI, TCP/IP; Data Link Control Protocols - HDLC, Point to Point Protocol (PPP); Ethernet- Fast Ethernet, Gigabit Ethernet; Wireless LANS – Merits, topologies, Architecture – Physical Layer, MAC Layer, Frame structure, Applications; Virtual LANs.

UNIT- II: ADVANCED NETWORK ARCHITECTURES (13 Periods)
Circuit switching network - SONET/SDH; Virtual Circuit Networks – Frame Relay, ATM - Protocol Architecture, Logical Connections, ATM Cells, Transmission of ATM Cells, ATM Service Categories; Signaling Protocols - MPLS, RSVP; VPN architectures.

UNIT- III: INTERNET TRANSPORT AND APPLICATION PROTOCOLS (11 Periods)
Internet protocol - IPv6, Transport protocols – Connection Oriented protocol TCP, Connectionless protocol UDP; Congestion control in TCP, Domain Name System, Simple Mail Transfer Protocol, WWW and HTTP, Multimedia Applications – RTP, Voice Over IP.

UNIT- IV: SECURITY IN ADVANCED NETWORKS (10 Periods)
Network security, Cryptography - Symmetric Key Cryptography, Public Key Cryptography, Simple Network Management Protocol, Firewalls - Packet filtering, Digital Signature, IP Security.

UNIT- V: MOBILE AD-HOC NETWORKS (11 Periods)
Overview of Wireless Ad-Hoc Networks, Routing in Ad-Hoc Networks, Routing Protocols for Ad-Hoc Networks; Wireless Sensor Networks: Sensor Networks and Protocol Structures, Communication Energy Model, Clustering Protocols, Routing Protocols.

Total Periods: 55

TEXT BOOKS:

1. Behrouz A. Forouzan, "Data Communications and Networking", Tata McGraw-Hill, New Delhi, 4th edition, 2006
2. Nader F. Mir, Computer and Communication Networks, Pearson Education, 4th edition, 2007.
3. William Stallings, "Data and Computer Communication", Prentice hall, 9th edition, 2010

REFERENCE BOOKS:

1. Jim Kurose, Keith Ross, "Computer Networking: A Top Down Approach", Addison Wesley, 4th edition, July 2007.
2. Andrew S. Tanenbaum "Computer Networks", Pearson Education, 4th edition, 2008.

M. Tech.-I Semester
(16MT16102) DIGITAL SATELLITE COMMUNICATIONS
(PE-I)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES: A Course on Satellite Communications at UG level

COURSE DESCRIPTION:

Orbital mechanics and satellite sub-systems; Non-geostationary satellite systems; Demand assignment multiple access techniques and packet communications; Spread spectrum communications; Satellite applications.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate advanced knowledge in
   - Satellite Orbits and Sub-Systems
   - NGSO Constellation Designs
   - DAMA Interfaces
   - Satellite Packet Communications and ALOHA systems
   - Spread spectrum Communications
   - Satellite Applications such as VSAT, MSAT, Direct Broadcast Satellite Television.
2. Investigate and analyze engineering problems critically in the field of satellite system design and communications.
3. Design efficient Digital Satellite Systems/ Subsystems and solve engineering problems in the area of satellite communications.
4. Solve engineering problems with feasible and economical solutions in digital satellite communications.
5. Apply appropriate techniques, resources and tools to engineering activities in the field of digital satellite communications.
6. Develop ethical attitude towards environment in the field of digital satellite communications.

DETAILED SYLLABUS

UNIT– I: SATELLITE ORBITS AND SUBSYSTEMS (Periods: 11)

Overview of Satellite Communications- Brief history, Orbital Mechanics, Look Angles determination, Orbital perturbations, Apogee- Perigee heights. Geo-stationary orbits- launching orbits, launch vehicles. Satellite Sub-Systems- Attitude and Orbit Control system, TT&C subsystem, Power systems, Communication subsystems, Satellite Antenna Equipment.

UNIT– II: LOW EARTH ORBIT AND NON-GEOSTATIONARY SATELLITE SYSTEMS (Periods:10)

Introduction-Orbit Considerations, Equatorial Orbits, Inclined Orbits, Elliptical Orbits, Molniya Orbit. Coverage and Frequency Considerations- General Aspects, Frequency band, Elevation Angle Considerations, Number of Beams Per Coverage, Off-Axis Scanning, Determination of Optimum Orbital Altitude, Projected NGSO System Customer Service Base. Delay and Throughput Considerations, System considerations- Incremental Growth, Interim Operations, Replenishment Options. Operational NGSO Constellation Designs- Ellipse, Global star, New ICO, Iridium, Orbcomn, Sky bridge, Teledesic.

UNIT –III: EFFICIENT TECHNIQUES & SATELLITE PACKET COMMUNICATIONS (Periods:11)

Demand Assignment Multiple Access and Digital Speech Interpolation: The ERLANG B Formula, Types of Demand Assignments, DAMA Characteristics, Real-Time Frame Reconfiguration- Frame and Burst Structures for DA-TDMA. DAMA Interfaces, SCPC-DAMA, SPADE, Digital Speech Interpolation.

Satellite Packet Communications: Preliminaries, Message Transmission by FDMA-The M/G/1 Queue, Message Transmission by TDMA, Pure ALOHA-Satellite Packet Switching, Slotted ALOHA, Packet Reservation, Tree Algorithm.

UNIT– IV: SATELLITE SPREAD SPECTRUM COMMUNICATIONS (Periods:12)

Direct Sequence Spread Spectrum Systems- PN Sequence, Error Rate Performance in Uniform Jamming, Error Rate Performance in Pulsed Jamming. Direct Sequence Code Division Multiple Access-Sequence Synchronous DS-CDMA, Sequence Asynchronous DS-CDMA, Random Access DS-CDMA. Frequency HOP Spread Spectrum Systems-Frequency HOP Code Division Multiple Access. DS Acquisition and Synchronization, FH Acquisition and Synchronization, Satellite on Board Processing.

UNIT –V: SATELLITE APPLICATIONS (Periods: 11)

Very Small Aperture Terminal Networks: VSAT Technologies, Network Configurations, Multi-access and Networking, Network Error Control.

Mobile Satellite Networks: Operating Environment, MSAT Network Concept, CDMA MSAT Network, Statistics of Mobile Propagation.

Direct Broadcast Satellite Television and Radio

C-Band and Ku-Band Home Satellite TV, Digital DBS TV, DBS-TV System Design, DBS-TV Link Budget, Error Control in Digital DBS-TV, Master Control Station and Uplink, Installation of DBS-TV Antennas, Satellite Radio Broadcasting. **Total periods: 55**

TEXT BOOKS:

1. Timothy Pratt, Charles Bostian, Jeremy Allnutt, *"Satellite Communications",* John Wiley & Sons, 2nd edition, 2003.
2. Tri T. Ha, *"Digital Satellite Communications",* McGraw-Hill, 2nd edition, 1999.

REFERENCE BOOKS:

1. Dennis Roddy,*"Satellite Communications",* Tata McGraw-Hill Education Private Limited, 4th edition, 2009.
2. Wilbur L. Pritchard, H.G. Suyderhoud , Robert A.Nelson,*"Satellite Communication Systems Engineering"*, Pearson Publications, 2nd edition, 2008.

M. Tech. -I Semester
(16MT16103) SOFTWARE DEFINED RADIO
(PE-I)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES:
A Course on Wireless Communication, Digital Signal Processing and Antennas at UG Level.

COURSE DESCRIPTION:
Principles of software defined radio; Multirate digital filter banks; Analysis and Synthesis of signals performance; Smart antennas with applications.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Demonstrate advanced knowledge in the evolving paradigm of Software defined radio and technologies for its implementation.
2. Analyze complex problems critically in the domains of Radio frequency Implementation issues, multirate signal processing in SDR, as well as Smart antenna techniques for better spectrum exploitation for conducting research.
3. Design a Software defined Radio System/ Subsystem for public needs.
4. Initiate research in Software Defined Radio.
5. Apply appropriate techniques for the development of scientific and technological knowledge in designing software defined radios and their usage for cognitive radio.
6. Contribute to multidisciplinary scientific work in the fields of Satellite and Microwave Communications.
7. Understand ethical responsibility towards environment and society in the field of SDR.

DETAILED SYLLABUS

UNIT–I: INTRODUCTION TO SOFTWARE RADIO CONCEPTS (Periods:11)
The need for Software radios and its definition, Characteristics and benefits of Software radio, Design principles of a software radio.

Radio Frequency Implementation Issues: Purpose of RF front – end, Dynamic range, RF receiver front – end topologies, Enhanced flexibility of the RF chain with software radios, Importance of the components to overall performance, Transmitter architectures and their issues, Noise and distortion in the RF chain, ADC & DAC distortion, Pre-distortion, Flexible RF systems using micro-electromechanical systems.

UNIT – II: MULTIRATE SIGNAL PROCESSING IN SDR (Periods:11)
Sample rate conversion principles, Polyphase filters, Digital filter banks, Timing recovery in digital receivers using multirate digital filters.

Digital Frequency Up- and Down Converters- Introduction- Frequency Converter Fundamentals-Digital NCO- Digital Mixers- Digital Filters- Half band Filters- CIC Filters- Decimation, Interpolation, and Multirate Processing-DUCs - Cascading Digital Converters and Digital Frequency Converters.

UNIT -III: DIGITAL GENERATION OF SIGNALS (Periods:11)
Introduction, Comparison of direct digital synthesis with analog signal synthesis, Approaches to direct digital synthesis, Analysis of spurious signals, Spurious components due to periodic jitter, Band pass signal generation, Performance of direct digital synthesis systems, Hybrid DDS – PLL Systems, Applications of direct digital synthesis, Generation of random sequences, ROM compression techniques.

UNIT – IV: SMART ANTENNAS USING SOFTWARE RADIO (Periods:11)
Introduction, Vector channel modeling, Benefits of smart antennas, Structures for beam forming systems, Smart antenna algorithms, Diversity and Space time adaptive signal processing, Algorithms for transmit STAP, Hardware implementation of smart antennas, Array calibration, Digital Hardware Choices-Key hardware elements, DSP processors, FPGAs, Power management issues.Applying Software Radio Principles to Antenna Systems-Smart Antenna Architectures- Optimum Combining/ Adaptive Arrays- DOA Arrays- Beam Forming for CDMA- Downlink Beam Forming.

UNIT – V: OBJECT ORIENTED REPRESENTATION OF RADIOS AND NETWORK (Periods:11)
Networks, Object –oriented programming, Object brokers, Mobile application environments, Joint Tactical radio system.

Case Studies in Software Radio Design: SPEAKeasy, JTRS, WirelessInformation transfer system, SDR-3000 digital transceiver subsystem, Spectrum Ware, Brief introduction to Cognitive Networking.

Total periods: 55

TEXT BOOKS:

1. Jeffrey Hugh Reed, "*Software Radio: A Modern Approach to Radio Engineering*," Prentice Hall PTR, 2002.
2. Paul Burns, "*Software Defined Radio for 3G*," Artech House, 2003.

REFERENCE BOOKS:

1. Tony J Rouphael, "*RF and Digital Signal Processing for Software-Defined Radio*," Elsevier Newnes Press, 2009.
2. P. Kenington, "*RF and Baseband Techniques for Software Defined Radio*," Artech House, 2005.
3. Jouko Vankka,"*Digital Synthesizers and Transmitter for Software Radio*", Springer, 2005.

M. Tech. -I Semester
(16MT13807)TRANSFORM TECHNIQUES
(Common to CMS & DECS)
(PE-I)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES:
Course on Signal Processing at UG Level.

COURSE DESCRIPTION:
Continuous Wavelet Transforms; Discrete Wavelet Transforms; Multi Resolution Analysis; Wavelet packets; Applications of Wavelet Transforms.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Gain in-depth knowledge in
    - Multiresolution Analysis
    - Continuous wavelets
    - Discrete wavelets and Filter design.
    - Alternative Wavelets & Wavelet packets
2. Analyze complex engineering problems critically in the area of Signal Processing and communications.
3. Design, conduct experiments, analyze and interpret complex engineering problems and apply appropriate research methodologies for conducting research in Signal Processing.
4. Solve engineering problems with wide range of solutions in the areas of Biomedical Signal Processing, Image Processing, Radar Signal Processing and Communications and arrive at optimum solutions.
5. Initiate research in Transform Techniques.
6. Use appropriate techniques, resources and tools to engineering activities in the fields of Signal Processing and Communications.
7. Contribute to collaborative multidisciplinary scientific work/research by initiating research work on Data compression, Noise reduction, Communications, Image and signal Processing.

DETAILED SYLLABUS

UNIT –I: (14 Periods)

Review of Transforms:
Fourier series and Geometry- Vector space, functions and function spaces. Fourier transform, short-time Fourier transform, Walsh, Hadamard, Haar, Slant, KLT, Hilbert transforms.

Continuous Wavelet Transform:
Introduction, Continuous-Time Wavelets, Definition of the CWT, The CWT as a correlation, Constant Q-Factor Filtering Interpretation and Time-Frequency Resolution, The CWT as an operator, Inverse CWT.

UNIT –II: DISCRETE WAVELET TRANSFORM AND ORTHOGONAL WAVELET DECOMPOSITION (08 Periods)
Introduction, Approximations of vectors in nested linear vector spaces, Example of an MRA-Bases for the Approximation Subspaces and Harr Scaling Function, Bases for the Detail Subspaces and Harr Wavelet, Digital Filter Implementation of the Harr Wavelet Decomposition.

UNIT –III: MRA ORTHONORMAL WAVELETS, AND THEIR RELATIONSHIP TO FILTER BANKS (12 Periods)
Introduction, Formal Definition of an MRA, Construction of a General Orthonormal MRA, A Wavelet basis for MRA, Digital Filtering Interpretation, Examples of Orthogonal Basis Generating Wavelets, Interpreting Orthonormal MRAs for Discrete time signals, Miscellaneous issues Related to PRQMF Filter Banks, Generating Scaling Functions and Wavelets from Filter Coefficients.

UNIT-IV: ALTERNATIVE WAVELET REPRESENTATIONS (09 Periods)
Bi-orthogonal Wavelet Bases, Filtering Relationship for Bi-orthogonal Filters, Examples of Bi-orthogonal Scaling Functions and Wavelets, Two-Dimensional Wavelets, Non-separable Multidimensional Wavelets, Wavelet Packets.

UNIT–V: APPLICATIONS OF WAVELETS (11 Periods)
Wavelet De-noising, Speckle Removal, Edge Detection and Object Isolation, Image Fusion, Object Detection by Wavelet Transforms of Projections, Communication Applications-Scaling Functions as signaling pulses, Discrete Wavelet Multitone Modulation. **Total Periods: 54**

TEXT BOOKS:

1. Raghuveer M.Rao and Ajit S.Bopardikar, "*Wavelet Transforms-Introduction theory and applications*", Pearson Education, 1998.
2. Soman.K.P, Ramachandran.K.I, Resmi.N.G, "*Insight into Wavelets from theory to Practice*", PHI, 3rd edition, 2010.

REFERENCE BOOKS:

1. R. C. Gonzalez, R. E. Woods, "*Digital Image Processing*," Pearson Education, 2nd edition, 1992.
2. Jaideva C Goswami, Andrew K.Chan, "*Fundamentals of Wavelets-Theory, Algorithms and Applications*", John Wiley and sons, 1999.
3. C.Sidney Burrus, Ramesh A Gopinath and Haitao Guo, "*Introduction to Wavelets and Wavelet Transforms*", Prentice Hall, 1998.

M. Tech. - I SEMESTER
(16MT16131) COMMUNICATIONS LAB-I

Int. Marks	Ext. Marks	Max. Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES: Simulation Lab at UG Level

COURSE DESCRIPTION:

Design and simulation of communication systems - Baseband Communication Systems with Optimum terminal filters, QPSK communication system for AWGN channel, Baseband Direct Sequence Spread Spectrum (DS/SS) System; Generation of different density and distribution functions; Generation of maximal and Gold code sequences.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Gain advanced knowledge in
   - Generation of Maximal and Gold Sequences & verification of their properties.
   - Design of communication system for band limited channels for Zero ISI.
   - Evaluating the performance of QPSK over AWGN Channel, 16MPSK and 16QAM.
   - Simulation of Code matched filter in Spread Spectrum Communication System.
   - Design of Baseband Communication Systems with Optimum terminal filters.
   - Simulation of baseband Direct Sequence Spread Spectrum (DS/SS) System.
   - Equalization of Multipath Channel using LMS or RLS Algorithms.
2. Analyze complex and critical engineering problems in the field of communications.
3. Use MATLAB Toolbox to simulate complex engineering activities in the field of communication.
4. Demonstrate knowledge and understanding of engineering principles to execute the Projects effectively in the field of communications.
5. Understand ethical responsibility towards environment & society in the field of communications.
6. Communicate effectively in verbal & written forms.

LIST OF EXERCISES:

1. Generation of discrete time independent and identically distributed (IID) random processes with different distributions (Bernoulli, Binomial, Geometric, Poisson, Uniform, Gaussian, Exponential, Laplacian, Rayleigh, Rician). (2 time slots)
2. Communication system Design for Band limited Channels: System design for Zero ISI. (2 time slots)
3. Design of Baseband Communication Systems with Optimum terminal filters. (2 time slots)
4. Simulation of QPSK communication system and performance evaluation for AWGN channel. (1time slot)
5. Simulation of Maximal sequences of any length and verification of their properties. (1 time slot)
6. Generation of Gold codes, and verification of auto-correlation & cross correlation properties. (1 time slot)
7. Design and simulation of code matched filter in spread spectrum communication system. (2time slots)
8. Comparison of 16-MPSK and 16-QAM. (1time slot)
9. Design and simulation of baseband Direct Sequence Spread Spectrum (DS/SS) System. (2 time slots)
10. Equalization of Multipath Channel using LMS or RLS Algorithms. (1 time slot)

Total Time Slots: 14

Tools:

Numerical Computing Environments–GNU Octave or MATLAB

REFERENCE BOOKS:

1. W.H. Tranter, K. Sam Shanmugham, T.S. Rappaport, and K.L. Kosbar, "*Principles of Communication System Simulation with Wireless Applications*", Pearson,3 rd edition, 2004.
2. J.G. Proakis, and M. Salehi, "*Contemporary Communication Systems using MATLAB*", Bookware Companion Series,2 nd edition, 2006.
3. John G. Proakis, "*Digital Communications*", McGraw Hill, 4th edition, 2001.

M. Tech. - I SEMESTER
(16MT16132) RF CIRCUITS & OPTICAL COMMUNICATIONS LAB

Int. Marks	Ext. Marks	Max. Marks	L	T	P	C
50	50	100	-	-	4	2

PRE- REQUISITES:
Antennas, Microwaves and Optical Communication lab at UG level

COURSE DESCRIPTION:
Design and simulation of Various antennas; Measurement of various parameters; characteristics of couplers; non-ideal behaviour of lumped circuit components; characteristics of microwave passive components; Measurement of 4 channel CWDM using modulation; PC to PC communication; Characterization of Optial circulator and Bragg-grating.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Demonstrate advanced knowledge required in
   - Measurement of Impedance, Coupling and cross talk in 3 wire pickup.
   - Design and simulation of different antennas.
   - Design and measurement of PC to PC communication.
   - Characterization of branch line directional copupler, capacitive coupling and inductive coupling.
   - Study of non ideal behaviour of lumped circuit components, 3 dB power divider and filters.
   - Designing WDM system and measurement of 4 channel CWDM by internal and external modulation.
   - Wavelength division multiplexing & de-multiplexing of analog/digital signals over 1310 nm and 1550 nm wavelengths.
2. Analyse of engineering problems for feasible and optimal solutions in the core area of RF, Microwave and Optical Communications.
3. Use RF Spice Pro Software to complex engineering activities in the domain of RF, Microwave and Optical communications.
4. Demonstrate Knowledge and understanding of Engineering Principles to execute the Projects effectively in the field of RF, Microwave and Optical communications.
5. Understand ethical responsibility towards environment & society in the field of communications.
6. Communicate effectively in verbal & written forms in the core area of RF, Microwave and Optical communications

LIST OF EXERCISES:

1. Measurement of Frequency, Wavelength and Impedance.
2. Characteristics of branch line directional coupler.
3. Measurement of coupling & cross talk in 3 wire pick up.
4. Characterization of current probe with capacitive coupling or inductive coupling.
5. Study of non-ideal behaviour of lumped circuit components.
6. Measure characteristics of passive components such as attenuator, isolator, coupler and WDM.
7. Characterization of Optial circulator and Bragg-grating.
8. Measurement of 4 channel CWDM by internal & external modulation.
9. Wavelength division multiplexing & de-multiplexing of analog/digital signals over 1310 nm and 1550 nm wavelengths.
10. Design and Simulate any patch antenna given by the faculty in the lab.

Total Time slots : 10

TOOLS REQUIRED:
RF Spice Pro simulation software, MIC System, Motorized microstrip transmission line trainer, advanced fiber optic lab with Fiber optic laser source, passive component, cable dispersion, DWDM and bragg grating modules.

REFERENCE BOOKS:

1. RF Circuit & Optical Communications lab-II manual of the department.
2. RF Spice Pro User Manual
3. Devendra K. Misra, "Radio Frequency and Microwave Communication Circuits Analysis and Design", Wiley Student Edition, John Wiley & Sons, 2nd edition, July 2004.
4. S.E.Miller, A.G.Chynoweth, *Optical Fiber Telecommunication,* 1979.

M. Tech. – I Semester
(16MT13808) RESEARCH METHODOLOGY
(Common to all M. Tech. Programs)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	-	2	-	-

PREREQUISITES: --

COURSE DESCRIPTION:

Overview of Research, research problem and design, various research designs, data collection methods, statistical methods for research, importance of research reports and its types.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Acquire in-depth knowledge on
   - Research design and conducting research
   - Various data collection methods
   - Statistical methods in research
   - Report writing techniques.
2. Analyze various research design issues for conducting research in core or allied areas.
3. Formulate solutions for engineering problems by conducting research effectively in the core or allied areas.
4. Carryout literature survey and apply research methodologies for the development of scientific/technological knowledge in one or more domains of engineering.
5. Select and Apply appropriate techniques and tools to complex engineering activities in their respective fields.
6. Write effective research reports.
7. Develop attitude for lifelong learning to do research.
8. Develop professional code of conduct and ethics of research.

DETAILED SYLLABUS:

Unit-I: Introduction to Research Methodology (Periods: 5)

Objectives and Motivation of Research, Types of Research, Research Approaches, Research Process, Criteria of good Research, Defining and Formulating the Research Problem, Problem Selection, Necessity of Defining the Problem, Techniques involved in Defining a Problem.

Unit-II: Research Problem Design and Data Collection Methods (Periods: 7)

Features of Good Design, Research Design Concepts, Different Research Designs, Different Methods of Data Collection, Data preparation: Processing Operations, Types of Analysis.

Unit-III: Statistics in Research (Periods: 6)

Review of Statistical Techniques - Mean, Median, Mode, Geometric and Harmonic Mean, Standard Deviation, Measure of Asymmetry, ANOVA, Regression analysis.

Unit-IV: Hypothesis Testing (Periods: 7)

Normal Distribution, Properties of Normal Distribution, Basic Concepts of Testing of Hypothesis, Hypothesis Testing Procedure, Hypothesis Testing: t-Distribution, Chi-Square Test as a Test of Goodness of Fit.

Unit-V: Interpretation and Report Writing (Periods: 3)

Interpretation – Techniques and Precautions, Report Writing – Significance, Stages, Layout, Types of reports, Precautions in Writing Reports.

Total Periods: 28

TEXT BOOK:

1. C.R. Kothari, "*Research Methodology: Methods and Techniques*," New Age International Publishers, New Delhi, 2nd Revised Edition, 2004.

REFERENCE BOOKS:

1. Ranjit Kumar, "*Research Methodology: A step-by-step guide for beginners*," Sage South Asia, 3rd ed., 2011.
2. R. Panneerselvam, "Research Methodology," PHI learning Pvt. Ltd., 2009

M. Tech. -II Semester
(16MT26101) ADAPTIVE SIGNAL PROCESSING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES:
A Course on Signal Processing at UG Level

COURSE DESCRIPTION: Development of adaptive filter theory: Method of steepest descent, Least-Mean-Square Algorithm, recursive least square algorithm, Kalman filtering algorithm and order-recursive adaptive filters.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Demonstrate in-depth knowledge in
   - Adaptive systems
   - Linear Optimum Filters
   - steepest descent
   - LMS,RLS Algorithms
   - Kalman filtering
   - Order-recursive adaptive filtering
   - Blind deconvolution
2. Analyze problems critically in the field of adaptive signal processing.
3. Design an Optimum adaptive filter for solving problems in the field of analog and digital communications.
4. Solve engineering problems and arrive at optimal solutions pertaining to communications.
5. Initiate research in adaptive signal processing.
6. Apply appropriate techniques to complex engineering activities in the field of signal processing and communications.
7. Contribute to multidisciplinary scientific work in the field of communications, Bio-Medical, Instrumentation, and control engineering.

DETAILED SYLLABUS

UNIT I: INTRODUCTION TO ADAPTIVE SYSTEMS & DEVELOPMENT OF ADAPTIVE FILTER THEORY **(Periods: 10)**
Eigen Value Problem, Properties of eigen values and eigen vectors(proof is not required), Eigen Filters, eigen Value computations. The Filtering problem,Linear Optimum Filters, Adaptive Filters, Linear Filter sturucters, Approaches to the development of linear adaptive filters. Linear Optimum Filtering: Statement of the problem, Principle of Orthogonality, Minimum Mean Square Error, Wiener- Hopf equations, Error- Performance Surface.

UNIT-II METHOD OF STEEPEST DESCENT **(Periods: 7)**
Basic Idea of Steepest-Descent Algorithm, Steepest-Descent Algorithm applied to the Wiener Filter, Stability of the Steepest-Descent Algorithm, Examination of the transient behavior of the Steepest-Descent Algorithm, the Steepest-Descent Algorithm as a deterministic search method, Virtue and limitation of the Steepest-Descent Algorithm.

UNIT III: LEAST-MEAN-SQUARE ADAPTIVE FILTERS AND RECURSIVE LEAST- SQUARES ADAPTIVE FILTERS **(Periods: 12)**
Overview of the structure and operation of the Least-Mean-Square Algorithm, Least-Mean-Square adaptation Algorithm, Applications-Adaptive Noise cancelling Applied to a Sinusoidal Interference and Adaptive Beam forming, Comparison of the LMS Algorithm with Steepest-Descent Algorithm.
Matrix Inversion lemma, exponentially weighted recursive least square algorithm, update recursion for the sum of weighted error squares, Single-Weight Adaptive Noise Canceller convergence analysis of RLS Algorithm.

UNIT IV: KALMAN FILTERING & NON LINEAR ADAPTIVE FILTERING **(Periods: 16)**
Recursive Minimum Mean-Square Estimation for Scalar Random variables, Statement of Kalman filtering problem, The Innovations Process, estimation of the state using the Innovations Process, Filtering, Initial conditions.
An overview of the Blind Deconvolution problem, Buss Gang Algorithm for blind Equalization.

UNIT V: ORDER-RECURSIVE ADAPTIVE FILTERS **(Periods: 10)**
Gradient-Adaptive Lattice Filter, order-recursive adaptive filters using least square estimation, adaptive forward linear prediction, adaptive backward linear prediction, conversion factor, least-square lattice predictor, angle-normalized estimation errors, first order state space models for lattice filtering.

Total periods: 55

TEXT BOOK:

1. Simon Haykin, *"Adaptive Filter Theory",* Pearson Education, 4th edition, 2002.

REFERENCE BOOK:

1. Bernard Widrow, Samuel D. Strearns, *"Adaptive Signal Processing",* Pearson Education, 1985.

M. Tech.-II Semester
(16MT23801) DETECTION AND ESTIMATION OF SIGNALS
(Common to CMS & DECS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES:
A Course on Probability and Stochastic Processes at UG Level
COURSE DESCRIPTION:
Decision criteria for single and multiple observations; Estimation techniques; Properties of estimators; parameter Estimation.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
1. Demonstrate advanced knowledge in
   - Different decision criteria
   - Estimation techniques and their properties
   - Selection of a good estimator for the given specifications.
   - Kalman Filter
   - Statistical estimation of parameters
2. Analyze complex engineering problems critically for conducting research in the field of signal detection and estimation.
3. Design optimum filters for solving problems in the field of Communications.
4. Solve engineering problems to obtain solutions for the design of optimum receivers.
5. Initiate research in detection and estimation of signals.
6. Apply appropriate techniques, resources to complex engineering activities in the field of Communications.
7. Contribute to multidisciplinary scientific work in the field of Communications and Radar Systems.

DETAILED SYLLABUS
UNIT– I: Detection Theory **(12 Periods)**
Binary Decisions: Single observation**–**Maximum-likelihood decision criterion, Neyman-Pearson criterion, Receiver operating characteristics, Probability-of-error criterion, Bayes risk criterion, Min-max criterion.
UNIT – II: Binary Decisions: Multiple Observations **(11 Periods)**
Vector observations, the general Gaussian Problem, Waveform Observation in Additive Gaussian Noise, The Integrating Optimum Receiver, Matched Filter Receiver.
UNIT -III: Estimation Theory **(12 Periods)**
Maximum-likelihood estimation, Bayes estimation criterion - Mean Square Error Criterion, Uniform Cost Function, Absolute-Value Cost Function. Linear minimum-Variance and Least Squares Method, Estimation in the presence of Gaussian noise - Linear observation, Non-linear estimation.
UNIT – IV: Properties of Estimators (**10 Periods)**
Bias, Efficiency, Cramer-Rao bound, Asymptotic properties, Sensitivity and error analysis.
UNIT–V: State Estimation & Statistical Estimation of Parameters **(10 periods)**
State Estimation: Prediction, Kalman filter, Problem solving.
Statistical Estimation of Parameters: Concept of sufficient statistics, Exponential families of Distributions, Exponential families and Maximum likelihood estimation, uniformly minimum-variance unbiased estimation. **Total periods: 55**

TEXT BOOKS:

1. James L.Melsa & David L.Cohn, "Decision and Estimation Theory", McGraw-Hill, 1978.
2. Steven M. Kay, "Statistical Signal Processing Vol. 1: Estimation Theory, Prentice Hall, 1993, Vol. 2: Detection Theory", Prentice Hall Inc., 1998.

REFERENCE BOOKS:

1. Harry L. Van Trees, "Detection, Estimation and Modulation Theory", Part 1, John Wiley & Sons Inc. 1968.
2. Jerry M. Mendel, "Lessons in Estimation Theory for Signal Processing, Communication and Control", Prentice Hall Inc., 1995.
3. Sophocles J.Orfanidis, "Optimum Signal Processing", McGraw-Hill, 2nd edition, 1988.

M. Tech.-II Semester
(16MT13804) IMAGE & VIDEO PROCESSING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES:
A Course on Digital Communications & Digital Signal Processing at UG Level

COURSE DESCRIPTION:
Image Fundamentals and its transforms; image enhancement techniques; Image compression, Image Restoration & Image Segmentation; Video Processing basics like Representation, Sampling, Motion estimation, Filtering and Compression.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Gain in-depth knowledge in
   a. Image Transforms
   b. Image Enhancement & Restoration Techniques
   c. Image Segmentation & Compression Techniques
   d. Video Processing
2. Analyze complex engineering problems critically in the domain of Image Processing for conducting research.
3. Solve engineering problems for feasible and optimal solutions in the core area of Image Processing.
4. Initiate research in image and video processing.
5. Apply appropriate tools and techniques to complex engineering activities in the field of Image Processing.
6. Contribute positively to multidisciplinary scientific research in Image Processing.

DETAILED SYLLABUS

UNIT I: FUNDAMENTALS OF IMAGE PROCESSING AND IMAGE TRANSFORMS: (10 Periods)
Fundamental steps in Image Processing, Gray scale and color Images, image sampling and quantization, **2-D Transforms:** DFT, Walsh, Hadamard, Haar, KLT, DCT.

UNIT II: IMAGE ENHANCEMENT & RESTORATION: (10 Periods)
Enhancement: Intensity transformation functions, Filters in spatial and frequency domains, histogram processing, homomorphic filtering.
Restoration: Image Degradation Model, Restoration in presence of noise only- spatial filtering, inverse filtering, Wiener filtering and Constrained least squares filtering.

UNIT III: IMAGE COMPRESSION & IMAGE SEGMENTATION: (13 Periods)
Image compression fundamentals -Redundancies, Compression models: Lossy & Lossless, Arithmetic coding, Bit plane coding, Run length coding, symbol based coding, Transform coding, fidelity criteria.
Segmentation: Fundamentals, Point, line and edge detection, Thresholding, Region based segmentation.

UNIT IV: VIDEO PROCESSING - I (11 Periods)
Analog Video, Digital Video. Time-Varying Image Formation models: Three-Dimensional Motion Models, Geometric Image Formation, Photometric Image Formation, Sampling for Analog and Digital Video, Two-Dimensional Rectangular Sampling, Two-Dimensional Periodic Sampling, Sampling on 3-D Structures, Reconstruction from Samples.

UNIT V: VIDEO PROCESSING -II (10 Periods)
Motion Estimation: 2-D Motion vs. Apparent Motion, 2-D Motion Estimation, Methods Using the Optical Flow Equation. Video filtering: motion compensated filtering, noise filtering, restoration, video compression standards. **Total periods: 54**

TEXT BOOKS:

- Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing, Pearson Education, 3rd edition, 2008.
- A. Murat Tekalp, Digital Video Processing, Prentice-Hall, 1995.

REFERENCE BOOKS:

1. R. C. Gonzalez, R. E. Woods, Digital Image Processing, Pearson Education, 2nd edition, 2002.
2. Anil K. Jain, 'Fundamentals of Digital Image Processing', Pearson Education, Inc., 2002.

M. Tech. - II Semester
(16MT26102) SMART ANTENNAS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: --
A Course on Antennas and Wave Propagation at UG Level
COURSE DESCRIPTION:
Smart antenna configurations and architecture; Beam forming methods; Direction of Arrival (DOA) estimating methods, simulation of smart antennas and space time processing.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
1. Demonstrate in-depth knowledge on
    - Smart antenna architecture and configurations
    - Methods of estimating DOA
    - Beam forming techniques
    - Design and simulation of smart antennas
    - Space time processing
2. Analyze various design issues for conducting research related to smart antennas.
3. Design and develop smart antennas for wireless applications.
4. Formulate solutions for engineering problems pertaining to smart antennas in the field of communication.
5. Apply appropriate techniques to complex engineering activities in the field of Smart antennas.

DETAILED SYLLABUS
UNIT -I: SMART ANTENNAS (Periods: 10)
Introduction, Need for Smart Antennas, Overview, Smart Antenna Configurations- Switched Beam Antennas, Adaptive Antenna Approach. Space Division Multiple Access (SDMA), Architecture of a Smart Antenna System- Receiver, Transmitter. Benefits and Drawbacks, Basic Principles, Mutual Coupling Effects.
UNIT -II: DOA ESTIMATION FUNDAMENTALS (Periods: 12)
Introduction, Array Response Vector, Received Signal Model, Subspace-Based Data Model, Signal Autocovariance matrices, Conventional DOA Estimation Methods- Conventional Beamforming Method, Capon's Minimum Variance Method. Subspace Approach to DOA Estimation- MUSIC Algorithm, ESPRIT Algorithm. Uniqueness of DOA Estimates.
UNIT -III: BEAM FORMING FUNDAMENTALS (Periods: 10)
Classical Beam former, Statistically Optimum Beamforming Weight Vectors- Maximum SNR Beam former, Multiple Sidelobe Canceller and Maximum, SINR Beam former, Minimum Mean Square Error (MMSE), Direct Matrix Inversion (DMI), Linearly Constrained Minimum Variance (LCMV). Adaptive Algorithms for Beamforming
UNIT -IV: INTEGRATION AND SIMULATION OF SMART ANTENNAS (Periods: 11)
Overview, Antenna Design, Mutual Coupling, Adaptive Signal Processing Algorithms- DOA, Adaptive Beam forming, Beam forming and Diversity Combining for Rayleigh-Fading Channel. Trellis-Coded Modulation (TCM) for Adaptive Arrays, Smart Antenna Systems for Mobile Ad Hoc Networks (MANETs)- Protocol, Simulations. Discussion.
UNIT -V: SPACE–TIME PROCESSING (Periods: 12)
Introduction, Discrete Space–Time Channel and Signal Models, Space–Time Beamforming, Intersymbol and Co-Channel Suppression, Space–Time Processing for DS-CDMA, Capacity and Data Rates in MIMO Systems, Discussion.

Total Periods: 55

TEXT BOOKS:

1. Constantine A. Balanis & Panayiotis I. Ioannides, "*Introduction to Smart Antennas*", Morgan & Claypool Publishers, 2007.
2. Joseph C. Liberti Jr., Theodore S Rappaport , "*Smart Antennas for Wireless Communications :IS-95 and Third Generation CDMA Applications*", Prentice Hall PTR, 1999

REFERENCE BOOKS:

1. T.S Rappaport ,"*Smart Antennas: Adaptive Arrays, Algorithms, & Wireless Position Locations*", IEEE press, 1998.
2. Lal Chand Godara, " *Smart Antennas*", CRC Press LLC, 2004.

M. Tech. - II Semester
(16MT23805) WIRELESS COMMUNICATIONS
(Common to CMS & DECS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES: A Course on Digital Communications at UG Level.

COURSE DESCRIPTION:
Introduction to cellular wireless communication; Radio propagation in mobile atmosphere; Equalization along with Diversity techniques; several access techniques; Introduction to wireless networking; Multicarrier modulation techniques.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Demonstrate advanced knowledge in
   - Cellular systems and wireless standards
   - Radio wave propagation in wireless environment
   - Equalization and diversity techniques
   - Multiple access techniques and networking
   - Multicarrier modulation
2. Analyze complex engineering problems critically for conducting research in wireless systems.
3. Design a Digital Communication System/ Subsystem for societal needs.
4. Solve engineering problems with wide range of solutions in wireless communications.
5. Apply appropriate techniques to engineering activities in the field of wireless communications.

DETAILED SYLLABUS

UNIT-I:INTRODUCTION TO WIRELESS COMMUNICATION SYSTEMS AND CELLULAR CONCEPT (Periods:11)
Evolution of Mobile Radio Communication Systems, Examples of Wireless Communication Systems, 1G, 2G, 2.5G,3G and 4G Wireless Cellular Networks and Standards, Frequency Reuse Concept, Channel Assignment Strategies, Interference and System Capacity, Trunking and Grade of Service, Improving Coverage and Capacity in Cellular Systems-cell splitting and sectoring. Problem solving.

UNIT – II: MOBILE RADIO PROPAGATION (Periods:11)
Large Scale Path Loss: Introduction, Free Space Propagation Model, Relating Power to Electric field, Propagation Mechanisms – Reflection, Diffraction, and Scattering. Practical Budget Design using Path Loss Models, Outdoor and Indoor Propagation Models. Problem solving.
Small Scale Fading and Multipath: Small Scale Multipath Propagation, Impulse Response Model of a Multipath Channel, Small Scale Multipath Measurements, Parameters of Mobile Channels, Types of Small Scale Fading (all variations) Statistical Models– Clarke's Model for Flat Fading, and Jake's Model. Problem solving.

UNIT -III: EQUALIZATION & DIVERSITY TECHNIQUES (Periods:11)
Equalization: Introduction, Survey of Equalization Techniques, Linear and Non-linear Equalizers – Linear Transversal Equalizer, Decision Feedback Equalizer (DFE). Algorithms for Adaptive Equalization – Zero Forcing, LMS, and RLS. Problem solving.
Diversity Techniques: Realization of Independent Fading Paths, Receiver Diversity – System Model, Selection Combining, Threshold Combining, Maximal Ratio Combining, and Equal Gain Combining, Rake receiver. Transmit Diversity–Channel known at Transmitter, Channel unknown at Transmitter – the Alamouti Scheme, analysis.

UNIT–IV: MULTIPLE ACCESS TECHNIQUES & NETWORKING (Periods:11)
Introduction to Multiple Access: FDMA, TDMA, CDMA, SDMA, Packet Radio- Pure ALOHA, Slotted ALOHA, CSMA, and Reservation protocols. Capacity of Cellular Systems- Cellular CDMA. Problem Solving.
Introduction to Wireless Networking: Introduction to Wireless Networks, Differences between Wireless and Fixed Telephone Networks, Development of Wireless Networks, Traffic Routing in Wireless Networks, Wireless Data Services, Common Channel Signaling.

UNIT – V: MULTICARRIER MODULATION (Periods:11)
Data Transmission using Multiple Carriers, Multicarrier Modulation with Overlapping Sub channels, Discrete Implementation of Multicarrier Modulation –
DFT and its properties, The Cyclic Prefix, Orthogonal Frequency Division Multiplexing (OFDM), Matrix Representation of OFDM, Vector Coding. Challenges in Multicarrier Systems. Problem solving.
MIMO and multicarrier modulation: Narrowband MIMO model-parallel decomposition of MIMO channel-MIMO channel capacity-MIMO diversity gain –data transmission using multiple carriers multicarrier modulation with overlapping sub channels-mitigation of subcarrier fading.

Total periods: 55

TEXT BOOKS:

1. T. S. Rappaport, "Wireless Communications, Principles and Practice," Prentice Hall, 2nd edition, 2002.
2. Andrea Goldsmith, "Wireless Communications," Cambridge University Press, 2005.

REFERENCE BOOKS:

1. David Tse, Pramod Viswanath, "Fundamentals of Wireless Communications," Cambridge University Press, 2006.
2. Dr. KamiloFeher, "Wireless Digital Communications," Prentice Hall, 1995.
3. Raj Pandya, "Mobile and Personal Communication Systems and Services," Prentice Hall of India, 2002.
4. William C.Y. Lee, "Wireless and Cellular Telecommunications," McGraw-Hill, 3rd edition, 2006.

M. Tech. -II Semester
(16MT26103) EMI/EMC
(PE – II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES:
Courses on Electromagnetic waves and Transmission lines, Antennas and wave propagation & Microwave engineering at UG Level.

COURSE DESCRIPTION:
Electromagnetic interference & compatibility; EMI/EMC Standards; Radiated Interference Measurement; Conducted Interference Measurement; Effects of Grounding, Shielding, Bonding; EMI Filters; EMI Cables; EMI Connectors; EMI Components.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:
1. Demonstrate in-depth knowledge in
   - electromagnetic interference effects
   - standards of EMC
   - Radiated and conducted interference measurements
   - Effects of grounding at high frequencies
   - EMC Filters, Cables, Connectors, and Components
2. Analysis and design of electronic systems for real time applications.
3. Solve engineering problems and arrive at optimal solutions pertaining to EMI/EMC.
4. Initiate research in electromagnetic interference and compatibility.
5. Apply appropriate techniques to complex engineering activities in the field of electronic systems.
6. Ability to contribute multidisciplinary scientific research on radiated measurements.
7. Demonstrate knowledge and understanding of effects of Electromagnetic Interference and apply the same in practice, manage projects effectively in practical implementing issues.
8. Understand ethical responsibility towards environment and society in the field of communication applications.

DETAILED SYLLABUS

UNIT-I: Introduction and Sources of EMI and Non ideal Behavior of Components (12 periods)
Concepts and Definition of EMI and EMC, Natural and man-made EMI sources - Lighting Discharge, Electrostatic Discharge, Electromagnetic Pulse, Transient EMI, Time domain vs frequency domain EMI, Units of measurement parameters. Non-ideal behavior of components-Wires, printed circuit board (PCB) lands, effect of component leads, resistors, capacitors, inductors.

UNIT-II: EMI/EMC Standards and Open Area Test Sites (10 periods)
Introduction - Standards for EMI/EMC, MIL-STD 461 /462, IEEE/ANSI Standards, CISPR/IEC Standards, FCC regulations. Open area test sites- open area test site measurements, Measurement precautions, open area test site, Terrain Roughness, Normalized Site Attenuation, Measurement of test site imperfections, Antenna factor measurement, Measurement errors.

UNIT-III: Radiated Interference and Conducted Interference Measurements (11 periods)
Radiated Interference measurements-Anechoic chamber, Transverse Electromagnetic Cell, Reverberating chamber, Giga-Hertz TEM Cell, Comparison of test facilities. Conducted Interference measurements-Characterization of conduction currents/voltages, Conducted EM noise on power supply lines, Conducted EMI from equipment, Immunity to conducted EMI, Detectors and measurement.

UNIT-IV: Grounding, Shielding and Bonding (12 periods)
Grounding - Principles and Practice of Earthing, Precautions in Earthing, Measurements of ground resistance, System grounding for EMC, Cable shield Grounding. Shielding- Shielding Theory and Effectiveness, Shielding Materials, Shielding Integrity at discontinuities, Conductive coatings, Cable shielding, Shielding Effectiveness measurements. Electrical Bonding.

UNIT-V: EMI Filters, Cables, Connectors and Components (10 periods)
Characteristics and Types of Filters - Impedance Mismatch Effects, Lumped Element Low Pass Filter, High Pass Filter, Band Pass Filter, Band Reject filter. Power Line filter Design-Common mode filter, Differential mode filter, Combined CM and DM filter. EMI suppression cables. EMC connectors.
EMC Gaskets - Knitted Wire-Mesh Gaskets, Wire Screen Gaskets, Oriented Wire mesh, Conductive Elastomer, Transparent Conductive windows, Conductive Adhesive, Conductive Grease. Conductive Coatings. Isolation transformers. Opto Isolators, Ferrite Components. **Total Periods: 55**

TEXT BOOKS:

1. V. Prasad Kodali, "*Engineering Electromagnetic Compatibility*", S.Chand & company Ltd., 1st edition, 2000.
2. Clayton R. Paul, "*Introduction to Electromagnetic Compatibility*", John Wiley and Sons, 2nd edition, 2008.

REFERENCE BOOK:

1. Christos Christopoulos, "*Principles and Techniques of Electromagnetic Compatibility*", CRC Press (Taylor & Francis Group) 2nd edition, 2007.

M. Tech. -II Semester
(16MT26104) RADAR SIGNAL PROCESSING
(PE-II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

Pre-requisite: A course on Radar systems at UG level.
Course Description: Radar range equation and matched filter; Detection of radar signals in the presence of noise; Wave form selection and radar clutter; Pulse compression and Phase coding techniques.
Course Outcomes:
After successful completion of the course, students will be able to:
1. Demonstrate knowledge in
   - Characteristics of matched filter
   - Detection criteria of radar signals in noise environment.
   - Radar waveform design requirements.
   - Pulse compression techniques
   - Different coding techniques.
2. Analyze complex engineering problems critically in the domain of information, source encoding.
3. Conceptualize and Solve engineering problems for feasible and optimal solutions in the core area of information theory and coding techniques.
4. Initiate research in radar signal processing.
5. Apply different detection techniques to extract the radar echo signals in the presence of Noise.
6. Contribute to multidisciplinary scientific work in the field of Communication and dynamics of environment.

DETAILED SYLLABUS
UNIT I: RANGE EQUATION AND MATCHED FILTER (Periods: 13)
Introduction– Radar Frequencies, Radar Block Diagram, Radar Equation, Information Available from Radar Echo. Review of Radar Range Performance– General Radar Range Equation, Radar Detection with Noise Jamming, Beacon and Repeater Equations, Bistatic Radar.
Matched Filter Receiver – Impulse Response, Frequency Response Characteristic and its Derivation. Matched Filter and Correlation Function, Correlation Detection and Cross-Correlation Receiver. Efficiency of Non-Matched Filters, Matched Filter for Non-White Noise.
UNIT II: DETECTION OF RADAR SIGNALS IN NOISE (Periods: 10)
Detection Criteria – Neyman-Pearson Observer, Likelihood-Ratio Receiver, Inverse Probability Receiver, Sequential Observer, Detectors –Envelope Detector, Logarithmic Detector, I/Q Detector. Automatic Detection – CFAR Receiver, Cell Averaging CFAR Receiver, CFAR Loss, CFAR Uses in Radar. Radar Signal Management –Schematics, Component Parts, Resources and Constraints.
UNIT III: WAVEFORM SELECTION (Periods: 09)
Radar Ambiguity Function and Ambiguity Diagram – Principles and Properties; Specific Cases – Ideal Case, Single Pulse of Sine Wave, Periodic Pulse Train, Single Linear FM Pulse, Noise like Waveforms. Waveform Design Requirements. Radar clutter- Introduction, surface clutter, Land clutter, Detection of targets in Clutter.
UNIT IV: PULSE COMPRESSION IN RADAR SIGNALS (Periods: 08)
Introduction, Significance, Types. Linear FM Pulse Compression – Block Diagram, Characteristics, Reduction of Time Side lobes, Stretch Techniques, Generation and Decoding of FM Waveforms – Block Schematic and Characteristics of Passive System, Digital Compression, SAW Pulse Compression.
UNIT V: PHASE CODING TECHNIQUES (Periods: 13)
Phase Coding Techniques: Principles, Binary Phase Coding, Barker Codes, Maximal Length Sequences (MLS/LRS/PN), Block Diagram of a Phase Coded CW Radar.
Poly Phase Codes : Frank Codes, Costas Codes, Non-Linear FM Pulse Compression, Doppler Tolerant PC Waveforms – Short Pulse, Linear Period Modulation (LPM/HFM), Side lobe Reduction for Phase Coded PC Signals, Complementary codes, Huffman codes, Limiting in Pulse Compression, Cross-Correlation Properties, compatibility.

Total Periods : 53

TEXT BOOKS:

1. M.I. Skolnik, "*Introduction to Radar Systems*", TMH, 3rd edition, 2001.
2. Fred E. Nathanson, "*Radar Design Principles – Signal Processing and The Environment*", McGraw Hill, Inc, 2nd edition, 1991.
3. M.I. Skolnik," *Radar Handbook*", McGraw Hill, 2nd edition, 1991.

REFERENCE BOOKS:

1. Peyton Z. Peebles Jr., "*Radar Principles*", Wiley India Pvt. Ltd., 1998.
2. R. Nitzberg,"*Radar Signal Processing and Adaptive Systems*", Artech House,2nd edition, 1999.
3. F.E. Nathanson, "*Radar Design Principles*", 1st edition, McGraw Hill, 1969.

M. Tech. - II Semester
(16MT23809) SPEECH PROCESSING
(Common to CMS & DECS)
(PE-II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Courses on Signals & Systems and Digital Signal Processing in UG

COURSE DESCRIPTION:
Acoustic theory of speech production; Models for speech signals and speech processing systems; Mathematical analysis of speech signals - homomorphic and LPC models; Speech and speaker recognition systems.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Demonstrate in-depth knowledge in
   - Digital model representation of speech signal
   - LPC analysis
   - Homomorphic models
2. Analyze complex engineering problems critically for conducting research in speech signal processing.
3. Solve engineering problems using efficient algorithms for feasible and optimal solutions in Speech signal processing field.
4. Initiate research in speech signal processing.
5. Apply speech and speaker verification techniques to complex engineering activities in the field of speech processing.
6. Contribute to scientific research in Speech and speaker identification and verification systems with objectivity and rational analysis.

DETAILED SYLLABUS:

UNIT-I: DIGITAL MODEL FOR THE SPEECH SIGNAL (Periods:13)
The process of speech production - the mechanism of speech production, acoustic phonetics. The Acoustic theory of speech production- sound propagation, uniform lossless tubes, Effect of losses in the vocal tract, Effect of radiation at the lips, Vocal tract transfer functions for vowels, the effect of nasal coupling, Excitation of sound in the vocal tract. Digital model for speech signals.

UNIT - II : TIME DOMAIN MODELS FOR SPEECH PROCESSING (Periods:10)
Introduction, Window considerations, Short time energy and average magnitude, Short time average zero crossing rate, Speech vs silence discrimination using Average energy and zero crossing, Pitch period estimation using parallel processing approach, The short time autocorrelation function, The short time average magnitude difference function, Pitch period estimation using the autocorrelation function.

UNIT-III: HOMOMORPHIC SPEECH PROCESSING (Periods:09)
Homomorphic systems for convolution – properties of the complex Cepstrum, computational considerations. The complex Cepstrum of speech, pitch detection, formant estimation, Homomorphic vocoder.

UNIT-IV : LINEAR PREDICTIVE CODING OF SPEECH (Periods:12)
Basic principles of linear predictive analysis – Auto correlation method, The covariance method. Computation of the gain for the model, solution of LPC Equations – Cholesky Decomposition solution for the covariance method. Durbin's Recursive solution for the autocorrelation equations. Comparison between methods of solutions of LPC analysis equations. Applications of LPC parameters – Pitch detection using LPC parameters, Formant analysis using LPC parameters.

UNIT-V: SPEECH AND SPEAKER RECOGNITION SYSTEMS (Periods:08)
Speaker recognition system-speaker verification system, speaker identification systems.
Speech recognition system- isolated digit recognition system, continuous digit recognition system, LPC distance measure.

Total periods: 52

TEXT BOOKS:

1. L R Rabiner and SW Schafer, "*Digital processing of speech signal*s", Pearson Education, 2006.
2. LR Rabiner, BH Juang, B Yegnanarayana, "*Fundamentals of Speech Recognition*", Pearson Education, 1993.

REFERENCE BOOKS:

1. Thomas F Quateri, "*Discrete time speech signal processing*", Pearson edition, 2006.
2. Ben Gold & Nelson Morgan, "*Speech & audio signal processing*", wiley, 2006.
3. Douglas O Shaughnessy, "*Speech Communications*", Oxford university press, 2nd edition, 2000.

M. Tech. -II Semester
(16MT25709) WIRELESS SENSOR NETWORKS
(Common to CMS & VLSI)
(PE-II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: --
A Course on Computer Networks and Wireless Communication and Networks at UG Level.
COURSE DESCRIPTION:
WSN architecture, types, Quality measures of wireless channels, various MAC protocols, Sensor deployment and routing related protocols, congestion control in WSNs.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
1. Gain in-depth knowledge in
   - Wireless Sensor Networks
   - Physical layer
   - Data link layer
   - Network layer
   - Transport layer
2. Analyze various design issues for conducting research related to Datalink, network and transport protocols of wireless sensor network architecture.
3. Design and develop feasible and optimal solutions for societal use.
4. Solve complex engineering problems pertaining to the field of wireless sensor networks.

DETAILED SYLLABUS
UNIT – I: Introduction To Wireless Sensor Networks (10 Periods)
Challenges for wireless sensor networks, Comparison of sensor network with ad hoc network, Single node architecture - Hardware components, energy consumption of sensor nodes. Network architecture: Sensor network scenarios - types of sources and sinks, single hop versus multi-hop networks, multiple sinks and sources. Design principles for wireless sensor networks.
UNIT – II: Physical Layer (10 Periods)
Introduction, wireless channel and communication fundamentals – frequency allocation, modulation and demodulation, wave propagation effects and noise, channels models, spread spectrum communication, packet transmission and synchronization, quality of wireless channels and measures for improvement. Physical layer and transceiver design consideration in wireless sensor networks - Energy usage profile, choice of modulation, Power Management .
UNIT -III: Data Link Layer (16 Periods)
MAC protocols: fundamentals of wireless MAC protocols - Requirements and design constraints for wireless MAC protocols, Important classes of MAC protocols, MAC protocols for wireless sensor networks. Low duty cycle protocols and wakeup concepts - Sparse topology and energy management (STEM), S-MAC, Wakeup radio concepts. Contention-based protocols - CSMA protocols, PAMAS. Schedule-based protocols - SMAC, BMAC, Traffic-adaptive medium access protocol (TRAMA). Link Layer protocols – fundamentals task and requirements, error control - Causes and characteristics of transmission errors, ARQ techniques, FEC techniques, Hybrid schemes, Power control
UNIT – IV: Network Layer (10 Periods)
Gossiping and agent-based uni-cast forwarding - Basic idea, Randomized forwarding. Energy-efficient unicast, Broadcast and multicast - Source-based tree protocols, Shared, core-based tree protocols, Mesh-based protocols. geographic routing - Basics of position-based routing, Geocasting. Mobile nodes - Mobile sinks, Mobile data collectors, Mobile regions. Data centric and content-based networking - Introduction, Data-centric routing, Data aggregation.
UNIT – V: Transport Layer (09 Periods)
The transport layer and QoS in wireless sensor networks - Quality of service/reliabilitym, Transport protocols. Coverage and deployment - Sensing models, Coverage measures, Uniform random deployments: Poisson point processes, Coverage of random deployments: Boolean sensing model, general sensing model, Coverage determination, Coverage of grid deployments. Reliable data transport, Single packet delivery - Using a single path, Multiple paths, Multiple receivers. Congestion control and rate control - Congestion situations in sensor networks, Mechanisms for congestion detection and handling, Protocols with rate control, The CODA congestion-control framework.

Total periods: 55

TEXT BOOK:

1. Holger Karl, Andreas willig "Protocol and Architecture for Wireless Sensor Networks", John wiley publication, Oct 2007.

REFERENCE BOOKS:

1. Fengzhao, Leonidas, Guibas, "Wireless Sensor Networks: an information processing approach – publication, Elsevier,2004.
2. Edgar H .Callaway,"Wireless Sensor Networks: Architecture and protocol", 1st Edition, CRC press 2003.
3. C.S.Raghavendra Krishna, M.Sivalingam and Taribznati, "Wireless Sensor Networks", Springer publication, 2006.

M. Tech. - II SEMESTER
(16MT26131) COMMUNICATIONS LAB-II

Int. Marks	Ext. Marks	Max. Marks	L	T	P	C
50	50	100	-	-	4	2

PRE- REQUISITES: Simulation lab at UG level

COURSE DESCRIPTION:
Simulation of communication systems over communication channels with and without line coding; Design and simulation of Bussgang Blind channel; Minimum Mean Square Error and zero force equalizer; Adaptive equalizers using LMS and RLS algorithms.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Demonstarte in-depth knowledge in
   - Design of CDMA communication system and evluate its performance over a Gaussian and multipath Rayleigh fading channel.
   - Design and simulation of an adaptive equalizer using LMS and RLS algorithms.
   - Design and simulation of M-ary QAM system over an AWGN fading channel and evaluate its performance.
   - Simulating communication system using convolutional codes & Viterbi Decoding.
   - BER evaluation for BPSK modulation system with Minimum Mean Square Error (MMSE) equalization and Zero force Equalization in 3 tap ISI channel.
2. Analyze engineering problems for feasible and optimal solutions in the core area of advanced Communications.
3. Design of various components of communication systems.
4. Use MATLAB Toolboxes to solve complex engineering activities in the domain of advanced communications.
5. Understand ethical responsibility towards environment & society in the field of communications.
6. Communicate effectively in verbal & written forms.

LIST OF EXERCISES:

1. Design and simulation of M-ary QAM system with AWGN fading channel.
2. Simulation of Rayleigh fading channel in the mobile environment.
3. Design and performance evaluation of CDMA communication system over a Gaussian channel.
4. Design and performance evaluation of CDMA communication system over a multipath Rayleigh fading channel.
5. Simulation of communication system using convolutional codes & Viterbi Decoding.
6. Design and simulation of an adaptive equalizer using LMS algorithm.
7. Design and simulation of an adaptive equalizer using RLS algorithm.
8. Design and simulation of communication system using Bussgang Blind channel equalizer.
9. BER evaluation for BPSK modulation system with Minimum Mean Square Error (MMSE) equalization in 3 tap ISI channel.
10. BER evaluation for BPSK modulation system with Zero force Equalization in 3 tap ISI channel.

Total Time Slots : 10

TOOLS REQUIRED:
MATLAB with communication and Signal Processing tool boxes.

REFERENCE BOOKS:

1. Advanced communication lab-II manual of the department.
2. W.H. Tranter, K. Sam Shanmugham, T.S. Rappaport, and K.L. Kosbar, *"Principles of Communication System Simulation with Wireless Applications",* Prentice Hall Professional Technical Reference,2004.
3. J.G. Proakis, and M. Salehi, *"Contemporary Communication Systems using MATLAB",* cengage learning, *2nd edition,* 2004.

M.Tech – II Semester
(16MT13832) IMAGE & VIDEO PROCESSING LAB

Int. Marks	Ext. Marks	Max. Marks	L	T	P	C
50	50	100	-	-	4	2

PREREQUISITE:
A course on Image & Video Processing
COURSE DESCRIPTION: Fundamentals of images, image transforms, enhancement, restoration, image compression and coding and video processing.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Demonstrate knowledge in
    - Image Transforms
    - Image Enhancement & Restoration Techniques
    - Image Segmentation & Compression Techniques
    - Video Processing
2. Understand various applications of image processing in industry, Medicine, and defense.
3. Solve engineering problems for feasible and optimal solutions in the core area of Image and video Processing.
4. Initiate research in image and video processing.
5. Acquire an appreciation for the Image and video processing issues and techniques and be able to apply these techniques to real world problems.
6. Contribute positively to multidisciplinary scientific research in Image and video Processing.
7. Communicate effectively in verbal and written forms.

List of Exercises

1. Point processing in spatial domain
    a. Negation of an image
    b. Thresholding of an image
    c. Contrast Stretching of an image
2. Geometric transformations.
    a. Image rotation
    b. Scaling
    c. Translation
3. Logical operations on Digital Image
    a. AND
    b. NAND
    c. OR
    d. NOR
    e. NOT
4. Histogram Equalization and Specification
5. Filtering in spatial domain
    a. smoothing
    b. sharpening
6. Filtering in frequency domain
    a. Low pass filter
    b. High pass filter
7. Edge Detection using derivative filter mask
    a. Prewitt
    b. Sobel
    c. Laplacian
8. Image compression using transform techniques.
9. Zooming and shrinking operations on images
10. Morphological operations on images
11. Representation of Digital video: Read, Write, View Videos and conversion of videos in different formats.
12. Video to frame and frame to Video conversion.

Total Time Slots: 12

Required Software Tools:
1. MATLAB with image processing and computer vision tool box

REFERENCE BOOKS:

1. Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing, 3rd edition, Pearson Education, 2008.
2. A. Murat Tekalp, Digital Video Processing, Prentice-Hall, 1995.

M. Tech. -II Semester
(16MT26133) SEMINAR

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
--	100	100	--	--	--	2

PRE-REQUISITES:--

COURSE DESCRIPTION:
Identification of seminar topic; literature survey; preparation of technical report and presentation.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Demonstrate capacity to identify an advanced topic for seminar in core and allied areas.
2. Extract information pertinent to the topic through literature survey.
3. Comprehend extracted information through analysis and synthesis critically on the topic.
4. Plan, organize, prepare and present effective written and oral technical report on the topic.
5. Adapt to independent and reflective learning for sustainable professional growth in communication systems.
6. Contribute to multidisciplinary scientific work in the field of Communication Systems.
7. Understand ethical responsibility towards environment and society in the field of Communication Systems.
8. Engage in lifelong learning for development of technical competence in the field of Communication Systems.

M. Tech. – II Semester
(16MT23810) INTELLECTUAL PROPERTY RIGHTS
(Common to all M. Tech. Programs)
(Audit Course)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	-	2	-	-

PRE-REQUISITES: --

COURSE DESCRIPTION:

Introduction to Intellectual Property; Trade Marks; Law of Copy Rights; Law of Patents; Trade Secrets; Unfair Competition; New Development of Intellectual Property.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate in-depth knowledge on
   - Intellectual Property
   - Trade Marks & Secrets
   - Law of Copy Rights, Patents
   - New development of Intellectual Property
2. Analyze the different forms of infringement of intellectual property rights.
3. Solve problems pertaining to Intellectual Property Rights.
4. Stimulate research zeal for patenting of an idea or product.
5. Write effective reports required for filing patents.
6. Develop life-long learning capabilities.
7. Develop awareness of the relevance and impact of IP Law on their academic and professional lives.
8. Develop attitude for reflective learning.

DETAILED SYLLABUS:

UNIT - I: Introduction to Intellectual property **(Periods:5)**

Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT - II: Trade Marks: **(Periods:5)**

Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT - III: Law of copy rights: **(Periods:6)**

Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT - IV: Trade Secrets: **(Periods:6)**

Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.

Unfair competition: Misappropriation right of publicity, False advertising.

UNIT - V: New development of intellectual property: **(Periods:6)**

New developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law. **Total Periods: 28**

REFERENCE BOOKS:

1. Deborah, E. Bouchoux, *Intellectual property right*, Cengage learning.
2. Prabuddha ganguli, *Intellectual property right - Unleashing the knowledge economy*, Tata Mc Graw Hill Publishing Company Ltd.

SREE VIDYANIKETHAN ENGINEERING COLLEGE
Sree Sainath Nagar, Tirupati – 517 102.
M. Tech. (EPS) Course Structure

I-Semester

S. No.	Course Code	Course Title	Contact Periods per Week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
1.	16MT10701	Advanced Control Systems	4	-	-	4	4	40	60	100
2.	16MT10702	High Voltage Engineering	4	-	-	4	4	40	60	100
3.	16MT10703	Power Electronic Converters	4	-	-	4	4	40	60	100
4.	16MT10704	Power System Security and State Estimation	4	-	-	4	4	40	60	100
5.	16MT10705	Reactive Power Compensation and Management	4	-	-	4	4	40	60	100
6.	**Professional Elective-1**		4	-	-	4	4	40	60	100
	16MT10706	EHVAC Transmission								
	16MT10707	Microcontrollers and Applications								
	16MT10708	Power System Reliability								
	16MT10709	Solar and Wind Energy Conversion Systems								
7.	16MT10731	High Voltage Engineering Lab	-	-	4	4	2	50	50	100
8.	16MT10732	Power Systems Simulation-I lab	-	-	4	4	2	50	50	100
		Total	**24**	**-**	**8**	**32**	**28**	**340**	**460**	**800**
9.	16MT13808	Research Methodology (Audit course)	-	2	-	2	-	-	-	-

II-Semester

S. No.	Course Code	Course Title	Contact Periods per Week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
1.	16MT20701	Flexible AC Transmission System	4	-	-	4	4	40	60	100
2.	16MT20702	Intelligent Systems	4	-	-	4	4	40	60	100
3.	16MT20703	Power System Stability and Control	4	-	-	4	4	40	60	100
4.	16MT20704	Restructured Power System	4	-	-	4	4	40	60	100
5.	16MT20705	Static and Digital Protection of Power System	4	-	-	4	4	40	60	100
6.	**Professional Elective-2**		4	-	-	4	4	40	60	100
	16MT20706	Energy Auditing, Conservation and Management								
	16MT20707	High Voltage DC Transmission								
	16MT20708	Power Quality								
	16MT20709	Smart Grid Technology								
7.	16MT20731	Power Systems and Relays Lab	-	-	4	4	2	50	50	100
8.	16MT20732	Power Systems Simulation-II lab	-	-	4	4	2	50	50	100
9.	16MT20733	Seminar	-	-	-	-	2	--	100	100
		Total:	**24**	**-**	**8**	**32**	**30**	**340**	**560**	**900**
10.	16MT23810	Intellectual Property Rights (Audit Course)	-	2	-	2	-	-	-	-

III-Semester

S. No	Course Code	Course Title	Contact Periods per Week				Credits	Scheme of Examination Max. Marks		
			L	T	P*	Total		Internal Marks	External Marks	Total Marks
1.	16MT3MOOC	MOOC	-	-	-	-	-	-	-	-
2.	16MT30731	Project Work – Phase I	-	-	-	-	8	50	50	100
Total:			**-**	**-**	**-**	**-**	**8**	**50**	**50**	**100**

*Fulltime Project Work

IV-Semester

S. No	Course Code	Course Title	Contact Periods per Week				Credits	Scheme of Examination Max. Marks		
			L	T	P*	Total		Internal Marks	External Marks	Total Marks
1.	16MT40731	Project Work – Phase II	-	-	-	-	20	150	150	300
Total:			**-**	**-**	**-**	**-**	**20**	**150**	**150**	**300**
Grand Total:							**86**	**880**	**1220**	**2100**

*Fulltime Project Work

M. Tech. I-Semester
16MT10701:ADVANCED CONTROL SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Control Systems at UG level.

COURSE DESCRIPTION:
Advanced concepts of controllability, observability; Analysis of non-linear systems; Lyapunov stability; design of controllers and observers; optimal control concepts.

COURSE OUTCOMES:On successful completion of the course, student will be able to
CO1.demonstrateknowledge in canonical forms, principle of duality, controllability, observability, effect of feedback, stability of nonlinear control systems and the concept of optimal control.
CO2.apply/analyse describing function, Phase-Plane methods and Lyapunov's stability criterion forstability analysis of non-linear systems.
CO3.solve problems in the area of non-linear systems.
CO4.initiate research in stability and optimal control systems applied to various real-time applications**.**
CO5.use modern techniques in the design and study of controllers,observers for stability of non-linear systems.

DETAILED SYLLABUS:
UNIT - I: CONTROLLABILITY AND OBSERVABILITY (10 Periods)
Review of state variable techniques – Concept of controllability and observabilityfor Continuous Time Systems. Principle of Duality. Controllability and Observability of state models in Jordan canonical form and other canonical forms – effect of state feedback on controllability and observability.

UNIT - II: ANALYSIS OF NON-LINEAR SYSTEMS (12 Periods)
Introduction to non-linear systems, types of physical non-linearities, characteristics of non-linearities, properties of non-linear systems. Describing functions, derivation of describing functions for: dead zone, saturation, backlash, relay with dead zone and hysteresis. Stability analysis of non-linear systems through describing functions. Phase-plane analysis, singular points, isocline method, delta method.

UNIT - III: STABILITY ANALYSIS (12 Periods)
Stability in the sense of Lyapunov, Lyapunov' stability theorems, definiteness, Sylvester criterion, stability analysis by lyapunov second method, lyapunov functions, Krasovoskii method, variable gradient method.

UNIT - IV: CONTROLLERS AND OBSERVERS DESIGN (07 Periods)
Design of state feedback control through pole placement - full order observer and reduced order observer, state regulator problem.

UNIT - V: OPTIMAL CONTROL (11 Periods)
Introduction to optimal control - formulation of optimal control problems - calculus of variations, minimization of functional of single function, Euler Lagrange equation, constrained minimization, minimum principle, control variable inequality constraints.

Total Periods:52

TEXT BOOKS:

1.M. Gopal, *Modern Control System Theory*, 2nd edition, New Age International Publishers, 1996.
2.Katsuhiko Ogata, *Modern Control Engineering,* 5thedition, Prentice Hall of India, 2010.
3.A.Nagoor kani. *Advanced control theory*, 2ndedition, RBA publications,2004.

REFERENCE BOOKS:

1.I.J. Nagrath and M.Gopal, *Control Systems Engineering*, New Age International (P) Ltd. 2007.
2.M. Gopal, *Digital Control and State Variable Methods,* Tata Mc Graw-Hill Companies, 1997.

M. Tech. I-Semester
16MT10702: HIGH VOLTAGE ENGINEERING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Engineering Mathematics, Electromagnetic fields and Electrical Circuits at UG level.
COURSE DESCRIPTION:
Breakdown mechanisms in solids, liquids, gases and composite dielectrics materials; conventional methods of generation and measurement of high DC, AC, impulse voltages and currents; determine the ability of an electrical apparatus to meet guaranteed test procedures and standards.
COURSE OUTCOMES: On successful completion of the course, student will be able to
CO1. demonstrate knowledge on
- behavior of various insulation materials,
- generation of high voltage and currents,
- measuring techniques for high voltage and currents,
- testing of various electrical apparatus,
- overvoltage phenomena and protection against them.

CO2. analyze the
- behavior of insulation materials,
- circuits for generation and measurement of high voltages,
- testingcircuits for testing of high voltage equipment.

CO3. evaluate various high voltage generation, measuring and testing parameters of high voltage circuits.
CO4. initiate research skills in design of
- new methods of generation of high voltages,
- measuring and testing circuits for high voltage systems,
- composite insulation systems to improve the dielectric strength.

DETAILED SYLLABUS:
UNIT - I: BREAKDOWN PHENOMENA (12 Periods)
Introduction to HV technology, need for generating high voltages in laboratory, Industrial applications of high voltage**.** Classification of HV insulating media. Properties of important HV insulating media under each category. Gaseous dielectrics, Ionization: primary and secondary ionization processes. Criteria for gaseous insulation breakdown based on Townsend's theory. Limitations of Townsend's theory. Streamer's theory breakdown in non-uniform fields. Corona discharges. Breakdown in electro negative gases. Paschen's law and its significance. Time lags of Breakdown. Breakdown in solid dielectrics: Intrinsic Breakdown, avalanche breakdown, thermal breakdown, and electro mechanic breakdown. Breakdown of liquid dielectrics: Suspended particle theory, electronic Breakdown, cavity breakdown (bubble's theory), electro convection breakdown.
UNIT - II: GENERATION OF HIGH VOLTAGE AC AND DC & GENERATION OF IMPULSE VOLTAGE AND CURRENT (12 Periods)
GENERATION OF HIGH VOLTAGE AC AND DC: HVAC-HV transformer; Need for cascade connection and working of transformers units connected in cascade. Series resonant circuit-principle of operation and advantages. Tesla coil. HVDC- voltage doubler circuit, cock croft- Walton type high voltage DC set, Van de Graaff generator. Calculation of high voltage regulation, ripple and optimum number of stages for minimum voltage drop.
GENERATION OF IMPULSE VOLTAGE AND CURRENT: Introduction to standard lightning and switching impulse voltages. Analysis of single stage impulse generator-expression for Output impulse voltage. Multistage impulse generator working of Marx impulse. Rating of impulse generator. Components of multistage impulse generator. Triggering of impulse generator by three electrode gap arrangement. Trigatron gap and oscillograph time sweep circuits. Generation of switching impulse voltage. Generation of high impulse current
UNIT - III: MEASUREMENT OF HIGH VOLTAGES (10 Periods)
Electrostatic voltmeter-principle, construction and limitation. Chubb and Fortescue method for HV AC measurement. Generating voltmeter- Principle, construction. Series resistance micro ammeter for HVDC measurements. Standard sphere gap measurements of HVAC, HVDC and impulse voltages; Factors affecting the measurements. Potential dividers-resistance dividers capacitance dividers mixed RC potential dividers. Measurement of high impulse currents-Rogowsky coil and Magnetic Links.
UNIT - IV: NON-DESTRUCTIVE INSULATION TESTING TECHNIQUES (09 Periods)
Dielectric loss and loss angle measurements using Schering Bridge, Transformer ratio Arms Bridge. Need for discharge detection and PD measurements aspects. Factors affecting the discharge detection. PD equivalent model, PD measuring circuits, straight and balanced detectors, Location and estimation of PD in power apparatus, PD measurement by non-electrical methods, Calibration of PD detectors.
UNIT - V: HIGH VOLTAGE TESTS ON ELECTRICAL APPARATUS (12 Periods)
Need for testing standards, Standards for porcelain / Glass insulator, Polymeric insulators Classification of porcelain / glass , Polymeric insulators ; insulator tests- Tests for cap and pin porcelain/ Glass insulators, Polymeric insulators. High voltage AC testing methods, power frequency tests- Over voltage tests on insulators, Isolators, Circuit Breakers and power cables. Impulse Testing: Impulse testing of transformers – Surge diverters and other apparatus. Contamination flashover phenomena – Contamination Severity, Artificial contamination tests.
Total Periods: 55

TEXT BOOKS:
1. M.S.Naidu and V. Kamaraju, *High Voltage Engineering*, 4th edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2008.
2. E.Kuffel, W.S. Zaengl and J. Kuffel, *High Voltage Engineering: Fundamentals*, 2nd edition, Newnes, Elsevier Press, 2000.
3. C.L.Wadhwa, *High Voltage Engineering*, New Age Science, 2010.

REFERENCE BOOKS:

1.Mazen Abdel-Salam, Hussein Anis, Ahdab El-Morshedy, Roshdy Radwan, *High Voltage Engineering Theory and Practice,* 2nd edition, Revised & Expanded, Marcel-Dekker Publishers (Special Indian Edn.), 2000.
2.T J Gallagher and A J Pearmain,*High voltage: measurement, testing, and design*. John Wiley & Sons, 1983.

M. Tech. I-Semester
16MT10703: POWER ELECTRONIC CONVERTERS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Power Electronics at UG level

COURSE DESCRIPTION:

Power semiconductor devices; Characteristics of power switching devices; Gate and base drive circuits; Multipulse controlled rectifiers; Power factor improvement techniques; Voltage source converters; Current source converters; Switching mode regulators; Resonant converters; Voltage control of single phase and three phase inverters; Multilevel inverters.

COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1.demonstrate knowledge on
- operation and performance of power electronic converters,
- control strategies of power devices and converters.

CO2.analyze the performance of multi pulse AC/DC converters and DC/DC converters.

CO3.evaluate the power converter modules for various operating/control parameters.

CO4.initiate research in designing appropriate power converter schemesto meet/solve the industrial requirements/problems.

DETAILED SYLLABUS:

UNIT - I: POWER DEVICES AND THEIR CONTROL (11 Periods)

Overview of power semiconductor devices-reverse recovery characteristics of power diodes, switching characteristics of Power MOSFET and IGBT. Basic construction and switching characteristics of GTO and IGCT.

Characteristics of power switching devices- control characteristics, ideal and practical characteristics, specifications of switches. Gate drive circuits for SCR, MOSFET, IGBT and base drive circuits for power BJT.

UNIT - II: MULTIPULSE CONTROLLED RECTIFIERS (11 Periods)

Six pulse SCR rectifiers – Semi and full converters, operation with different firing angles, effect of line inductance, power factor and THD.

Twelve pulse SCR rectifiers- idealized 12 pulse rectifier operation, effect of line and leakage inductance,power factor and THD. 18 and 24 pulse SCR rectifiers, operation.

Single phase series converters. Power factor improvement- extinction angle control, symmetric angle control, PWM control-single and three phase control.

UNIT - III: VOLTAGE SOURCE AND CURRENT SOURCE CONVERTERS (09 Periods)

Self-commutated voltage source converters (VSC)-basic principles. Single phase full wave VSC- one phase leg circuit operation, voltage harmonics. Three phase full wave VSC-operation of a phase leg through four quadrants.

Current source converters-types, operation of thyristor based converter and current stiff converter.

UNIT - IV: ANALYSIS OF DC-DC AND RESONANT CONVERTERS (13 Periods)

Voltage commutated chopper. Current commutated chopper. Switch mode regulators – buck, boost, buck-boost and Cuk regulators, condition for continuous inductor current and capacitor voltage - design of LC filter, comparison of regulators. Multi-output boost converters – advantages, applications, numerical problems.Resonant converters- concept of ZVS and ZCS, principle of operation, analysis of M-type and L-type converters.

UNIT - V: PWM AND MULTI LEVEL INVERTERS (11 Periods)

Voltage control of single phase inverters – single, multiple, sinusoidal, modified sinusoidal pulse width modulation, phase displacement control. Advanced PWM techniques-trapezoidal, staircase, stepped, harmonic injection, delta modulations. Voltage control of three phase inverter-sinusoidal PWM, 60 degree PWM, third harmonic PWM, space vector modulation. Harmonic reduction. Multilevel inverters-types-diode clamped, flying capacitor, cascaded- operation, features, applications.

Total Periods: 55

TEXT BOOKS:

1.Muhammad H. Rashid, *Power Electronics circuits, devices and applications*, 3rd edition, Prentice Hall publications, 2009.
2.Ned Mohan, Tore M. Undeland and William P. Robbin, *Power Electronics: Converters, Application and Design*, 3rd edition, John Wiley and sons Inc., New York, 2009.

REFERENCE BOOKS:

1.Bin Wu, *High power converters and AC Drives,* John Wiley and Sons, 2006.
2.P.C Sen., *Modern Power Electronics*, 1st edition, Wheeler publishing Co, 1998.

3. Naran G. Hingorani, Laszlo Gyugyi, *Understanding FACTS*, IEEE Press., Standard Publishers Distributors, Delhi, 2001.

M. Tech. I-Semester
16MT10704: POWER SYSTEM SECURITY AND STATE ESTIMATION

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Engineering mathematics, numerical methods, fundamental of power system, Power system operation and Control and Power system Analysis at UG level

COURSE DESCRIPTION:
Power system network matrices; Balanced and unbalanced short circuit analysis; AC and DC Load flow studies; Power system security; Methods of power system state estimation

COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1. demonstrate in-depth knowledge on
- formation of power system network matrices,
- load flow solutions and fault analysis for various operating conditions,
- state estimation and security analysis of power systems,
- Energy Management System (EMS) and control center.

CO2. analyze state and security aspects of power system network for various operational issues and contingencies.

CO3. develop skills in evaluating the state and security of power system network.

CO4. initiate research in developing algorithms to investigate the state &securityof power system network and design appropriate control strategy to meet the required specifications.

DETAILED SYLLABUS:

UNIT - I: POWER SYSTEM NETWORK MATRICES (09 Periods)
Formation of bus admittance matrices by direct inspection method – Algorithm for formation of Bus impedance matrix: addition of a branch and addition of a link, removal element in Bus impedance matrix – simple problems. Π-representation of off-nominal tap transformers.

UNIT - II: FAULT ANALYSIS (11 Periods)
Short circuit studies – introduction, short circuit calculations using Z_{bus}, Z_f^{abc}, Y_f^{abc}, Z_f^{012} and Y_f^{012} matrices for various faults. Analysis of balanced and unbalanced three phase faults – simple problems.

UNIT - III: POWERSYSTEM SECURITY-I (12 Periods)
Review of power flow methods *(qualitative treatment only),* DC power flow method-simple problems. Introduction to power system security,factors influencing power system security. Introduction to contingency analysis

UNIT - IV: POWER SYSTEM SECURITY-II (09 Periods)
Contingency analysis: Detection of Network problems, linear sensitivity factors, AC power flow methods, Contingency selection, concentric relaxation, bounding – simple problems.

UNIT - V: STATE ESTIMATION IN POWER SYSTEM (14 Periods)
Power system state estimation, EMS center, data acquisition, Methods of state estimation – method of leastsquares, orthogonal matrix, properties, Givens rotation, orthogonal decomposition - Hessian matrix, Treatment of bad data – applications topower system state estimation – simple problems

Total Periods:55

TEXT BOOKS:
1. Allen J.Wood and Wollenberg B.F., *Power Generation Operation and control* John Wiley & Sons, 2nd edition, 2006.
2. Venkatesh, B.V. Manikandan, S. Charles Raja and A.Srinivasan, *Electrical power systems analysis, security, and deregulation,* PHI Learning private limited, Delhi, 2014.

REFERENCE BOOKS:
1. Nagrath I.J. and KothariD.P., *Modern Power System Analysis,* TMH, NewDelhi, 2004.

2.T.K. Nagasarkar and M.S. Sukija, *Electrical Power Analysis,* OXFORD University press, 2nd edition,New Delhi, 2009.

M. Tech. I-Semester

16MT10705: REACTIVE POWER COMPENSATION AND MANAGEMENT

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Power Systems at UG level

COURSE DESCRIPTION:

Reactive Power compensation: Ideal compensator; Line and load compensation ; Compensating devices; Reactive power coordination; Quality of power supply; Distribution side management; Reactive power management in domestic and industrial sectors.

COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1.demonstrate knowledge on

- concepts of reactive power compensation,
- different methods of reactive power compensation,
- load patterns and loss reduction methods in distribution lines.

CO2.analyze different types of reactive power compensation methods

CO3.develop skills in evaluating size and location of compensator to improve power system profile.

CO4.initiate research in reactive power management for commercial and industrial applications.

CO5.follow standards and practices for maintaining quality of power.

DETAILED SYLLABUS:

UNIT - I: REACTIVE POWER COMPENSATION (10 Periods)

Need for Reactive Power compensation – reactive power characteristics. Ideal compensator, practical compensation –power factor correction and voltage regulation. Load compensator as a voltage regulator, phase balancing and power factor correction of unsymmetrical loads– examples.

UNIT - II: REACTIVE POWER COMPENSATION IN TRANSMISSION SYSTEMS (12 Periods)

Steady state Reactive power compensation – Uncompensated line, Types of compensation, Passive shunt, series and dynamic shunt compensation–examples.

Transient state Reactive power compensation–Characteristic time periods. Passive shuntcompensation. Static compensations–series capacitor compensation, compensation using synchronous condensers -examples

UNIT - III: REACTIVE POWER COORDINATION AND PLANNING (11 Periods)

Reactive power coordination: Objectives, Mathematical modeling, Operation planning, transmission benefits. Basic concepts of quality of power supply: Disturbances, steady – state variations, effects of under voltages, frequency, Harmonics, radio frequency and electromagnetic interferences, IEEE /IEC standards.

Reactive power planning: Objectives, Economics Planning capacitor placement and retrofitting of capacitor banks.

UNIT - IV: REACTIVE POWER MANAGEMENT (12 Periods)

KVAR requirements for domestic appliances: Purpose of using capacitors, selection of capacitors, deciding factors. Types of available capacitors – characteristics and limitations, Control of capacitors.

Demand side management: Load patterns, basic methods load shaping, power tariffs, KVAR based tariffs penalties for voltage flickers and Harmonic voltage levels - System losses, loss reduction methods - examples.

UNIT -V:REACTIVE POWER MANAGEMENT IN INDUSTRIAL SECTORS (10 Periods)

Typical layout of traction systems–reactive power control requirements. Distribution transformers, Electric arc furnaces, textile and plastic industries, furnace transformer, filter requirements, remedial measures, and power factor of an arc furnace, role of capacitors in wind mill generator, minimum capacitance required for excitation. **Total Periods: 55**

TEXT BOOKS:

1. T.J.E.Miller, *Reactive power control in Electric power systems*, John Wiley and Sons, 1982.
2. D.M. Tagare, *Reactive power Management*, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2004

REFERENCE BOOK:

1. Wolfgang Hofmann, Jurgen Schlabbach, Wolfgang Just, *Reactive power compensation: A Practical Guide,* Willey, April, 2012.

M. Tech. I-Semester
16MT10706: EHVAC TRANSMISSION
(Professional Elective - 1)

Int. Marks	Ext. Marks	Total marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Transmission of electric power, Distribution of Electric Power and Power System Analysis at UG level.

COURSE DESCRIPTION:
Transmission Line Trends and Preliminaries, Voltage Gradients of Conductors, Corona Effects, Electrostatic Fields, Power-Frequency Voltage Control and Over Voltages.

COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1.demonstrate knowledge on
- EHVAC conductor parameters, configurations, electrical and mechanical aspects,
- corona interference, effects and relevant parameters in EHVAC systems,
- electrostatic field interference and effects,
- voltage control methods in EHVAC system.

CO2. analyze
- various electrical parameters of conductor with various configurations,
- various parameters of corona phenomenon in EHVAC system.

CO3.demonstrate skills in evaluation of various parameters of EHV lines

CO4.initiate research in designing strategies to minimize adverse effects of EHVAC system.

DETAILED SYLLABUS:

UNIT - I:TRANSMISSION LINE TRENDS AND PRELIMINARIES (13 Periods)
Role of EHV AC transmission. Power handling capacity and line loss, costs of transmission lines and equipment. Mechanical considerations in line performance – numerical problems.

Line and Ground parameters:
Calculation of resistance of conductors. Properties of bundled conductors - bundle spacing, bundle radius and geometric mean radius of bundle. Inductance of EHV line configurations – Inductance of two conductors, multi-conductor lines and bundled conductor lines. Line Capacitance calculation - sequence inductances and capacitances – modes of propagation – Resistance and inductance of ground return – numerical problems.

UNIT - II: VOLTAGE GRADIENTS OF CONDUCTORS (12 Periods)
Electrostatics, field of sphere gap, field of line changes and their properties, charge - potential relations for multi-conductors. Surface voltage gradient on conductors - distribution of voltage gradient on sub conductors of bundle - numerical problems.

UNIT - III: CORONA EFFECTS (14 Periods)
Power loss: corona loss formulae, charge-voltage (Q-V) diagram.
Audible Noise (AN): Generation, characteristics, limits and measurements of AN, relation between 1-phase and 3-phase AN levels – numerical problems.
Radio Interference (RI): Corona pulses - generation, properties and frequency spectrum. Limits for radio interference fields. Lateral profiles of RI and modes of propagation, excitation function, measurement of RI, RIV and excitation functions – numerical problems.

UNIT - IV: ELECTROSTATIC FIELDS (10 Periods)
Electrostatic field: calculation of electrostatic field of EHV lines, effect on humans, animals and plants - electrostatic induction in un-energized circuit of Single circuit and double-circuit lines –meters and measurement of electrostatic fields– numerical problems.

UNIT - V: POWER-FREQUENCY VOLTAGE CONTROL AND OVERVOLTAGES (10 Periods)
No-load voltage conditions and charging currents, voltage control – synchronous condenser, shunt and series compensation. Static VAR compensation – Numerical problems. **Total Periods: 59**

TEXT BOOK:

1. Rakosh Das Begamudre, *Extra High Voltage AC Transmission Engineering*, 3rd edition, New Age International Pvt. Ltd, 2009.

REFERENCE BOOKS:

1. S. Rao, *EHVAC, HVDC Transmission and Distribution Engineering*, 3rd edition, Khanna Publications, 2001.

2. General Electric Company (GEC), Project EHV, *EHV Transmission line reference Book*, Edison House, 1968.

M. Tech. I-Semester
16MT10707: MICROCONTROLLERS AND APPLICATIONS
(Professional Elective - 1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	**60**	**100**	**4**	**--**	**--**	**4**

PRE-REQUISITES: Digital logic design, Microprocessors and Microcontrollers at UG level
COURSE DESCRIPTION:
8051 Microcontroller: Architecture, Programming and Interfacing; PIC Microcontrollers: Architecture, features, programming and Interfacing
COURSE OUTCOMES: On successful completion of the course, student will be able to
CO1.demonstrate knowledge onarchitecture and salient features of 8051 and PIC microcontrollers.
CO2.critically analyze a microcontroller and develop a suitable interface for interfacing and control operations.
CO3.develop skills in evaluating stand-alone systems and develop programs for interfacing and control.
CO4.undertake research by identifying a suitable microcontroller for solving complex electrical engineering problems.
CO5.use modern tools like PROTEUS, MPLAB, SCILAB, PIC 'C' Compiler etc., for the design, analysis and implementation of the system.
DETAILED SYLLABUS:
UNIT - I: 8051 MICROCONTROLLER (12 Periods)
Overview of 8051 microcontrollers. 8051/8052 – architecture and features. Memory – internal / external Program, Data memory and their interfacing. Data memory – Register Bank, Bit addressable space, scratch pad area. Special Function Registers (SFRs). Instruction set – Data transfer, Arithmetic, logical, branch control instructions. Addressing modes. Timers – Mode - 0, 1, 2 and 3 operations, TMOD, TCON. Timer applications – wave generation, Device control operations.
UNIT-II: 8051 INTERFACING (10 Periods)
Basics of serial communication – RS232, MAX232, Baud rate. Serial port programming - SCON, SMOD, SBUF, PCON. Interrupts – IE, TCON, IP. Applications using interrupts of 8051/8052 – wave generation. Device control operations. Interfacing – ADC, DAC, DC motor key board and PWM.
UNNIT-III: PIC MICROCONTROLLERS (11 Periods)
CISC vs RISC.Harvard Vs Von Neumann architectures.PIC16F87XA architecture and features.PIC16 Memory organization – program memory, data memory. PIC Register file – General purpose registers and SFRs. Introduction to PIC Assembly Programming, PIC Data Format and Directives.PIC programming tools. Instruction set – data transfer, arithmetic, logical, bit manipulation, branch Instructions. I/O Port Programming. Addressing modes – Immediate, Direct and Register indirect addressing Modes. Macros and Modules.PIC programming using MPLAB and PIC 'C' Compiler.
UNIT–IV:SERIAL, INTERRUPT, I/O PORTS AND TIMER PROGRAMMING (11 Periods)
I/O ports – Port A, TRISA, Port B, TRISB, Port C TRISC. Timer - 0, 1, 2 modules. Compare mode, capture mode. PIC Serial Port programming, PIC Interrupts, Programming Timer Interrupts, Programming the Serial Communication Interrupts, Port-B - Change Interrupt, Interrupt Priority in the PIC.
UNIT–V: PIC INTERFACING (11 Periods)
ADC Characteristics, ADC Programming in the PIC, DAC Interfacing, Sensor Interfacing and Signal Conditioning, Standard and Enhanced CCP Modules, Compare Mode Programming, Capture Mode Programming, PWM Programming, ECCP Programming, Relays and Opto-isolators, Stepper Motor Interfacing, DC Motor Interfacing and PWM, PWM Motor Control with CCP, DC Motor Control with ECCP.

Total Periods: 55

TEXT BOOKS:
1.Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay, *The 8051 Microcontroller and Embedded Systems using Assembly and C*, 2nd edition, Pearson education, 2009.
2.John B. Peatman, *Design with PIC Microcontrollers*, Pearson education, 2009.
REFERENCE BOOKS:
1.PIC16F87XA manual.
2.Muhammad Ali Mazidi, Rolin D. McKinlay, Danny Causey, *PIC Microcontroller and Embedded Systems using assembly and C for PIC 18,*Pearson Prentice Hall, 2008.
3.John B. Peatman, *Embedded design with the PIC18F452 Microcontroller volume 1*, Prentice Hall, 2003.

M. Tech. I-Semester
16MT10708: POWER SYSTEM RELIABILITY
(Professional Elective - I)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: Probability and Statistics at UG level

COURSE DESCRIPTION:

Fundamentals of Reliability Engineering; Evaluation of Power system operating capacity reserve; Evaluation of Frequency and Duration Techniques; Reliability Analysis of Interconnected Systems; Power Distribution System Reliability Analysis

COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1.demonstrate knowledge on

- conceptual algorithms for planning, security and reliable operation of power system,
- system risks during normal and adverse weather conditions.

CO2.analyze complex power system network structures for computation of reliability indices.

CO3.evaluatethe reliability of power system network using reliability indices.

CO4.initiate research indeveloping various algorithms for determining the power system network reliability for various operating scenarios.

DETAILED SYLLABUS:

UNIT – I: FUNDAMENTALS OF RELIABILITY ENGINEERING (13 Periods)

Probability Concept, Random variables, Probability Density and Distribution functions – Probability Distributions: time dependent and independent, Mean, SD, Variance. Reliability function, Hazard rate, types of Failures, Bath Tub Curve and Reliability cost and worth.

Network and Markov Modeling: redundant and non-redundant configuration – complex systems – conditional probability approach, Decomposition Method, cut-set, tie-set approaches – Standby redundant systems – Event trees. Markov chain – Markov Process, STPM, LSP – one, two and three component repairable models.

UNIT – II:EVALUATION OF GENERATING CAPACITY RESERVE (10 Periods)

Introduction – Generation system model – determination of capacity outage probability table – Identical units – Non-Identical units – Determination of transitional rates – deterministic and probabilistic criteria – Sequential addition method – Recursive relation for unit addition, unit removal - LOLP, LOLE, EIR.

UNIT – III:EVALUATION OF FREQUENCY AND DURATION TECHNIQUES (10Periods)

Frequency and duration concepts – Two components repairable model (with & without identical components) – Evaluation of cumulative probability and cumulative frequency by using recursive relation – Equivalent transition rates – nonequivalent transition rates.

System risk indices: Daily load model – Two level representation of daily load modeling – evaluation of probabilities, transitional rates.

UNIT – IV: RELIABILITY ANALYSIS OF INTERCONNECTED SYSTEMS (12Periods)

Introduction – probability array method in two interconnected systems – evaluation techniques – equivalent assisting approach – factors affecting interconnections, effect of tie capacities, tie lines.

Weather effects on transmission lines – common mode failures – circuit breaker model – Preventive maintenance.

UNIT – V:DISTRIBUTION SYSTEM RELIABILITY ANALYSIS (10 Periods)

Distribution system reliability system analysis – Basic indices – Customer oriented indices – Load and energy indices – Active and Passive failures – open circuit & short circuit failures – Problems.

Total Periods:55

TEXTBOOKS:

1. Roy Billinton and Ronald N Allan, *Reliability Evaluation of Power Systems*, 2nd edition, Springer, New York, 1996.
2. J. Endrenyi, *Reliability Modeling in Electric Power Systems*, 1st edition, A Wiley-Interscience Publication,John Willey and Sons, US, 1979.

REFERENCE BOOKS:

1. Roy Billinton and Ronald N Allan, *Reliability Evaluation of Engineering Systems - Concepts and Techniques*, 2nd edition, Springer, NewYork, 2013.

2.Charles E. Ebeling, *An Introduction to Reliability and Maintainability Engineering*, Tata McGraw Hill, India, 2004.

M. Tech. I-Semester
16MT10709: SOLAR AND WIND ENERGY CONVERSION SYSTEMS
(Professional Elective - I)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Power Electronics and Non-Conventional Energy Resources at UG level
COURSE DESCRIPTION:
Non-Conventional energy resources; Wind and Solar energy systems: design and operation; Power Conditioning Schemes for Solar and Wind Energy systems; Impact of power quality problems.
COURSE OUTCOMES: On successful completion of the course, student will be able to
CO1.demonstrate knowledge on various renewable energy sources.
CO2.analyze
- various operational aspects of renewable energy sources,
- various power quality and conditioning issues while integrating renewable energy sources.

CO3.develop skills in estimating wind &solar power generation and other parameters.
CO4.initiate research in designing of wind and solar power systems.
DETAILED SYLLABUS:
UNIT – I:INTRODUCTION TO RENEWABLE ENERGY SYSTEMS (10 Periods)
Renewable Energy systems, Environmental aspects of electric energy conversion: impacts of renewable energy generation on environment - Qualitative study of different renewable energy resources: Solar, wind, ocean, Biomass and Fuel cell. Renewable energy resources available in India.
UNIT – II:DESIGN AND OPERATION OF WIND POWER SYSTEM (11 Periods)
Wind Power System: Components, Turbine Rating, Electrical Load Matching, Variable-Speed operation, system design features, Maximum Power Operation, System Control Requirements, Speed Control, Rate Control and Environmental Aspects. Wind Energy Conversion Systems and their Classification.
UNIT – III:DESIGN AND OPERATION OF PV SYSTEM (14 Periods)
Solar Photovoltaic Power System: The PV Cell, Module and Array, Equivalent Electrical Circuit, Open Circuit Voltage and Short Circuit Current, I-V and P-V Curves, Array Design, Peak Power Point Operation, PV System Components.
Solar Thermal System: Energy Collection, Synchronous Generator, Equivalent Electrical circuit, Excitation Methods, Electrical Power Output, Transient Stability Limit, Commercial Power Plants. Introduction to Electric vehicles: operation and design of Electric Vehicles.
UNIT – IV: POWER CONDITIONING SCHEMES FOR SOLAR AND WIND ENERGY SYSTEMS (12 Periods)
Switching devices for solar energy conversion: DC power conditioning converters, maximum power point tracking algorithms, AC Power conditioners, Line commutated inverters, synchronized operation with grid supply, Harmonic reduction.
Wind energy Conversion system (WECS): Performance of Induction generators for WECS, Self-Excited Induction Generator (SEIG) for isolated power generators. Controllable DC power from SEIGs, system performance, Grid related problems, generator control, AC voltage controllers, Harmonic reduction and Power factor improvement.
UNIT – V:POWER QUALITY ISSUES IN INTEGRATION OF RENEWABLE ENERGY RESOURCES (09 Periods)
Stand alone and Grid connected systems, Power Quality issues, Impact of power quality problems on DG, Mitigation of power quality problems, role of custom power devices in Distributed Generation.
Total Periods: 56
TEXT BOOKS:
1.Mukund. R. Patel, *Wind and Solar Power Systems*, CRC Press, 1999.
2.G.D. Rai, *Non - Conventional Energy Resources*, Khanna Publishers, 2002.
REFERENCE BOOKS:
1.V. Daniel Hunt, *Windpower: a handbook on wind energy conversion systems*, Van Nostrand Reinhold Co., 1981.

2. Arindam Ghosh, Gerard Ledwich, *Power Quality Enhancement Using Custom Power Devices,* Springer, 2002.
3. Roger C. Dugan, Mark F. McGranaghan, Surya Santoso and H. Wayne Beaty, *Electrical Power Systems Quality*, 2nd edition,TATA McGraw Hill,2008.

M. Tech. I-Semester

16MT10731: HIGH VOLTAGE ENGINEERING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	--	--	4	2

PRE-REQUISITES: High Voltage Engineering and Electrical Measurements at UG level.

COURSE DESCRIPTION:

To conduct experiments on Breakdown mechanisms in dielectrics materials; Generation &measurement of high DC, AC, impulse voltages and currents and testinghigh voltageelectrical apparatus.

COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1.demonstrate knowledge on

- behavior of various insulation materials,
- generation of high voltage and currents,
- measuring techniques for high voltage and currents,
- testing of various electrical apparatus.

CO2.analyze the behavior of insulation systems, circuits for high voltage generation, measurement and testing.

CO3.evaluate various parameters of high voltage generating, measuring and testing circuits.

CO4.initiate research to design a suitable setup for measuring and testing of High Voltage.

CO5.follow the IEC standards and safety measures for efficient operation and testing of high voltage equipment.

CO6. function effectively as an individual and as a member in a team

CO7.prepare laboratory report that clearly communicates the experimental information.

CO8.practice professional code of ethics.

LIST OF EXPERIMENTS:

Conduct any **TEN** experimentsfrom the following

1. Generation and characteristics of Lightning Impulse Voltages.
2. Generation of High DC voltage using voltage doubler circuit.
3. Spark over characteristics of gaseous, liquid and solid insulation under uniform and non-uniform fields.
4. Measurement of HVAC and HVDC.
5. Breakdown strength of transformer oil using oil-testing unit.
6. Determination of the Flashover Characteristics of Insulators.
7. Determination of 50% Critical Impulse Flash-Over Voltages on the 11 kV type Insulator with Positive Impulse and Negative Impulse.
8. Determination of String Efficiency of Suspension Type Insulator.
9. Measurement of Capacitance and loss tangent.
10. Measurement of Earth and insulation resistance.

11. Partial discharge measurement in high voltage apparatus.
12. Calibration of meters by using Sphere Gap, Rod Gap and Point Gap method.

M. Tech. I-Semester
16MT10732: POWER SYSTEMS SIMULATION-I LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	**50**	**100**	**--**	**--**	**4**	**2**

PRE-REQUISITES:
Power system operation and control, Power system analysis, Power quality, Power electronics and Control Systems at UGand PG level.

COURSE DESCRIPTION:
Modelling, simulation and analyze operation, control of power system Networks and Power electronics converters.

COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1. demonstrate knowledge on various problems in electrical engineering through modern tools and simulate the methods to mitigate using software packages in field of power system and power electronics.
CO2. analyze the simulated observations of power system networks, power electronic circuits and their behavior through theoretical perspective.
CO3. evaluate various parameters of the power systems/power electronic circuits
CO4. interpret the observations of network/circuits and design a suitable control strategy to meet the required specifications.
CO5. select and apply modern software tools for solving problems in the existing power system.
CO6. function effectively as an individual and as a member in a team
CO7. prepare laboratory report that clearly communicates the experimental information.
CO8. practice the professional code of ethics.

LIST OF EXPERIMENTS:

Conduct any **TEN experiments**from the followingusing **MATLAB/ SIMULINK**

1. Formation of bus admittance matrix.
2. Formation of Bus Impedance matrix.
3. Load flow studies.
4. Contingency analysis.
5. Available Transfer Capabilities computation.
6. Fault analysis using Bus impedance matrix.
7. Weighted Least Square linear and nonlinear state estimation.
8. Analysis of various controller and observers for power system applications.
9. Three phase fully controlled Rectifier.
10. Three phase inverter with PWM controller.
11. Buck and Boost converter for power system applications.
12. Resonant converter for power system applications.

M. Tech. I-Semester
16MT13808: RESEARCH METHODOLOGY
(Common to all M. Tech. Programs)
(Audit Course)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	-	2	-	-

PRE-REQUISITES:

COURSE DESCRIPTION:
Overview of Research, research problem and design, various research designs, data collection methods, statistical methods for research, importance of research reports and its types

COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1. demonstrate knowledge on
- research design and conducting good research,
- various data collection methods,
- statistical methods in research,
- report writing techniques.

CO2. analyze various research design issues for conducting research in core or allied areas

CO3. formulate solutions for engineering problems by conducting research effectively in the core or allied areas

CO4. carryout literature survey and apply good research methodologies for the development of scientific/technological knowledge in one or more domains of engineering.

CO5. select and apply appropriate techniques and tools to complex engineering activities in their respective fields

CO6. write effective research reports.

CO7. develop attitude for lifelong learning to do research

CO8. develop professional code of conduct and ethics of research.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO RESEARCH METHODOLOGY (05 Periods)
Objectives and Motivation of Research, Types of Research, Research Approaches, Research Process, Criteria of good Research, Defining and Formulating the Research Problem, Problem Selection, Necessity of Defining the Problem, Techniques involved in Defining a Problem.

UNIT-II: RESEARCH PROBLEM DESIGN AND DATA COLLECTION METHODS (07 Periods)
Features of Good Design, Research Design Concepts, Different Research Designs, Different Methods of Data Collection, Data preparation: Processing Operations, Types of Analysis.

UNIT-III: STATISTICS IN RESEARCH (06 Periods)
Review of Statistical Techniques - Mean, Median, Mode, Geometric and Harmonic Mean, Standard Deviation, Measure of Asymmetry, ANOVA, Regression analysis.

UNIT-IV: HYPOTHESIS TESTING (07 Periods)
Normal Distribution, Properties of Normal Distribution, Basic Concepts of Testing of Hypothesis, Hypothesis Testing Procedure, Hypothesis Testing: t-Distribution, Chi-Square Test as a Test of Goodness of Fit.

UNIT-V: INTERPRETATION AND REPORT WRITING (03 Periods)
Interpretation – Techniques and Precautions, Report Writing – Significance, Stages, Layout, Types of reports, Precautions in Writing Reports.

Total Periods: 28

TEXT BOOK:

1. C.R. Kothari, *Research Methodology: Methods and Techniques*, New Age International Publishers, New Delhi, 2nd revised edition, 2004.

REFERENCE BOOKS:

1. Ranjit Kumar, *Research Methodology: A step-by-step guide for beginners*, Sage South Asia, 3rd edition, 2011.

2.R. Panneerselvam, *Research Methodology*, PHI learning Pvt. Ltd., 2009.

M. Tech. II-Semester

16MT20701: FLEXIBLE AC TRANSMISSION SYSTEM

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Power Electronics and Power Systems at UG level and Power Electronic Converters and Reactive Power Compensation and management at I-Sem. of M.Tech. EPS

COURSE DESCRIPTION:

Need for Flexible AC transmission systems; objectives of shunt and series compensation, phase angle regulators; FACTS controllers: shunt, series and combined; Coordination of various FACTS controllers.

COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1.demonstrate knowledge on
- compensation schemes for real and reactive power control,
- Static Shunt, Series and Shunt-Series compensation,
- FACTS devices.

CO2.analyze FACTS devices for the appropriate control operation.

CO3.evaluate feasibility of FACTS device and controllers for flexible operation of system.

CO4.initiate research to develop/design new FACTS controllers for reliable operation of power system.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO AC TRANSMISSION SYSTEMS (08 Periods)

Overview of interconnected power system. Power flow in AC systems, expression for real and reactive power flow between two nodes of a power system, controllable parameters. Power flow in parallel and meshed system. Overview of compensated transmission lines, shunt and series compensation. Conventional controllers for real and reactive power flows, merits and demerits.

FACTS: benefits, types of FACTS controllers.

UNIT - II: STATIC SHUNT COMPENSATION (12 Periods)

Expression for real and reactive power flow with mid-point voltage regulation. Variable impedance type static VAR generators, V-I characteristics and control schemes of TCR, TSR, TSC. Q_D-Q_O characteristic and control scheme of TSC-TCR. Switching converter type VAR generators: V-I characteristics and control schemes of STATCOM. Hybrid VAR generators: V-I characteristics of SVC and STATCOM, regulation of V-I slope. Applications of static shunt compensators: Voltage regulation, improvement in transient stability, prevention of voltage instability, power oscillation damping. Comparison of static shunt compensators.

UNIT - III: STATIC SERIES COMPENSATION (10 Periods)

Expression for real and reactive power flow with series line compensation. Variable impedance type series compensators: V-I characteristics and control schemes of GCSC, TSSC, TCSC, modes of operation. Sub-synchronous resonance. Switching converter type series compensator: V-I characteristics, internal and external control schemes of SSSC. Applications of static series compensators: improvement in transient stability, power oscillation damping. Comparison of static series compensators.

UNIT - IV: STATIC PHASE ANGLE REGULATORS AND COMBINED COMPENSATORS(12 Periods)

Power flow control by phase angle regulators: concept of voltage and phase angle regulation, operation and control of TCVR and TCPAR. Switching converter type phase angle regulators. Objectives of TCPAR: improvement of transient stability, power oscillation damping. UPFC: principle, expression for real and reactive power between two nodes of UPFC, independent real and reactive power flow control using UPFC, control schemes of UPFC, operating principle and characteristics of IPFC.

UNIT - V: CO-ORDINATION OF FACTS CONTROLLERS (12 Periods)

FACTS controller interactions: interaction between multiple SVC's, interaction between multiple TCSC's: SVC-TCSC interaction, co-ordination of multiple controllers using linear control techniques. Comparative evaluation of different FACTS controllers: performance comparison and cost comparison, Control coordination using Genetic Algorithm, Future direction of FACTS technology.

Total periods: 54

TEXT BOOKS:

1.Narain G. Hingorani, Laszlo Gyugyi, *Understanding FACTS: Concepts and Technology of Flexible AC Transmission Systems,* Wiley-IEEE Press, 2000.

2. R. Mohan Mathur and Rajiv K. Varma, *Thyristor based FACTS controllers for Electrical Transmission Systems,* Wiley-IEEE Press, 2002.

REFERENCE BOOKS:

1.Xiao-Ping Zhang, Christian Rehtanz,Bikash Pal,*Flexible AC Transmission Systems: Modelling and Control*, Springer Power Systems Series, 2012.

2.Timothy J.E. Miller, *Reactive Power Control in Electric Systems*, Wiley, 1982.

M. Tech. II-Semester

16MT20702:INTELLIGENT SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Engineering Mathematics, Electrical Machines & Power Systems at UG level.

COURSE DESCRIPTION:

Neural Networks; Fuzzy Logic Systems; Genetic Algorithms; Hybrid Intelligent Systems; Swarm intelligence; Applications.

COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1. demonstrate knowledge on soft computing techniques.

CO2. analyze complex engineering problems with intelligent techniques.

CO3. solve electrical engineering problems using intelligent systems.

CO4.initiate research related to applications of soft computing in the fields of electrical engineering and allied areas.

CO5.select and apply suitable intelligent techniques for engineering problems.

DETAILED SYLLABUS:

UNIT - I: NEURAL NETWORKS (11 Periods)

Neural network Architectures, Perceptron model, Learning strategies: Supervised Learning, Radial basis function network, Back propagation Network. Unsupervised Learning: Kohonen's SOM, Reinforced learning. Load forecasting using neural networks

UNIT - II: FUZZY LOGIC SYSTEMS (11 Periods)

Fuzzy sets: Relations & Operations, Membership functions, Fuzzification, Rule base, Inference Mechanism, Defuzzification and design of Fuzzy control system, Speed control of separately excited DC motor using fuzzy logic.

UNIT - III: GENETIC ALGORITHMS (10Periods)

Introduction to evolutionary computation, Genetic algorithms (GA): Biological background, Traditional optimization and search techniques, Basic terminologies, Simple GA, Flow chart, Operators in GA, Encoding, selection, crossover, mutation, Constraints in GA, Fitness function, Advantages and limitations of GA, Economic load dispatch using GA.

UNIT -IV: HYBRID INTELLIGENT SYSTEMS (12 Periods)

Introduction to hybrid intelligent systems: Adaptive Neuro-Fuzzy Inference Systems, Architecture and Learning. Fuzzy GA systems: rules generation. ANN Learning Using GA: Optimization of weights, Load forecasting problem using Neuro-fuzzy approach.

UNIT - V: SWARM INTELLIGENCE (11 Periods)

Introduction to swarm intelligence, Swarm intelligence algorithms-Ant colony optimization: Biological and artificial ant colony systems, Applications of ant colony intelligence: Static & Dynamic combinatorial optimization problems, Algorithm of Ant colony system, Particle swarm optimization: The basic PSO method, characteristic features of PSO, PSO algorithm, Optimum parameter setting for the best performance of PSO, Comparison with other Evolutionary computing techniques, Engineering application of ANT colony intelligence in unit commitment problem

Total Periods: 55

TEXT BOOKS:

1.S.N.Sivanandam, S.N.Deepa, *Principles of Soft Computing*, Wiley–India Edition,2008.

2.N.P.Padhy, *Artificial Intelligence and Intelligent Systems*, Oxford University press, 10thReprint, 2011.

REFERENCE BOOKS:

1.Saroj Kaushik, *Artificial Intelligence*, Cengage Learning India Private Limited, Fifth Indian reprint,2013.

2.J.S.R.Jang, C.T.Sun, E.Mizutani, *Neuro-fuzzy and Soft Computing: A Computational Approach to Learning and Machine Intelligence*, Pearson Education Taiwan Limited, 2004.

3.Fakhreddine O.karray, Clarence De Silva, *Soft computing andIntelligent systems Design, Theory, tools and applications,* Pearson Education Limited, 2009.

M. Tech. II-Semester
16MT20703:POWER SYSTEM STABILITY AND CONTROL

1nt. marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Electrical Machines, Control systems, Power system analysis, Power System operation and control at UG level and Advanced control systems and Power System Security and State Estimation at PG level.

COURSE DESCRIPTION:

Introduction to the synchronous machine classical model; state space models of synchronous machine; Methods of Excitation systems and modelling; Effect of excitation on stability; Analysis of Voltage stability

COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1.demonstrate knowledge on

- various power system stability issues of a small and large power system networks,
- modeling of SMIB, multi-machine and excitation systems,
- voltage control and reactive power management concepts.

CO2.analyzethe power system network for stability and control.

CO3.develop skills in evaluating power system stability.

CO4.initiate research to develop / design new control strategies or methodology for enhancing stability of power system.

DETAILED SYLLABUS:

UNIT - I: THE ELEMENTARY MATHEMATICAL MODEL (13 Periods)

A Classical model of one machine connected to infinite bus – Problems. System Response to small Disturbances: Types of problems studied, Block diagram of unregulated and regulated synchronous Machine, methods of studies – Effect of small changes of speed. Regulated synchronous machine – voltage regulator with one time lag – Governor with one time lag Classical model of multi-machine system – Modes of oscillation of unregulated Multi machine system – Problems

UNIT – II:THE SYNCHRONOUS MACHINE MODEL (10 Periods)

Introduction – Clarkes's and Park's Transformation – flux linkage equations, self and mutual inductances of stator and rotor, transformation of inductances, voltage equations. Formulations of state space model of one machine system connected to infinite bus, voltage, current equations.

UNIT – III:EXCITATION SYSTEMS (11 Periods)

Simplified view of excitation control, control configuration. Excitation system response -Non-continuously regulated systems, and continuously regulated systems. Excitation system compensation-state space description of the excitation system - simplified linear model only.

Types of Excitation systems: Type -1 system: Continuously acting regulator, Type - 2 system: rotating rectifier system, Type - 3 system: Static with terminal potential and current supplies, Type-4system: non–continuous acting - Block diagram representation – state space representation.

UNIT – IV:EFFECT OF EXCITATION ON STABILITY (10 Periods)

Introduction – effect of excitation on generator power limits – effect of the excitation system on transient stability,effect of excitation on dynamic stability – examination of dynamic stability by routh's criterion. Block diagram of the linear generator with exciter, supplementary stabilizing signals, approximate model of the complete exciter-generator system, Lead compensation

UNIT – V: VOLTAGE STABILITY ANALYSIS (11 Periods)

Voltage stability – Factors affecting voltage instability and collapse – Comparison of Angle and voltage stability – Analysis of voltage in stability collapse – Control of voltage instability.

Review of Lyapunov's stability theorems of non-liner systems using energy concept – Method based on first concept – Method based on first integrals – Quadratic forms – Variable gradient method – Zubov's method – Popov's method, Lyapunov function for single machine connected to infinite bus.

Total Periods: 55

TEXT BOOKS:

1. P.M.Anderson, A.A.Fouad, *Power System Control and Stability*, 2nd edition, IEEE Press,2003.
2. K.R.Padiyar, *Power System Dynamics Stability & Control*, 2nd edition, B.S.Publications, Hyderabad, India, 2008.

REFERENCE BOOKS:

1. Prabha Kundur, Neal J. Balu, Mark G. Lauby, *Power System Stability and Control*, 2ndedition, McGraw-Hill, 1994.
2. M.A.Pai, *Power System Stability: Analysis by the direct method of Lyapunov*, North Holland Publishing Company, Newyork, 1981.

M. Tech. (EPS), II-Semester
16MT20704: RESTRUCTURED POWER SYSTEM

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Power system operation and control, FACTS and Reactive Power Compensation and Management at UG level.

COURSE DESCRIPTION:
Features of Restructured Power systems; Market models; Information and transmission services; Electricity pricing and forecasting; Ancillary services management.

COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1.demonstrate knowledge on:
- operation of deregulated electricity market,
- key issues of electricity market models and their functionalities in different scenarios,
- electricity pricing, forecasting methods and ancillary service management in competitive market.

CO2.analyze market models to provide power exchange among various entities of deregulated power system.

CO3.solve market models, evaluating transmission losses and to regulate congestion in tie-lines for reliable operation in the competitive premise

CO4.design and developvarious forecasting methods for pricing, planning and operation of deregulated power systems.

DETAILED SYLLABUS:

UNIT - I: OVERVIEW OF KEY ISSUES IN ELECTRIC UTILITIES (10 Periods)
Introduction: Deregulation, need for deregulation, Advantages of deregulation in power system. Restructuring Models: PoolCo Model, Bilateral Model, Hybrid Model: independent system operator (ISO),Role of ISO. Power exchange, market operations, market power, standard cost, transmission pricing, congestion pricing, management of congestion.

UNIT - II: MARKET MODELS IN RESTRICTED POWER SYSTEMS (10 Periods)
Introduction: Market models based on contractual arrangements: Monopoly model, Single buyer model, Wholesale competition model, Retail competition model. Comparison of various market models. Market architecture: Day-ahead and Hour-Ahead Markets, Block forwards Market, Transmission Congestion Contracts(TCCs), and Ancillary service market.

UNIT - III: OASIS: OPEN ACCESS SAME-TIME INFORMATION SYSTEM (11 Periods)
Structure of OASIS: Functionality and Architecture of OASIS, information requirement of OASIS, Transfer Capability on OASIS: Definitions, Transfer Capability Issues, ATC Calculation, TTC Calculation, TRM Calculation, CBM Calculation. Transmission Services, Methodologies to Calculate ATC.

UNIT - IV: ELECTRICITY PRICING - VOLATILITY, RISK AND FORECASTING (12 Periods)
Electricity pricing: introduction, electricity price volatility, electricity price indexes. Challenges to Electricity Pricing: Pricing Models, Reliable Forward Curves. Construction of Forward Price Curves: Time frame for Price Curves, Types of Forward Price Curves: Short-term Price Forecasting, Factors Impacting Electricity Price, Forecasting Methods, Analyzing Forecasting Errors.

UNIT - V: ANCILLARY SERVICES MANAGEMENT (12 Periods)
Introduction:Types of ancillary services, Classification of ancillary services, Load-generation balancing related services: Frequency regulation, Load following, Spinning reserve services. Voltage control and reactive power support services: Generators, Synchronous condensers, Capacitors and inductors, SVCs, STATCOMs- Black start capability service. **Total Periods: 55**

TEXT BOOKS:
1. Kankan Bhattacharya, Math H.J. Buller, JalapE.Daladier, *Operation of Restructured Power System*, Kluwer Academic Publisher, 2001.
2. Mohammad Shahidehpour, and Muwaffaq Alomoush, - *Restructured Electrical Power Systems – Operation, Trading and Volatility,* Marcel Dekker, Inc. 2001.

REFERENCE BOOK:

1. Loi Lei Lai, *Power system Restructuring and Deregulation*, John Wiley & Sons Ltd., England, 2001.

M. Tech. II-Semester

16MT20705: STATICAND DIGITAL PROTECTION OF POWER SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Switchgear and Protection, Microprocessors and Microcontrollers at UG level.

COURSE DESCRIPTION:

Fundamentals of static and digital relays; Amplitude and Phase Comparators; characteristics of Static over current and differential relays; Static Distance relays; Numerical relays.

COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1.demonstrate knowledge on
- digital and numerical relays,
- operation of static and microprocessor based relays.

CO2.analyze different power system protection schemes.

CO3.evaluatevarious protection schemes for power system components.

CO4.initiate research related to design and application of appropriate digital relays in the fields of electrical engineering.

DETAILED SYLLABUS:

UNIT – I: INTRODUCTION TO STATIC AND DIGITAL RELAYS (10 Periods)

Static Relays- basicconstruction and advantages. Level detectors, Replica impedance, Mixing circuits, Phase and Amplitude Comparators – General equation for two input phase and amplitude comparators, Duality between Phase and Amplitude Comparators.

Numerical Relays: Block diagram of typical Numerical Relay – Advantages and Disadvantages.

UNIT – II: COMPARATORS (13 Periods)

Amplitude comparators: Circulating current type, opposed voltage type rectifier bridge comparators – Direct and Instantaneous comparators.

Phase comparators: Coincidence circuit type - block spike phase comparator, techniques to measure the period of coincidence – Integrating type – Rectifier and vector product type phase comparators.

Multi–Input comparators: Conic section characteristics – Three input amplitude comparator – Hybrid comparator.

UNIT – III: STATIC OVER CURRENTAND DIFFERENTIAL RELAYS (11 Periods)

Static over current relays: Introduction, Instantaneous over current relay – Time overcurrent relays. Basic principles – Definite time, Inverse Definite time and Directional over current relays.

Static Differential Relays: Analysis of Static differential relays – static relay schemes – Duo bias transformer differential protection – Harmonic restraint relay.

UNIT – IV: STATIC DISTANCE RELAYS (10 Periods)

Static impedance, Reactance, MHO and angle impedance relays – sampling comparator – realization of reactance and MHO relays using a sampling comparator.

Power Swings: Effect of power swings on the performance of distance relays, Power swing analysis, Principle of out-of-step tripping and blocking relays, effect of line length and source impedance on distance relays.

UNIT – V: MICROPROCESSOR BASED PROTECTIVE RELAYS (11 Periods)

Microprocessor based over current relays, Impedance relay, Directional relay, Reactance relay. Generalized mathematical expression for distance relays, measurement of resistance and reactance, MHO and offset-MHO relays –Realization of MHO characteristics, realization of offset MHO characteristics – Microprocessor Implementation of Digital distance relaying algorithms – Mann-Morrison technique, Differential equation technique.

Total Periods: 55

TEXT BOOKS:

1.T.S. Madhava Rao, *Power system Protection - Static relays with Microprocessor Applications*, 2nd edition, Tata McGraw Hill Publishing Company limited, 2008.

2.Badri Ram and D.N. Vishwakarma, *Power system Protection and Switchgear*, 2nd edition, Tata McGraw Hill Publication Company limited 2013.

REFERENCE BOOK:

1.Bhuvanesh A Oza, Nirmal Kumar C Nair, Rashesh P Mehta, Vijay H Makwana, *Power system protection and switchgear*, TataMcGraw Hill Education Private Limited, 2010.

M. Tech. II-Semester

16MT20706:ENERGY AUDITING, CONSERVATION AND MANAGEMENT

(Professional Elective- 2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Generation of Electric Power and Managerial Economics and Financial Analysis at UG level.

COURSE DESCRIPTION:
Basic Principles of Energy Audit;Energy Management; Energy Efficient Motors and Lighting; Energy Instruments; Computation of Economic Aspects and Analysis.

COURSE OUTCOMES:On successful completion of the course, student will be able to

CO1. demonstrate knowledge on energy conservation and management.

CO2. analyze the economic aspects of energy management.

CO3. evaluateand practice various auditing schemes for domestic and industrial systems.

CO4. design and apply various energy instruments for energy auditing and lighting systems.

DETAILED SYLLABUS:

UNIT - I: BASIC PRINCIPLES OF ENERGY AUDIT (09 Periods)

Energy audit- definitions, concept , types of audit, energy index, cost index, pie charts, Sankey diagrams, load profiles, Energy conservation schemes - Energy audit of industries- energy saving potential, energy audit of process industry, thermal power station, building energy audit

UNIT-II: ENERGY MANAGEMENT (10 Periods)

Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting. Energy manger, Qualities and functions, language, Questionnaire - check list for top management.

UNIT-III: ENERGY EFFICIENT MOTORS AND LIGHTING (14 Periods)

Energy efficient motors , factors affecting efficiency, loss distribution, constructional details, characteristics - variable speed, variable duty cycle systems, RMS hp- voltage variation-voltage unbalance - over motoring – PF correction- motor energy audit.

Good lighting system design and practice, lighting control, lighting energy audit

UNIT-IV: ENERGY INSTRUMENTS (11 Periods)

Energy Instruments watt meter, data loggers, thermocouples, pyrometers, lux meters, tongue testers, application of PLC. Design of Energy instruments

UNIT-V: COMPUTATION OF ECONOMIC ASPECTS AND ANALYSIS (12 Periods)

Economics Analysis-Depreciation Methods, time value of money, rate of return, present worth method, replacement analysis, life cycle costing analysis - Calculation of simple payback method, net present worth method - Applications of life cycle costing analysis, return on investment.

Total Periods: 56

TEXT BOOKS:

1.W.RaymondMurphy&GordonMckay,*EnergyManagement*,Butterworths, 1982.

2.Umesh Rathore, *Energy management,*1st edition, Kataria & Sons, New Delhi 2014.

REFERENCE BOOKS:

1.John C. Andreas, *Energy Efficient Electric Motors*, 2ndedition, Marcel Dekker Inc. Ltd, 1982.

2.Wayne C. Turner, Steve Doty, *Energy Management Hand Book*, 6th edition, CRC Press, 2006.

3.Paul W. O' Callaghan, *Energy Management*, 1stedition, McGraw Hill BookCompany, 1993.

M. Tech. II-Semester
16MT20707: HIGH VOLTAGE DC TRANSMISSION
(Professional Elective - 2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Power Electronics and Power systems at UG level and Power Electronic converters at PG level

COURSE DESCRIPTION:
HVDC Transmission: Capabilities, Applications and planning; Analysis and control of power converter; Harmonics and Filters; Types of Multi-Terminal DC Systems and control; Faults and Protection.

COURSE OUTCOMES: On successful completion of the course, student will be able to
CO1.demonstrate knowledge on:
- HVDC transmission systems,
- operation of static converters and its control,
- different types of faults and protection schemes in HVDC systems.

CO2.analyze various static converters in HVDC systems, harmonics, filters and MTDC systems.
CO3.evaluate the performance of HVDC systems.
CO4.initiate research in designing filter circuits and control techniques for HVDC systems.

DETAILED SYLLABUS:

UNIT – I:INTRODUCTION TO HVDC TRANSMISSION (10 Periods)
HVDC Transmission– Comparison of HVAC and HVDC transmission, types of DC Links, power handling capabilities of HVDC lines, applications of HVDC Transmission, planning for HVDC transmission, modern trends in DC Transmission, basic conversion principles.

UNIT – II:STATIC POWER CONVERTOR ANALYSISIS AND CONTROL (12 Periods)
Static Power Converters: Static converter configuration- 6-pulse & 12-pulse converters, converter station and terminal equipment. Rectifier and inverter operation, converter bridge characteristics, equivalent circuit for converter.
Control of HVDC converter: Principle of DC link control – constant current, constant extinction angle and constant ignition angle control. Individual phase control and equidistant firing angle control.

UNIT – III: HARMONICS AND FILTERS (11 Periods)
Generation of harmonics in HVDC systems, methods of harmonics elimination, harmonic instability problems, Causes for instability, remedies for instability problems. Design of AC filters, single frequency tuned filter, Double frequency tuned filter, high pass filter, cost consideration of AC harmonic filter, DC filters.

UNIT – IV: MULTI-TERMINAL DC LINKS AND SYSTEMS (10 Periods)
Introduction – Potential applications of MTDC systems – Types of MTDC systems – series, parallel and series-parallel systems, their principle of operation and control - Protection of MTDC systems.

UNIT – V: FAULTS AND PROTECTION (12 Periods)
Over voltages due to disturbance on DC side, over voltages due to DC and AC side line faults – Converter faults, over current protection– Valve group and DC line protection. Over voltage protection of converters – Surge arresters.

Total Periods: 55

TEXT BOOKS:

1. K.R.Padiyar, *High Voltage Direct current Transmission*, New Age International (P) Ltd, Publishers, 2004.
2. S. Rao, *EHV-AC, HVDC Transmission & Distribution Engineering*, Khanna Publishers, 2006.

REFERENCE BOOKS:

1. E.Uhlman, *Power Transmission by Direct Current*, Springer Verlag, Berlin, 2000.
2. E. W. Kimbark, *Direct current Transmission*, John Wiely& sons, New York.
3. J. Arillaga, *HVDCTranmission*, peter peregrilnus Ltd., London UK, 1983.

M. Tech. II-Semester
16MT20708:POWER QUALITY
(Professional Elective - 2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Distribution of Electric Power and Power Electronics at UG level
COURSE DESCRIPTION:
Power Quality concepts; harmonics and voltage regulation using conventional methods; power quality enhancement using custom power devices; power quality issues in distributed generation.
COURSE OUTCOMES: On successful completion of the course, student will be able to
CO1.demonstrate knowledge on
- various power quality issues and mitigation techniques,
- operational issues in distributed generation.

CO2.analyze
- harmonic distortion due to commercial and industrial loads,
- the suitability of various custom power devices.

CO3.evaluate various power quality indices.
CO4.initiate research to develop/designnew schemes and techniques for power quality enhancement.
CO5.apply the appropriate principles and techniques for integration of distributed generation and utilities.

DETAILED SYLLABUS:
UNIT-I: FUNDAMENTALS OF POWER QUALITY (12 Periods)
Definition of power quality, classification of power quality issues, power quality standards, categories and characteristics of electromagnetic phenomena in power systems: impulsive and oscillatory transients, interruption, sag, swell, sustained interruption, under voltage, overvoltage and outage. Sources and causes of different power quality disturbances.
UNIT-II: HARMONICS & APPLIED HARMONICS (12 Periods)
Harmonic distortion, voltage vs current distortion, harmonics vs transients, power system qualities under non sinusoidal conditions, harmonic indices, harmonic sources from commercial loads, harmonic sources from industrial loads.
Applied harmonics**:** effects of harmonics, harmonic distortion evaluations, principles of controlling harmonics, devices for controlling harmonic distortion.
UNIT-III: VOLTAGE REGULATION USING CONVENTIONAL METHODS (08 Periods)
Principles of regulating the voltage, devices for voltage regulation: utility step-voltage regulators, ferro-resonant transformers, magnetic synthesizers, on-line UPS systems, motor-generator sets, static VAR compensators, shunt capacitors, series capacitors.
UNIT-IV: POWER QUALITY ENHANCEMENT USING CUSTOM POWER DEVICES (13 Periods)
Introduction to custom power devices: Network reconfiguring type: Solid State Current Limiter (SSCL), Solid State Breaker (SSB), Solid State Transfer Switch (SSTS).
Compensating type: Dynamic Voltage Restorer (DVR), Distribution STATCOM and Unified Power Quality Conditioner (UPQC): operation, realization and control of DVR, DSTATCOM and UPQC, load compensation. Power quality monitoring, Power quality monitoring standards.
UNIT - V: POWER QUALITY ISSUES IN DISTRIBUTED GENERATION (10 Periods)
DG Technologies, Perspectives on DG benefits- Interface to the Utility System - power quality issues affected by DG - Operating Conflicts: Utility fault-clearing, Reclosing, Interference with relaying, Voltage regulation issues, Islanding - siting DG. **Total Periods: 55**

TEXT BOOKS:
1. Roger C. Dugan, Mark F. McGranaghan, Surya Santoso and H. Wayne Beaty, *Electrical Power Systems Quality*, 2nd edition, TATA Mc Graw Hill, 2010.
2. Arindam Ghosh, Gerard Ledwich, *Power Quality Enhancement Using Custom Power Devices,* Springer, 2002.

REFERENCE BOOKS:
1. Math H J Bollen, *Understanding Power Quality Problems:Voltage Sags and Interruptions*, Wiley, 2010.
2. C. Sankaran, *Power Quality*, CRC press, 2000.

M. Tech. II-Semester
16MT20709:SMART GRID TECHNOLOGY
(Professional Elective - 2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Power Systems at UG level

COURSE DESCRIPTION:
Concept of smart grid; various information and communication technologies for Smart Grid; Smart metering; Demand side integration; Energy management systems

COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1.demonstrate knowledge on
- smart grid initiatives and technologies,
- information and communication technologies for the smart grid,
- sensing, measurement, control and automation.

CO2.demonstrateskills in analyzing fault levels and state of the system.
CO3.evaluate various information security protocols adhering the standards of smart grid.
CO4.initiate research on modern techniques for implementation in smart grid.

DETAILED SYLLABUS:

UNIT – I: SMART GRID (07 Periods)
smart grid introduction, ageing assets and lack of circuit capacity, thermal constraints, operational constraints, security of supply, national initiatives, early smart grid initiatives, active distribution networks, virtual power plant, other initiatives and demonstrations, overview of the technologies required for the smart grid.

UNIT – II: COMMUNICATION TECHNOLOGIES FOR THE SMART GRID (13 Periods)
Data Communications: Introduction, Dedicated and Shared Communication Channels, Switching Techniques, Circuit Switching, Message Switching, Packet Switching, Communication Channels, Wired Communication, Optical Fiber, Radio Communication, Cellular Mobile Communication, Layered Architecture and Protocols, the ISO/OSI Model, TCP/IP
Communication Technologies: IEEE 802 Series, Mobile Communications, Multi-Protocol Label Switching, Power line Communication, Standards for Information Exchange, Standards for Smart Metering, Modbus, DNP3, IEC 61850

UNIT – III: INFORMATION SECURITY FOR THE SMART GRID (11 Periods)
Introduction, Encryption and Decryption, Symmetric Key Encryption, Public Key Encryption, Authentication, Authentication Based on Shared Secret Key, Authentication Based on Key Distribution Center, Digital Signatures, Secret Key Signature, Public Key Signature, Message Digest, Cyber Security Standards, IEEE 1686: IEEE Standard for Substation Intelligent Electronic Devices(IEDs) Cyber Security Capabilities, IEC 62351: Power Systems Management and Association Information Exchange – Data and Communication Security.

UNIT – IV: SMART METERING AND DEMAND SIDE INTEGRATION (13 Periods)
Introduction, smart metering – evolution of electricity metering, key components of smart metering, smart meters: an overview of the hardware used – signal acquisition, signal conditioning, analogue to digital conversion, computation, input/output and communication. Communication infrastructure and protocols for smart metering - Home area network, Neighborhood Area Network, Data Concentrator, meter data management system, Protocols for communication. Demand Side Integration- Services Provided by DSI, Implementation of DSI, Hardware Support, Flexibility Delivered by Prosumers from the Demand Side, System Support from DSI.

UNIT – V: TRANSMISSION AND DISTRIBUTION MANAGEMENT SYSTEM (11Periods)
Data Sources, Energy Management System, Wide Area Applications, Visualization Techniques, Data Sources and Associated External Systems, SCADA, Customer Information System, Modeling and Analysis Tools, Distribution System Modeling, Topology Analysis, Load Forecasting, Power Flow Analysis, Fault Calculations, State Estimation, Applications, System Monitoring, Operation, Management, Outage Management System, Energy Storage Technologies, Batteries, Flow Battery, Fuel Cell and Hydrogen Electrolyzer, Flywheels, Super conducting Magnetic Energy Storage Systems, Super capacitors, Energy storage for wind power, Agent-based control of electrical vehicle battery charging.

Total Periods: 55

TEXT BOOKS:

1. Janaka Ekanayake, Kithsiri Liyanage, JianzhongWu, Akihiko Yokoyama, Nick Jenkins, *Smart Grid Technology and Applications,* Wiley Publications, 2012.
2. James Momoh, *Smart Grid: Fundamentals of Design and Analysis,* Wiley, IEEE Press, 2012.
3. Bharat Modi, Anu Prakash, Yogesh Kumar, *Fundamentals of Smart Grid Technology*, S.K Kataria & Sons, 2015.

REFERENCE BOOKS:

1. Eric D. Knapp, Raj Samani, *Applied Cyber Security and the Smart Grid-Implementing Security Controls into the Modern Power Infrastructure,*Syngress Publishers, 2013.
2. NouredineHadjsaid,Jean-Claude Sabonnadiere, *Smart Grids,* Wiley Blackwell Publications.

3.Peter Fox-Penner, *Smart Power: Climate Changes, the Smart Grid, and the future of electric utilities,* Island Press, 1st edition, June 2010.

M. Tech. II-Semester

16MT20731: POWER SYSTEMS AND RELAYS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	--	--	4	2

PRE-REQUISITES: Electrical Machines and Power Systems at UG Level

COURSE DESCRIPTION:
Relay testing, fault analysis, determination of sequence reactances of power system components, dielectric strength of transformer oil and synchronous machine power angle characteristics.

OUTCOMES: On successful completion of the course, student will be able to

CO1. demonstrate knowledge in power system protection and testing of relays bycombining existing and novel technology.

CO2. analyze protective schemes and testing methods in the field of power systems.

CO3. demonstrate skills in evaluating the power system network parameters and relay settings for appropriate protection.

CO4. initiate research to design/develop a suitable protection scheme for power system components/networks.

CO5. apply modern numerical and processor based relays for protection and relaying.

CO6. function effectively as an individual and as a member in a team

CO7. prepare laboratory report that clearly communicates the experimental information.

CO8. practice professional code of ethics

LIST OF EXPERIMENTS:

Conduct any **Twelve**Experiments from the following:

1. Determination of Sub-transient Reactance of Salient Pole Synchronous Machine.
2. Determination of Sequence Impedances of Cylindrical Rotor Synchronous Machine.
3. Fault Analysis
   i) LG and LL Faults
   ii) LLG and LLLG Faults
4. Measurement of Dielectric Strength of Transformer Oil Using Variable Electrodes.
5. Reactive power compensation using Tap changing transformer.
6. Power Angle Characteristic of Three-Phase Salient Pole Synchronous Machine.
7. Analysis of Long Transmission line.
8. Determination of Sequence Components of Salient Pole Synchronous Machine.
9. Scott Connection of Transformers.
10. Characteristics of Over Current Relay.
11. Characteristics of Over Voltage Relay.
12. Characteristics of Percentage Biased Differential Relay.
13. Testing of Frequency Relay.
14. Testing of Reverse Power Relay.

M. Tech. II-Semester
16MT20732:POWER SYSTEMS SIMULATION-II LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	--	--	4	2

PRE-REQUISITES: Power system analysis, FACTS, Power system operation & control, Power quality and Switchgear and protection at UG and PG level.

COURSE DESCRIPTION:
Modelling, simulation and analyze operation and control of power system networks.

COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1.demonstrate knowledge on various power system problems through modern tools and disseminate them using software packages in field of power system and power electronics.
CO2.analyze the simulated observations of power system networks, power electronic circuits and their behavior through theoretical perspective.
CO3.evaluate various parameters of the power systems
CO4.interpret the observations of power system network and design a suitable control strategy to meet the required specifications.
CO5. select and apply modern software tools for solving real time problems in the existing power system
CO6. function effectively as an individual and as a member in a team
CO7. prepare laboratory report that clearly communicates the experimental information.
CO8. practice professional code of ethics.

LIST OF EXPERIMENTS:

Conduct any **TEN**Experiments from the followingusing **MATLAB/PSCAD/MIPOWER**

1. Transient Response due to capacitor switching.
2. Transformer inrush currents measurement.
3. Load flow analysis.
4. Analysis of Short circuit studies with and with fault impedance.
5. Load frequency control problem for an interconnected power system.
6. Voltage stability analysis.
7. Stability analysis of SMIB.
8. Simulation of FACTS controllers.
9. Characteristics and Coordination of Relays.
10. Simulation of power quality problems (Sag/Swell, interruption, transients, harmonics, flickers etc.)
11. Harmonic analysis and tuned filter design to mitigate harmonics.
12. Demonstration of MATLAB tool boxes (Fuzzy, Neural, GA, PSO etc.) for power system applications.

M. Tech. II-Semester
16MT20733: SEMINAR

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
--	100	100	--	--	--	2

PRE-REQUISITES:--

COURSE DESCRIPTION:
Identification of seminar topic; literature survey; preparation of technical report and presentation.

COURSE OUTCOMES:On successful completion of the course, student will be able to

CO1.demonstrate capacity to identify an advanced topic for seminar in core and allied areas.
CO2.extract information pertinent to the topic through literature survey.
CO3.comprehend the extracted information through analysis and synthesis critically on the topic.
CO4.contribute to multidisciplinary scientific workin the field of Power systems.
CO5.manage time and resources effectively and efficiently.
CO6.plan, organize, prepare and present effective written and oral technical report on the topic.
CO7.engage in lifelong learning for development of technical competence in the field of Power Systems.

CO8.understand ethical responsibility towards environment and society in the field of Electrical engineering.
CO9.adapt to independent and reflective learning for sustainable professional growth in Electrical power systems.

M. Tech. II-Semester
16MT23810: INTELLECTUAL PROPERTY RIGHTS
(Common to all M. Tech. Programs)
(Audit Course)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	-	2	-	-

PRE-REQUISITES: -

COURSE DESCRIPTION:
Introduction to Intellectual Property; Trade Marks; Law of Copy Rights; Law of Patents; Trade Secrets; Unfair Competition; New Development of Intellectual Property.

COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1. demonstrate knowledge on
- Intellectual Property,
- Trade Marks & Secrets,
- Law of Copy Rights, Patents,
- New development of Intellectual Property.

CO2. analyze the different forms of infringement of intellectual property rights.
CO3. solve problems pertaining to Intellectual Property Rights.
CO4. stimulate research zeal for patenting of an idea or product.
CO5. write effective reports required for filing patents.
CO6. develop life-long learning capabilities.
CO7. develop awareness of the relevance and impact of IP Law on their academic and professional lives.
CO8. develop attitude for reflective learning.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO INTELLECTUAL PROPERTY (05 Periods)
Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT - II: TRADE MARKS (05 Periods)
Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT - III: LAW OF COPY RIGHTS (06 Periods)
Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.
Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT - IV: TRADE SECRETS (06 Periods)
Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.
Unfair competition: Misappropriation right of publicity, false advertising.

UNIT - V: NEW DEVELOPMENT OF INTELLECTUAL PROPERTY (06 Periods)
New developments in trade mark law; copy right law, patent law, intellectual property audits.
International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

Total Periods:28

TEXT BOOKS:

1. Deborah, E. Bouchoux, *Intellectual property right*, cengage learning.
2. Prabuddha Ganguli, *Intellectual property right - Unleashing the knowledge economy*, Tata Mc Graw Hill Publishing Company Ltd.

M. Tech. III & IV-Semester
16MT30731 & 16MT40731: PROJECT WORK

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
200	200	400	--	--	--	28

PRE-REQUISITES:--

COURSE DESCRIPTION:
Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Writing of thesis and presentation.

COURSE OUTCOMES:On successful completion of the course, the student will be able to

CO1.demonstrate capacity to identify an advanced topic for project work in core and allied areas.
CO2.analyze the problem and derive an optimal solution pertinent to the chosen topic.
CO3.solve engineering problems and provide a wide range of potential solutions.
CO4.comprehend extracted information through the literature survey for design and development of engineering problems pertinent to the chosen topic.
CO5.use the techniques, skills and modern engineering tools necessary for project work.
CO6.contribute to multidisciplinary scientific workin the field of Electrical power Systems.
CO7.execute the project effectively and efficiently considering economical and financial factors.
CO8.plan, prepare and present effective written and oral technical report on the topic.
CO9.engage in lifelong learning for development of technical competence in the field of Electrical power systems and allied fields.
CO10.understand ethical responsibility towards environment and society in the field of Electrical Engineering.
CO11.adaptto independent and reflective learning for sustainable professional growth.

SREE VIDYANIKETHAN ENGINEERING COLLEGE

Sree Sainath Nagar, Tirupati – 517 102.

SVEC16 M. Tech. (PED) Course Structure

I-Semester

S. No.	Course Code	Course Title	Contact Periods per Week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
1.	16MT1BS01	Applied Mathematics	4	-	-	4	4	40	60	100
2.	16MT12301	Advanced Power Semiconductor Devices	4	-	-	4	4	40	60	100
3.	16MT12302	Analysis of Inverters	4	-	-	4	4	40	60	100
4.	16MT12303	Analysis of Power Converters	4	-	-	4	4	40	60	100
5.	16MT12304	Modelling of Electrical Machines	4	-	-	4	4	40	60	100
6.	**Professional Elective-1**		4	-	-	4	4	40	60	100
	16MT12305	Electric and Hybrid-Electric Vehicles								
	16MT12306	Intelligent Controllers								
	16MT10707	Microcontrollers and Applications								
	16MT10705	Reactive Power Compensation and Management								
7.	16MT12331	Power Electronics Design Lab	-	-	4	4	2	50	50	100
8.	16MT12332	Power Electronics Simulation Lab	-	-	4	4	2	50	50	100
		Total	**24**	**-**	**8**	**32**	**28**	**340**	**460**	**800**
9.	16MT13808	Research Methodology (Audit course)	-	2	-	2	-	-	-	-

II-Semester

S. No.	Course Code	Course Title	Contact Periods per Week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
1.	16MT22301	Linear and Nonlinear Control Systems	4	-	-	4	4	40	60	100
2.	16MT22302	Power Electronics in Renewable Energy Systems	4	-	-	4	4	40	60	100
3.	16MT22303	Solid State AC Drives	4	-	-	4	4	40	60	100
4.	16MT22304	Solid State DC Drives	4	-	-	4	4	40	60	100
5.	16MT22305	Special Electrical Machines	4	-	-	4	4	40	60	100
6.	**Professional Elective-2**		4	-	-	4	4	40	60	100
	16MT20701	Flexible AC Transmission Systems								
	16MT20707	High Voltage DC Transmission								
	16MT20708	Power Quality								
	16MT20709	Smart Grid Technology								
7.	16MT22331	Electric Drives Lab	-	-	4	4	2	50	50	100
8.	16MT22332	Electric Drives Simulation Lab	-	-	4	4	2	50	50	100
9.	16MT22333	Seminar	-	-	-	-	2	--	100	100
		Total:	**24**	**-**	**8**	**32**	**30**	**340**	**560**	**900**
10.	16MT23810	Intellectual Property Rights (Audit Course)	-	2	-	2	-	-	-	-

III-Semester

S. No.	Course Code	Course Title	Contact Periods per Week				Credits	Scheme of Examination Max. Marks		
			L	T	P*	Total		Internal Marks	External Marks	Total Marks
1.	16MT3MOOC	MOOC	-	-	-	-	-	-	-	-
2.	16MT32301	Project Work – Phase I	-	-	-	-	8	50	50	100
		Total:	**-**	**-**	**-**	**-**	**8**	**50**	**50**	**100**

*Fulltime Project Work

IV-Semester

S. No.	Course Code	Course Title	Contact Periods per Week				Credits	Scheme of Examination Max. Marks		
			L	T	P*	Total		Internal Marks	External Marks	Total Marks
1.	16MT42301	Project Work – Phase II	-	-	-	-	20	150	150	300
		Total:	**-**	**-**	**-**	**-**	**20**	**150**	**150**	**300**
						Grand Total:	**86**	**880**	**1220**	**2100**

*Fulltime Project Work

M. Tech. (PED) – I Semester

(16MT1BS01)APPLIED MATHEMATICS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES: Course on Engineering Mathematics at UG Level.

COURSE DESCRIPTION:

Matrix theory, Calculus of variations, One dimensional random variables, Linear programming and Fourier series.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- matrix theory and eigen vectors
- functions of several variables
- probability theory and distributions
- optimization processes
- fourier series

CO2. analyze and solve problems involving
- matrix factorizations
- variations in moving boundaries
- probability distributions
- optimization methods
- power signals

CO3. design mathematical models for power signals, power electronic circuits and drives.

CO4. develop advanced skills in analyzing the complex problems involving periodic and non-periodic functions in power signals, power electronic circuits and allied areas.

DETAILED SYLLABUS:

UNIT-I: MATRIX THEORY (11 periods)

The Cholesky decomposition - Generalized Eigen vectors, Canonical basis - QR factorization –Least squares method - Singular value decomposition.

UNIT–II: CALCULUS OF VARIATIONS (11 periods)

Concept of variation and its properties – Euler’s equation – Functional dependent on first and higher order derivatives – Functionals dependent on functions of several independent variables – Variational problems with moving boundaries – problems with constraints - Direct methods: Ritz and Kantorovich methods.

UNIT–III: ONE DIMENSIONAL RANDOM VARIABLES (11 periods)

Random variables - Probability function – moments – moment generating functions and their properties – Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and Normal distributions – Function of a Random Variable.

UNIT-IV: LINEAR PROGRAMMING (11 periods)

Formulation – Graphical solution – Simplex method – Two phase method - Transportation and Assignment Models.

UNIT-V: FOURIER SERIES (11 periods)

Fourier Trigonometric series: Periodic function as power signals – Convergence of series – Even and odd function: cosine and sine series – Non-periodic function: Extension to other intervals – Power signals: Exponential Fourier series – Parseval’s theorem and power spectrum – Eigen value problems and orthogonal functions – Regular Sturm-Liouville systems – Generalized Fourier series.

Total Periods: 55

TEXT BOOKS:

1. Richard Bronson, *Matrix Operation*, Schaum’s outline series, 2nd edition, McGraw Hill, 2011.
2. Gupta, A.S., *Calculus of Variations with Applications*, Prentice Hall of India Pvt. Ltd., New Delhi, 1997.
3. Oliver C. Ibe, *Fundamentals of Applied Probability and Random Processes*, Academic Press, (An imprint of Elsevier), 2010.
4. Taha, H.A., *Operations Research, An introduction*, 10th edition, Pearson education, New Delhi, 2010.
5. Andrews L.C. and Phillips R.L., *Mathematical Techniques for Engineers and Scientists*, Prentice Hall of India Pvt. Ltd., New Delhi, 2005.

REFERENCE BOOKS:

1. Elsgolts, L., *Differential Equations and the Calculus of Variations*, MIR Publishers, Moscow, 1973.
2. Grewal, B.S., *Higher Engineering Mathematics*, 42nd edition, Khanna Publishers, 2012.
3. O'Neil, P.V., *Advanced Engineering Mathematics*, Thomson Asia Pvt. Ltd., Singapore, 2003.
4. Johnson R. A. and Gupta C. B., *Miller & Freund’s Probability and Statistics for Engineers*, Pearson Education, Asia, 7th edition, 2007.

M. Tech. (PED) – I Semester

(16MT12301)ADVANCED POWER SEMICONDUCTOR DEVICES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES: Courses on Electronic Devices and Power Electronics at UG Level.

COURSE DESCRIPTION:

Construction, types, switching, operating characteristics and applications of power semiconductor devices; Design of firing, protective circuits and heat sinks for various power semiconductor devices.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on

- construction, operation and characteristics of various power semiconductor devices.
- applications of power semiconductor devices.
- operation of firing and protection circuits.
- thermal protection of power semiconductor devices.

CO2. analyze various characteristics of power semiconductor devices.

CO3. design firing and protective circuits for power converters.

CO4. initiate research ideas in selecting the appropriate power semiconductor devices for desired applications.

CO5. select and apply the appropriate controlling and firing circuits for different power converters.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO POWER SWITCHING DEVICES (08 periods)

Power semiconductor devices: Introduction, classifications of various power switching devices – circuit symbols and ratings. Characteristics of an ideal switch, characteristics of practical devices, switch specifications, device selection strategy and Electro Magnetic Interference (EMI).

Power diodes: Construction, steady state characteristics, switching characteristics, electrical rating, Types – schottky diodes, fast recovery diodes, silicon carbide diodes, series and parallel connected diodes.

UNIT-II: THYRISTOR (10 periods)

Construction, steady state characteristics and switching characteristics.Thyristor protection – di/dt protection, dv/dt protection, design of snubber circuits, over voltage protection, over current protection and gate protection.Heat sink – Thermal resistance and specifications.Improvements of thyristor ratings and thyristor mounting techniques.

UNIT-III: POWER TRANSISTORS (14 periods)

Power Bipolar Junction Transistor: Construction, steady state characteristics, switching characteristics and Safe Operating Area (SOA).

Power MOSFETs: Types - Depletion & Enhancement, construction, steady state characteristics and switching characteristics.

IGBTs: Construction, steady state characteristics, switching characteristics, series & parallel operation, comparison of BJT, MOSFET & IGBT and design of snubber circuit.

UNIT-IV: SPECIAL POWER DEVICES (11 periods)

Thyristors: GTOs – Construction, operation, steady state characteristics and switching characteristics. Construction and operation: BCTs, TRIAC, FET – CTHs, ETOs, IGCTs, MCTs, SITHs, ASCR, RCT, SCS and light activated thyristor. Comparisons of various thyristors.

Transistors: Construction and operation – COOLMOS and SITs.

UNIT-V: GATE DRIVE CIRCUITS (12 periods)

MOSFET and BJT gate drive circuits. Isolation of gate and base drives – Pulse transformer andopto-couplers. Thyristor firing circuits – R, RC firing circuits, photo – SCR isolator, pulse transformer isolation, 1:6 isolation transformer for inverter gate bias circuits, thyristor converter gating circuits and UJT firing circuits. Gate drive ICs – MOSFETs and IGBTs. Drive ICs for converters – MOS Gated Driver.

Total Periods: 55

TEXT BOOKS:

1. Muhammad H. Rashid,*Power Electronics: Circuits, Devices and Applications*, Pearson Education, 4th edition, 2013.
2. Dr. P. S. Bimbhra, *Power Electronics*, Khanna Publishers, New Delhi, 5th edition, 2012.

REFERENCE BOOKS:

1. M. D. Singh & K. B. Kanchandhani, *Power Electronics*, Tata Mc Graw – Hill Publishing Company, 18th edition, 2013.
2. Ned Mohan, T. M. Undeland, W.P. Robbins, *Power Electronics: Converters, Applications and Design*, Wiley, 3rd edition, 2007.

M. Tech. (PED) – I Semester

(16MT12302)ANALYSIS OF INVERTERS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES: Courses on Power Electronics at UG Level.

COURSE DESCRIPTION:

Operation and performance of single phase and three phase voltage source inverters; Voltage control of single phase and three phase inverters; Design of PWM inverter; Current Source Inverters; Multilevel inverters and resonant inverters.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- operation of various configurations of inverters.
- various voltage control methods.
- Pulse Width Modulation techniques.

CO2. analyze& comprehend the operating modes of inverters under different configurations subjected to various loads.

CO3. evaluate the performance of various types of inverters and PWM controllers.

CO4. conduct investigations to provide feasible solutions for the problems in the field of power inverters.

CO5. select appropriate controlling technique for improving the performance of inverters.

DETAILED SYLLABUS:

UNIT-I: SINGLE PHASE VOLTAGE SOURCE INVERTERS (11 periods)

Introduction, classification of inverters, single phase half bridge and full bridge voltage source inverters and performance parameters of inverter. Voltage control of single phase inverters – single PWM, multiple PWM, sinusoidal PWM, modified sinusoidal PWM and phase displacement control. Uninterruptable Power Supply (UPS) – offline and online.

UNIT-II: THREE PHASE VOLTAGE SOURCE INVERTERS (13 periods)

Introduction, 180° conduction mode with R and RL load, 120° conduction mode with R-load, comparison of two conduction modes, voltage control of three phase inverter -Advanced modulation techniques - trapezoidal, staircase, stepped, harmonic injection and delta modulation.

UNIT-III: CURRENT SOURCE INVERTERS (09 periods)

Introduction, Operation of six-step thyristor inverter, commutated Inverters, Auto Sequential Current source Inverter (ASCI), current pulsations, comparison of current source inverter and voltage source inverters, PWM techniques for current source inverters.

UNIT-IV: RESONANT PULSE INVERTERS (08 periods)

Introduction, series resonant inverters with unidirectional and bi-directional switches, frequency response of series resonant inverters-series loaded, parallel loaded, parallel resonant inverters, voltage control of resonant inverters and class E resonant inverters.

UNIT-V: MULTILEVEL INVERTERS (14 periods)

Introduction, multilevel concept, types of multilevel inverter, diode clamped multilevel inverter-principle of operation and features.Flying capacitor multilevel inverter - principle of operation and features.Cascaded multi-level inverter - principle of operation and features. Applications of multilevel inverters, switching device current, DC link capacitor voltage balancing and comparison of multilevel inverters.

Total Periods: 55

TEXT BOOKS:

1. Muhammad H. Rashid,*Power Electronics: Circuits, Devices and Applications*, Pearson Education, 4th edition, 2013.
2. Ned Mohan, T.M.Undeland and W.P.Robbin, *Power Electronics: Converters, Application andDesign*, Wiley, 3rd edition, 2007.

REFERENCE BOOKS:

1. Dr. P. S. Bimbhra, *Power Electronics,* Khanna publishers, New Delhi, 5th edition, 2012.
2. M D Singh & K B Khanchandani, *Power Electronics*, Tata McGraw – Hill Publishers, New Delhi, 2ndedition, 2013.
3. P C Sen, *Modern Power Electronics*, Wheeler publishing Co, New Delhi, 1st edition, 1998.

M. Tech. (PED) – I Semester

(16MT12303)ANALYSIS OF POWER CONVERTERS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES: Courses on Engineering Mathematics, Electrical circuits and Power Electronics at UG Level.

COURSE DESCRIPTION:

Single phase and three phase converters - Types, operation of controlled and uncontrolled converters; Analysis of isolated and non-isolated converters; AC voltage controllers; Choppers.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- operation of various types of AC–DC and DC-DC converters,AC voltage controllers.
- Total Harmonic Distortion.
- forced commutation circuits.

CO2. analyze& comprehend the operating modesof converters with different configurations subjected to various loads.

CO3. develop skills in evaluating the performance of various power converters.

CO4. initiateresearch ideas to provide feasible solutions for AC-DC and DC-DC converters.

CO5. select appropriate controlling techniques for improving the performance of Chopper.

DETAILED SYLLABUS:

UNIT-I: SINGLE PHASE RECTIFIERS (12 periods)

Introduction, classification of converters, analysis of semi controlled and fully controlled converters with R, R-L, R-L-E loads, freewheeling diodes, continuous & discontinuous modes of operation and evaluation of various performance parameters. Total Harmonic Distortion (THD), power factor, effect of source impedance, extinction angle control, symmetrical angle control and SPWM control.

UNIT-II: MULTI PULSE CONVERTERS (12 periods)

Introduction, analysis of semi converter and fully controlled converters with R, R-L loads, freewheeling diodes, continuous and discontinuous modes of operation.Total Harmonic Distortion (THD), power factor improvements and effect of source impedance.

UNIT-III: NON-ISOLATED DC-DC CONVERTERS (14 periods)

Introduction, Choppers: Types – Class A, B, C, D & E operation and characteristics.Concept of duty ratio and current limit control.Performance analysis of buck, boost, buck-boost, cuk, sepic and quadratic converters.

UNIT-IV: ISOLATED DC-DC CONVERTERS (11 periods)

Introduction, Performance analysis of forward, fly-back, push-pull, half-bridge and full-bridge converters.Resonant Converters-Zero Voltage Switching (ZVS) and Zero Current Switching (ZCS) converters.Relationship between input and output voltages, expression for filter inductor and capacitors.

UNIT-V: AC VOLTAGE CONTROLLERS AND DUAL CONVERTERS (06 periods)

Principle of phase control: Single phase and three phase controllers - Analysis with R and R-L loads. Single phase dual converters: Non-circulating and circulating modes of operation.

Total Periods: 55

TEXT BOOKS:

1. Muhammad H. Rashid, *Power Electronics: Circuits, Devices and Applications*, Pearson Education, 4th edition, 2013.
2. Ned Mohan, T. M. Undeland, W.P. Robbins, *Power Electronics: Converters, Applications and Design*, Wiley, 3rd edition, 2007.

REFERENCE BOOKS:

1. P C Sen, *Modern Power Electronics*, Wheeler publishing Co, 1st edition, New Delhi, 1998.
2. Bimal K Bose, *Modern Power Electronics and Drives*, Pearson Education, 2nd edition, 2003.
3. M D Singh & K B Khanchandani, *Power Electronics*, Tata McGraw – Hill Publishers, New Delhi,2nd edition,2013.

M. Tech. (PED) – I Semester

(16MT12304)MODELLING OF ELECTRICAL MACHINES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES: Courses on DC Machines, Transformers and Induction Machines, Synchronous Machines.

COURSE DESCRIPTION:
Modelling and analysis of DC,induction andsynchronous machines in stationary and rotating reference frames

COURSEOUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate potential knowledge on modelling of DC, induction and synchronous machines.
CO2. analyze the performance of DC, induction and synchronous machines.
CO3. design DC, induction and synchronous machines meeting the needs of industry.
CO4. apply appropriate transformation technique to obtain reference frame variables.

DETAILED SYLLABUS:

UNIT-I: BASIC PRINCIPLES OF ELECTRICAL MACHINE ANALYSIS (14 periods)
Magnetically coupled circuits: Review of basic concepts, magnetizing inductance, modeling linear and nonlinear magnetic circuits.
Electromechanical energy conversion: Principles of energy flow, concept of field energy and co-energy. Derivation of torque expression for various machines using the principles of energy flow and the principle of co-energy. Inductance matrices of induction and synchronous machines.

UNIT-II: THEORY OF DC MACHINES (09 periods)
Review of the DC machine. State-space model of a DC machine, reduced order model andTransfer functions of the DC machine. Numerical problems.

UNIT-III: REFERENCE FRAME THEORY (11 periods)
Concept of space vector, types of transformation, condition for power invariance, zero-sequence component, expression for power with various types of transformation. Transformations between reference frames: Clarke and Park's Transformations, variables observed from various frames.

UNIT-IV: THEORY OF SYMMETRICAL INDUCTION MACHINES (11 periods)
Voltage and torque in machine variables, derivation of dq0 model for a symmetrical induction machine, voltage and torque equation in arbitrary reference frame variables, analysis of steady state operation. State-space model of induction machine in 'd-q' variables. Numerical problems.

UNIT-V: THEORY OF SYNCHRONOUS MACHINES (10 periods)
Equations in arbitrary reference frame. Park's transformation, derivation of dq0 model for a salient pole synchronous machine with damper windings, torque expression of a salient pole synchronous machine with damper windings and identification of various components.Numerical problems.

Total Periods: 55

TEXT BOOKS:

1. Paul C. Krause, Oleg Wasynczuk, Scott D. Sudhoff, *Analysis of Electric Machinery &Drive systems,* IEEE Press, 2002.
2. R. Krishnan, *Electric motor drives,Modeling,Analysis and Control,*Prentice Hall, 2001.

REFERENCE BOOKS:

1. Rik De Doncker, Duco W. J. Pulle, André Veltman, *Advanced Electrical Drives: Analysis, Modeling, Control*, Springer, 2011.
2. A.E. Fitzgerald*,* Charles Kingsley, Stephen D. Umans, *Electric Machinery*, TMH, 5th edition, 2003.

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M. Tech. (PED) – I Semester

(16MT12305)ELECTRIC AND HYBRID-ELECTRIC VEHICLES

(Professional Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES: Courses on Power Electronics, Special Electrical Machines and Power Semiconductor Drives at UG Level

COURSE DESCRIPTION:

Transportation vehicles and their impact in society; Concept and configurations of Electric Vehicles (EV); Principle, Types and operation of Hybrid-Electric Vehicles (HEVs); Power Electronic converters in HEVs; Different motor drives & energy storage technologies in EVs and HEVs.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- fundamental concepts of Electric Vehicles (EVs) and Hybrid-Electric Vehicles (HEVs).
- utilization of power converters in electric mobility.
- deployment of various electrical drives used in EVs and HEVs.
- battery energy storage technologies used in EVs and HEVs.
- different applications of EVs and HEVs such as aircraft, ships and locomotives.

CO2. analyze
- the practical aspects of power converters in EVs/HEVs.
- suitability of a motor drive in a vehicle application.

CO3. develop skills in evaluating the basic schemes of series & parallel HEVs and energy storage technologies in EVs/HEVs.

CO4. undertake research by implementing
- special electrical machines such as Switched Reluctance Motor and Permanent Magnet Brushless DC Motor for EVs/HEVs.
- DC-DC boost converter for HEVs.

CO5. select and apply the appropriate power converter & energy storage techniques for designing EVs and HEVs in the applications of aircraft, ships and locomotives.

CO6.demonstrate
- the effects of modern transportation on society and environment.
- the need to develop sustainable technologies in place of conventional vehicles.

DETAILED SYLLABUS:

UNIT-I: ELECTRIC AND HYBRID ELECTRIC VEHICLES (09 periods)

Environmental impact and history of modern transportation, history of transportation electrification.Electric Vehicles (EVs) - Introduction, configurations and traction motor characteristics. Hybrid-Electric Vehicles (HEVs) - Concept and architectures; Series HEV - Configuration, operation, advantages and disadvantages; HEVs - Interdisciplinary nature, challenges and key technologies.

UNIT-II: POWER ELECTRONICS IN HEVS (13 periods)

Introduction, principle of power electronics, rectifiers used in HEVs, Buck converter used in HEVs. Non-isolated bidirectional DC-DC Converter - operating principle, torque and power capability, current ripple and regenerative braking. Isolated bidirectional DC - DC converter - principle, steady state operations, output voltage and output power. Battery chargers - forward, fly back and bridge converters.

UNIT-III: ELECTRIC PROPULSION SYSTEMS (13 periods)

Introduction, typical functional block diagram and classification of electric motor drive, DC motor drives - Control methods, class A and B choppers, two and four quadrant chopper control. Induction Motor drives - Operating principle, steady - state performance, v/f control and power electronic control. PM BLDC Motor drives - Construction, advantages and disadvantages, performance analysis and control. Switched Reluctance Motor drives - SRM basic magnetic structure, torque production, converter topologies.

UNIT-IV: ENERGY STORAGE TECHNOLOGIES (12 periods)

Battery - basic theory andcharacterization, battery technologies, types – lead acid batteries, nickel-based batteries and lithium-based batteries. Ultra-capacitors - Features, basic principles, performance, battery modeling based on electric equivalent circuit, Modeling of ultra -capacitors, battery charging control and flywheel energy storage system.Fuel Cells - modeling and block diagrams of hybrid fuel cell energy storage systems.

UNIT-V APPLICATIONS OF HYBRID ELECTRIC VEHICLES (08 periods)

Introduction, Hydraulic Hybrid Vehicles (HHV) - Principle and operation of regenerative braking.Hybrid off road vehicular system, electric or hybrid ships and locomotives.Military applications - Electromagnetic launchers and hybrid-powered ships. **Total Periods: 55**

TEXT BOOKS:

1. MehrdadEhsani, YiminGao and Ali Emadi, *Modern Electric, Hybrid Electric and Fuel Cell Vehicles*, CRC Press, 2nd edition, 2015.
2. Chris Mi, M. AbulMasrur, David WenzhongGao, *Hybrid Electric Vehicles Principles and Applications with Practical Perspectives*, Wiley, 2011.

REFERENCE BOOKS:

1. Iqbal Husain, *Electric and Hybrid Vehicles Design Fundamentals,* CRC Press, 2nd edition, 2011.

2. Jack Erjavec, *Hybrid, Electric & Fuel-Cell Vehicles*, Delmar Cengage learning, 2nd edition, 2013.

M. Tech. (PED) – I Semester

(16MT12306)INTELLIGENT CONTROLLERS

(Professional Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES: Engineering Mathematics, Power Electronics, Electrical machines and Control Systems at UG level.

COURSE DESCRIPTION:
Neural Networks; Fuzzy Logic Systems; Genetic Algorithms; Hybrid Intelligent Systems; Swarm Intelligence; Applications.

COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge of soft computing techniques to build intelligent systems.
CO2. analyze complex engineering problems with intelligent techniques.
CO3. design and develop intelligent systems for power electronic controllers.
CO4. initiate research related to applications of soft computing in the fields of power converters and allied areas.
CO5. select and apply suitable intelligent techniques for appropriate power converter fed drives

DETAILED SYLLABUS:
UNIT–I: NEURAL NETWORKS (11 periods)
Neural network architectures, perceptron model, Learning strategies – Supervised Learning – radial basis function network, back propagation network. Unsupervised learning – Kohonen's SOM.Reinforced learning.PWM generation using neural networks.
UNIT–II: FUZZY LOGIC SYSTEMS (11 periods)
Fuzzy sets– relations & operations, membership functions, fuzzification, rule base, inference mechanism, defuzzification and design of fuzzy control system, speed control of DC motor using fuzzy logic.
UNIT–III: GENETIC ALGORITHMS (10 periods)
Introduction to evolutionary computation, Genetic Algorithms (GA) – Biological background, traditional optimization and search techniques-Basic terminologies-Simple GA-flow chart –Operators in GA-encoding, selection, crossover, mutation, constraints in GA, fitness function, advantages and limitations of GA, PWM generation using GA.
UNIT–IV: HYBRID INTELLIGENT SYSTEMS (11 periods)
Introduction to hybrid intelligent systems– Adaptive neuro-fuzzy inference systems – architecture and learning.Fuzzy GA systems – rules generation.ANN learning using GA – Optimization of weights, speed control of brushless DC drive using neuro-fuzzy approach.
UNIT–V: SWARM INTELLIGENCE (12 periods)
Introduction to swarm intelligence, swam intelligence algorithms-Ant colony optimization: biological and artificial ant colony systems, applications of ant colony intelligence: Static & dynamic combinatorial optimization problems, algorithm of ant colony system, particle swarm optimization: The basic PSO method, characteristic features of PSO, PSO algorithm, optimum parameter setting for the best performance of PSO, comparison with other evolutionary computing techniques, application of PSO intelligence in renewable energy systems.

Total Periods: 55

TEXT BOOKS:

1. S.N. Sivanandam, S.N. Deepa, *Principles of soft computing*, Wiley–India Edition, 2008.
2. N.P. Padhy, *Artificial Intelligence and intelligent systems*, Oxford university press, 10th Impression, 2011.

REFERENCE BOOKS:

1. SarojKaushik, *Artificial Intelligence*, Cengage Learning, Fifth Indian reprint, 2013.
2. J.S.R. Jang, C.T. Sun, E. Mizutani, *Neuro-Fuzzy & Soft computing*, Pearson Education Limited, 2004.
3. Fakhreddine O. Karray, Clarence De Silva, *Soft computing &Intelligent systems design, Theory, tools and applications,* Pearson Education Limited, 2009.

M. Tech. (PED) – I Semester

(16MT10707)MICROCONTROLLERS AND APPLICATIONS

(Common to EPS & PED)

(Professional Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES: Digital logic design, Microprocessors and Microcontrollers at UG level.

COURSE DESCRIPTION:

8051 Microcontroller: Architecture, Programming and Interfacing; PIC Microcontrollers: Architecture, features, programming and Interfacing

COURSE OUTCOMES: On successful completion of the course, the students will be able to

CO1. demonstrate knowledge on
- architecture of 8051 and PIC microcontroller
- salient features of 8051 and PIC

CO2. analyze and develop a suitable interface with an appropriate microcontroller for the control operations.

CO3. develop programs for stand-alone systems.

CO4. do research by identifying a suitable microcontroller for solving complex problems in the domain of Power Electronics and Drives.

CO5. use tools like PROTEUS, MPLAB, SCILAB, PIC 'C' Compiler etc., for the design, analysis and implementation of the system.

DETAILED SYLLABUS:

UNIT–I: 8051 MICROCONTROLLER (12 Periods)

Overview of 8051 microcontrollers. 8051/8052 – architecture and features. Memory – internal / external Program, Data memory and their interfacing. Data memory – Register Bank, Bit addressable space, scratch pad area. Special Function Registers (SFRs). Instruction set – Data transfer, Arithmetic, logical, branch control instructions. Addressing modes. Timers – Mode - 0, 1, 2 and 3 operations, TMOD, TCON. Timer applications – wave generation, Device control operations.

UNIT-II: 8051 INTERFACING (10 Periods)

Basics of serial communication – RS232, MAX232, Baud rate.Serial port programming - SCON, SMOD, SBUF, PCON. Interrupts – IE, TCON, IP. Applications using interrupts of 8051/8052 – wave generation. Device control operations. Interfacing – ADC, DAC, DC motor key board and PWM.

UNNIT-III: PIC MICROCONTROLLERS (11 Periods)

CISC vs RISC.Harvard vs Von Neumann architectures.PIC16F87XA architecture and features.PIC16 Memory organization – program memory, data memory. PIC Register file – General purpose registers and SFRs.

Introduction to PIC Assembly Programming, PIC Data Format and Directives.PIC programming tools. Instruction set – data transfer, arithmetic, logical, bit manipulation, branch Instructions. I/O Port Programming. Addressing modes – Immediate, Direct, Register Indirect Addressing Modes. Macros and Modules.PIC programming using MPLAB and PIC 'C' Compiler.

UNIT–IV:SERIAL, INTERRUPT, I/O PORTS AND TIMER PROGRAMMING (11 Periods)

I/O ports – Port A, TRISA, Port B, TRISB, Port C TRISC. Timer - 0, 1, 2 modules. Compare mode, capture mode. PIC Serial Port programming, PIC Interrupts, Programming Timer Interrupts, Programming the Serial Communication Interrupts, Port-B - Change Interrupt, Interrupt Priority in the PIC.

UNIT–V: PIC INTERFACING (11 Periods)

ADC Characteristics, ADC Programming in the PIC, DAC Interfacing, Sensor Interfacing and Signal Conditioning, Standard and Enhanced CCP Modules, Compare Mode Programming, Capture Mode Programming, PWM Programming, ECCP Programming, Relays and Opto-isolators, Stepper Motor Interfacing, DC Motor Interfacing and PWM, PWM Motor Control with CCP, DC Motor Control with ECCP.

Total Periods: 55

TEXT BOOKS:

1. Muhammad Ali MAzidi, JancieGillispieMazidi, RolinMcKinlay, *The 8051 Microcontroller and Embedded Sytems using Assembly and C*, Pearson Education, 2nd edition, 2007.
2. John B. Peatman, *Design with PIC Microcontrollers*, Pearson Education, 2007.

REFERENCE BOOKS:

1. PIC16F87XA manual.
2. Muhammad Ali Mazidi, Rolin D. McKinlay, Danny Causey, *PIC Microcontroller and Embedded Systems using assembly and C for PIC 18,* Pearson Education, 1999.
3. John B. Peatman, *Embedded design with the PIC18F452 Microcontroller*, Printice Hall, 2003

M. Tech. (PED) – I Semester

(16MT10705)REACTIVE POWER COMPENSATION AND MANAGEMENT

(Common to EPS & PED)

(Professional Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: Power Systems at UG level

COURSE DESCRIPTION:
Reactive Power compensation: Ideal compensator; Line and load compensation ; Compensating devices; Reactive power coordination; Quality of power supply; Distribution side management; Reactive power management in domestic and industrial sectors.

COURSE OUTCOMES: On successful completion of the course the students will be able to

CO1. demonstrate advanced knowledge on:
- necessity for reactive power compensation
- different methods of reactive power compensation.
- types of load patterns and loss reduction methods in distribution lines.

CO2. analyzedifferent types of compensations

CO3. developskills in designing a compensator for industrial applications**.**

CO4. do research in reactive power management in commercial and industrial applications

DETAILED SYLLABUS:

UNIT–I: REACTIVE POWER COMPENSATION (10 periods)

Need for Reactive Power compensation – reactive power characteristics. Ideal compensator, practical compensation – power factor correction and voltage regulation. Load compensator as a voltage regulator, phase balancing and power factor correction of unsymmetrical loads– examples.

UNIT–II: REACTIVE POWER COMPENSATION IN TRANSMISSION SYSTEMS (12 periods)

Steady state Reactive power compensation –Uncompensated line.Types of compensation, Passive shunt, series and dynamic shunt compensation–examples.

Transient state Reactive power compensation–Characteristic time periods. Passive shunt compensation. Static compensations–series capacitor compensation, compensation using synchronous condensers -examples

UNIT–III: REACTIVE POWER COORDINATION AND PLANNING (11periods)

Reactive power coordination: Objectives, Mathematical modeling, Operation planning, transmission benefits. Basic concepts of quality of power supply: Disturbances, steady – state variations, effects of under voltages, frequency, Harmonics, radio frequency and electromagnetic interferences, IEEE /IEC standards.

Reactive power planning: Objectives, Economics Planning capacitor placement and retrofitting of capacitor banks.

UNIT–IV: REACTIVE POWER MANAGEMENT (12 periods)

KVAR requirements for domestic appliances: Purpose of using capacitors, selection of capacitors, deciding factors. Types of available capacitors – characteristics and limitations, Control of capacitors.

Demand side management: Load patterns, basic methods load shaping, power tariffs, KVAR based tariffs penalties for voltage flickers and Harmonic voltage levels - System losses, loss reduction methods - examples.

UNIT–V:REACTIVE POWER MANAGEMENT IN INDUSTRIAL SECTORS (10 periods)

Typical layout of traction systems–reactive power control requirements. Distribution transformers, Electric arc furnaces, textile and plastic industries, furnace transformer, filter requirements, remedial measures, and power factor of an arc furnace, role of capacitors in wind mill generator, minimum capacitance required for excitation.

Total Periods: 55

TEXT BOOKS:

1. T.J.E.Miller, *Reactive power control in Electric power systems*, JohnWiley and Sons, 1982.
2. D.M.Tagare, *Reactive power Management*, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2004.

REFERENCE BOOKS:

1. Wolfgang Hofmann,Jurgen schiabbach, Wolfgang just, *Reactivepower compensation: A Practical Guide,* Willey, April,2012.

M. Tech. (PED) – I Semester

(16MT12331)POWER ELECTRONICS DESIGN LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	--	--	4	2

PREREQUISITES: Courses on Electronic Devices and Power Electronics at UG Level.

COURSE DESCRIPTION: Design and development of various power converters.

COURSEOUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate practical knowledge on:
- design and development of power converters.
- Understanding of gate firing circuits.

CO2. analyze and relate physical observations and measurements of various power converters with theoretical principles.

CO3. solve engineering problems related to power converters and firing circuits to provide feasible solutions.

CO4. initiateresearch ideas to provide solutions for design of power converters.

CO5. select and apply
- suitable commutation circuit for various power converters.
- PWM technique for multilevel inverters.

CO6. prepare laboratory reports that clearly communicate experimental information.

CO7. practice professional code of ethics.

CO8. function effectively as an individual and as a member in the team to solve various problems.

LIST OF EXPERIMENTS:

Conduct any Two Experiments from the following:

1. Design, develop and analyzeDC to DC converter using IGBTs.
2. Design, develop and analyze DC to DC converter using Power MOSFETs.
3. Design, develop and analyzeDC to AC converter using IGBTs.
4. Design, develop and analyzeDC to AC converter using Power MOSFETs.
5. Design, develop and analyzeAC to AC converters using SCRs.
6. Design, develop and analyzeAC to AC converters using TRIACs/SCRs.
7. Design, develop and analyzeAC to DC converters using SCRs.
8. Design, develop and analyze AC to DC converters using SCRs and Diodes.
9. Analysis of Three Level Neutral Point Clamped Multilevel Inverter.

M. Tech. (PED) – I Semester

(16MT12332)POWER ELECTRONICS SIMULATION LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	--	--	4	2

PREREQUISITES: Courses on Electronic Devices and Power Electronics at UG Level.

COURSE DESCRIPTION: Design and analysis of various converters and inverters.

COURSEOUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on various power converters.
CO2. analyze the performance of various power converters.
CO3. evaluate the output characteristics of different types of Power converters.
CO4. initiate research ideas to provide solutions for design of power converters.
CO5. select and apply appropriate control techniques for power converters.
CO6. function effectively as an individual and as a member in the team to solve various problems.
CO7. prepare laboratory reports that clearly communicate experimental information.
CO8. practice professional code of ethics.

LIST OF EXPERIMENTS:

Conduct any TEN Experiments from the following using MATLAB

1. Simulationof single phase semi converter.
2. Simulation of single phase fully controlled converter.
3. Simulation of three phase semi converter.
4. Simulation of three phase fully controlled converter.
5. Simulation of single phase full bridge inverter.
6. Simulation of three phase full bridge inverter.
7. Simulation of sinusoidal PWM inverter.
8. Simulation of single phase and three phase AC voltage controllers.
9. Simulation of DC–DC Buck–Boost Converter.
10. Simulation of Three level Neutral Point Clamped multilevel inverter.
11. Simulation of Five level H-Bridge cascaded multilevel inverter.

M. Tech. (PED) – I Semester

(16MT13808)RESEARCH METHODOLOGY

(Common to all M. Tech. Programs)

(Audit Course)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	--	2	--	--

PREREQUISITES:--

COURSE DESCRIPTION:
Overview of Research, research problem and design, various research designs, data collection methods, statistical methods for research, importance of research reports and its types

COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1. demonstrate knowledge on
- research design and conducting good research,
- various data collection methods,
- statistical methods in research,
- report writing techniques.

CO2. analyze various research design issues for conducting research in core or allied areas

CO3. formulate solutions for engineering problems by conducting research effectively in the core or allied areas

CO4. carryout literature survey and apply good research methodologies for the development of scientific/technological knowledge in one or more domains of engineering.

CO5. select and apply appropriate techniques and tools to complex engineering activities in their respective fields

CO6. write effective research reports.

CO7. develop attitude for lifelong learning to do research

CO8. develop professional code of conduct and ethics of research.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO RESEARCH METHODOLOGY (05 Periods)
Objectives and Motivation of Research, Types of Research, Research Approaches, Research Process, Criteria of good Research, Defining and Formulating the Research Problem, Problem Selection, Necessity of Defining the Problem, Techniques involved in Defining a Problem.

UNIT - II: RESEARCH PROBLEM DESIGN AND DATA COLLECTION METHODS (07 Periods)
Features of Good Design, Research Design Concepts, Different Research Designs, Different Methods of Data Collection, Data preparation: Processing Operations, Types of Analysis.

UNIT - III: STATISTICS IN RESEARCH (06 Periods)
Review of Statistical Techniques - Mean, Median, Mode, Geometric and Harmonic Mean, Standard Deviation, Measure of Asymmetry, ANOVA, Regression analysis.

UNIT - IV: HYPOTHESIS TESTING (07 Periods)
Normal Distribution, Properties of Normal Distribution, Basic Concepts of Testing of Hypothesis, Hypothesis Testing Procedure, Hypothesis Testing: t-Distribution, Chi-Square Test as a Test of Goodness of Fit.

UNIT - V: INTERPRETATION AND REPORT WRITING (03 Periods)
Interpretation – Techniques and Precautions, Report Writing – Significance, Stages, Layout, Types of reports, Precautions in Writing Reports.

Total Periods: 28

TEXT BOOK:

1. C.R. Kothari, *Research Methodology: Methods and Techniques*, New Age International Publishers, New Delhi, 2nd revised edition, 2004.

REFERENCE BOOKS:

1. Ranjit Kumar, *Research Methodology: A step-by-step guide for beginners*, Sage South Asia, 3rd edition, 2011.
2. R. Panneerselvam, *Research Methodology*, PHI learning Pvt. Ltd., 2009.

M. Tech. (PED) – II Semester

(16MT22301)LINEAR AND NON-LINEAR CONTROL SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES: Course on Control systems in UG Level.

COURSE DESCRIPTION:
Design of compensators and controllers; describing function, phase plane analysis, Lyapunov's stability analysis; Full order observer and reduced order observer;Nonlinearcontrol design.

COURSEOUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- various compensators and controllers.
- stability in the sense of Lyapunov.
- nonlinear control design.

CO2. analyze the stability of nonlinear system using
- describing function approach.
- phase plane analysis.
- Lyapunov's method.

CO3. design suitable compensator and controllers using root locus and Bode plot.
CO4. solve stability problems using Lyopunov method.
CO5. select appropriate techniques for analyzing stability of the system.

DETAILED SYLLABUS:

UNIT–I:LINEAR CONTROL SYSTEM DESIGN (12 periods)
Introduction to control system design, types of compensators, design of compensators using root locus technique. Types of controllers, design of PI, PD and PID controllers using Bode plot and root locus technique.

UNIT–II: DESIGN OF CONTROL SYSTEMS IN STATE SPACE (11 periods)
Necessity of pole placement, design by pole placement, necessary and sufficient conditions for arbitrary pole placement. Determination of feedback gain matrix using direct substitution method and Ackermann's formula. Full order observer and reduced order observer.

UNIT-III:LYAPUNOV STABILITY (11 periods)
Introduction, stability in the sense of Lyapunov, basic definitions, Lyapunov's second method, Lyapunov's functions for nonlinear systems - variable gradient method, Krasooviski's method.

UNIT–IV:INTRODUCTION TO NON LINEAR SYSTEM (15 periods)
Introduction to non-linear systems, different types of physical non-linearities, describing functions, derivation of describing functions for dead zone, saturation, backlash, relay and hysteresis. Stability analysis of non-linear systems through describing functions, phase-plane analysis, singular points, methods for constructing trajectories - Isoclines' method, delta method.

UNIT–V:NON-LINEAR CONTROL DESIGN (06 periods)
Feedback linearization, Input/output linearization, sliding mode control.

Total Periods: 55

TEXT BOOKS:

1. M. Gopal, *Modern Control System Theory*, New Age International (P) Ltd., 2nd edition, 2000.
2. K. Ogata, *Modern Control Engineering*, Prentice Hall of India, 4th edition, 2006.
3. Hasan A. Khalil *Nonlinear Systems,* Prentice Hall of India, 3rd edition, 2002.

REFERENCE BOOKS:

1. A. Nagoorkani, *Advanced control theory*, RBA publications, 2nd edition, 1999.
2. I.J. Nagrath and M.Gopal, *Control Systems Engineering*, New Age International (P) Ltd., 2007.

M. Tech. (PED) – II Semester

(16MT22302)POWER ELECTRONICS IN RENEWABLE ENERGY SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES: Courses on Analysis of power converters, Analysis of inverters and Modelling of electrical machines.

COURSE DESCRIPTION:

Solar energy conversion system; Types of photovoltaic systems – Stand-alone, hybrid and grid connected systems; Wind Energy Conversion Systems; Types of WECS - stand-alone, hybrid and grid connected systems; Hybrid systems – PV-diesel, PV-wind and wind-diesel hybrid systems.

COURSE OUTCOMES: On successful completion of this course, student will be able to

CO1. demonstrate potential knowledge on
- photo-voltaic panels and wind turbines.
- various possible hybrid systems.
- operation of stand-alone and grid connected renewable energy systems.
- applications of various renewable energy systems.

CO2. analyze the performance of converters used for various conversion systems.

CO3. solve engineering problems pertaining to Renewable Energy Conversion Systems to provide feasible solutions.

CO4. initiate research to design PV system, wind energy system and controller for power converters.

CO5. select and apply appropriate controlling technique and converters for applications of various Renewable energy systems.

CO6. possess knowledge in turbines, gears and generators and contribute positively to collaborative-multidisciplinary scientific research.

CO7. Follow professional code for safe and reliable operation of electrical appliances and power grid.

DETAILED SYLLABUS:

UNIT-I: POWER CONVERTERS FOR SOLAR APPLICATIONS (12 periods)

Solar: Characteristics of sunlight, semiconductors and P-N junctions, behavior of solar cells, cell properties, PV cell interconnection, block diagram of solar photo voltaic system. Principle of operation: line commutated converters (inversion-mode), boost and buck-boost converters. Selection of inverter.Multilevel inverters and its types.Battery sizing and array sizing.

UNIT-II: PHOTO VOLTAIC POWER SYSTEMS (11 periods)

Types of PV Systems: Stand-alone PV system: Charge controllers - series, shunt charge regulators and DC/DC converters, maximum power point tracking, selection of inverters, solar pumping application.

Grid Connected PV Systems: Inverter types – Line, self-commutated inverters and PV inverter with high frequency transformer, grid-compatible inverter characteristics

UNIT-III: ELECTRICAL MACHINES AND POWER CONVERTERS FOR WIND APPLICATIONS (13 periods)

Wind: Basic principle of wind energy conversion, nature of wind, power in the wind, components of Wind Energy Conversion System (WECS), performance of induction generators for WECS, classification of WECS. Electrical Machines: Principle of operation and analysis of induction generator, permanent magnet synchronous generator, squirrel cage induction generator and doubly fed induction generator. Power converters: Three phase AC voltage controllers, AC/DC/AC converters - uncontrolled rectifiers, PWM inverters, grid interactive inverters and matrix converters.

UNIT-IV: WIND POWER SYSTEMS (11 periods)

Types of wind power systems, stand-alone WECS: Elements of a stand-alone WECS, battery charging application with block diagram.

Grid connected WECS: Soft starting technique of induction generator, control of wind turbines- fixed and variable speed wind turbines. Selection of generators for variable speed wind turbines - Synchronous generator, squirrel cage and wound rotor induction generator. Isolated grid supply system with multiple wind turbines.

UNIT-V: HYBRID ENERGY SYSTEMS (08 periods)

Need for hybrid energy systems, issues in designing the hybrid energy systems. PV and Diesel hybrid system: Types – Series, parallel and switched hybrid energy systems. Stand-alone PV and wind hybrid energy system.Hybrid wind and diesel energy systems.

Total Periods: 55

TEXT BOOKS:

1. Rashid. M. H, *Power electronics Hand book*, Academic press, 2001.
2. Mukund R Patel, *Wind and Solar Power Systems*, CRC Press, 2004.

REFERENCE BOOKS:

1. J K Kaldellis, *Stand-alone and Hybrid Wind Energy Systems: Technology, Energy Storage and Applications*, Woodhead Publishing, 2010.
2. Rai, G.D., *Non-conventional Energy Sources*, Khanna Publishers, New Delhi, 2002.

M. Tech. (PED) – II Semester

(16MT22303)SOLID STATE AC DRIVES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES: Courses on Analysis of inverters and modeling of electrical machines.

COURSE DESCRIPTION:
Open loop and closed loop speed control of induction motor; Synchronous motor drive; Induction motor drive, torque control, field oriented control, flux vector estimation, synchronous motor control.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- operating regions of various AC drives.
- speed control of induction motor drives.
- control of synchronous motor drives.
- field oriented control of induction machines.

CO2. analyze the operation and performance of power converter fed AC motors.
CO3. solve engineering problems pertaining to AC drives to provide feasible solutions.
CO4. initiate research to design open loop and closed loop controllers for controlling of AC motors.
CO5. select and apply appropriatepower circuit configuration for the speed control of AC motor drives.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO INDUCTION MOTORS (09 periods)
Steady state performance equations.Rotating magnetic field, torque production, equivalent circuit, variable voltage, constant frequency operation, variable frequency operation, constant Volt/Hz operation. Drive operating regions, variable stator current operation, different braking methods.

UNIT-II: STATOR FREQUENCY CONTROL (12 periods)
Operation of induction motor with non-sinusoidal supply waveforms, variable frequency operation of PWM inverter fed three phase induction motors, constant flux operation & current fed operation, dynamic and regenerative braking of Current Source Inverter(CSI) and Voltage Source Inverter(VSI) fed drives.

UNIT-III: ROTOR RESISTANCE CONTROL (11 periods)
Torque-Slip characteristics, sub- and super- synchronous operation, slip control, rotor resistance control, chopper controlled resistance, equivalent resistance, TRC strategy. Characteristic relation between slip and chopper duty ratio, combined stator voltage control and rotor resistance control. Design solutions: Closed loop control scheme, slip power recovery schemes and power factor considerations.

UNIT-IV: FIELD ORIENTED CONTROL (12 periods)
Dynamic modeling of induction machines. Introduction to field oriented control of induction machines: Theory, DC drive analogy. Direct and Indirect methods. Flux vector estimation using voltage model and current model equations, merits and demerits. Direct Torque Control (DTC) of induction machines, torque expression with stator and rotor fluxes, DTC control strategy. Closed loop speed control.

UNIT-V: SPEED CONTROL OF SYNCHRONOUS MOTORS (11 periods)
Wound field cylindrical rotor motor, equivalent circuits, performance equations of operation from a voltage source. V-curves. Starting and braking. Open loop VSI and CSI fed synchronous motor. Self-control and Load commutated synchronous motor drives: Margin angle control, torque angle control, power factor control. Brush and Brushless excitation. Closed loop speed control scheme with various power controllers.

Total Periods: 55

TEXT BOOKS:
1. GopalK.Dubey, *Power semiconductor controlled Drives*, Prentice Hall Inc., New Jersey, 1989.
2. R.Krishnan, *Electric Motor Drives- Modeling, Analysis and Control*, Prentice-Hall of India Pvt. Ltd., New Delhi, 2010.

REFERENCE BOOKS:
1. GopalK.Dubey, *Fundamentals of Electrical Drives*, Narosa Publishing House, New Delhi, 2001.
2. BimalK.Bose, *Modern Power Electronics and AC Drives*, Pearson Education (Singapore) Pte. Ltd., New Delhi, 2002.
3. W.Shepherd, L.N.Hulley, D.T.W.Liang, *Power electronics and motor control*, Cambridge university press, 1996.
4. M.D.Singh, *Power Electronics*, Tata McGraw-Hill publishing company Ltd., New Delhi, 2008.

M. Tech. (PED) – II Semester

(16MT22304)SOLID STATE DC DRIVES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES: Courses on Analysis of power converters and Modelling of electrical machines.

COURSE DESCRIPTION:

Operation, characteristics, speed control and applications of DC motors;Performance characteristics and parameters of single phase, three phase and twelve pulse converters fed DC motor; Open loop, closed loop and digital control of DC drives.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- power circuit configuration.
- steady state operation and transient dynamics of motor load system.
- characteristics of DC motors.

CO2. analyze
- the operation of converter/chopper fed DC drives.
- single phase and three phase converter fed drives.
- the closed loop control and digital control of DC drives.

CO3. design speed controllers for closed loop solid-state DC drives.

CO4. solve engineering problems pertaining to electrical drives to provide feasible solutions.

CO5. select and apply appropriatepower circuit configuration of the phase controlled rectifiers and choppers for the speed control of DC drives.

DETAILED SYLLABUS:

UNIT–I: DC MOTOR FUNDAMENTALS AND MECHANICAL SYSTEMS (10 periods)

DC motor: Types, induced emf, speed-torque relations, electro-mechanical modeling, state space modeling of DC motor. Speed control: Armature and Field control, Ward Leonard Control - constant torque and horse power applications.

Characteristics of mechanical system: Dynamic equations, components of torque, types of load. Electric braking.Requirements of drives characteristics.Multi-quadrant operation.

UNIT–II:CONVERTER FED DC MOTOR DRIVES (14 periods)

Principle of phase control, fundamental relations. Analysis of series and separately excited DC motor with single-phase, three-phase and twelve pulse converters – waveforms, performance parameters and characteristics.

Steady state analysis of three phase controlled converter DC motor drive, average analysis, steady state modeling. Continuous and Discontinuous armature current operations, current ripple and its effect on performance, operation with freewheeling diode. Implementation of braking schemes, drive employing dual converter and applications. Four quadrant DC motor drive. Converter selection and its characteristics.

UNIT–III:CHOPPER CONTROL (15 periods)

Introduction to time ratio control and frequency modulation, model of chopper, input to the chopper. Class A,B,C,D and E chopper controlled DC motor: performance analysis, multi-quadrant control, chopper based implementation of braking schemes. Steady state analysis of chopper controlled DC motor drive, rating of devices, pulsating torques. Multi-phase chopper and applications.

UNIT–IV:CLOSED LOOP CONTROL OF DRIVES (09 periods)

Modeling of drive elements, equivalent circuit, transfer function of self, separately excited DC motors. Linear transfer function model of power converters, sensing and feedback elements, closed loop speed control, current and speed loops. P, PI and PID Controllers – response comparison.

UNIT–V:DIGITAL CONTROL OF DC DRIVES (07 periods)

Phase Locked Loop and micro-computer control of DC drives. Program flow chart for constant horse power and load disturbed operations. Speed detection and gate firing.

Total Periods: 55

TEXT BOOKS:

1. Gopal K.Dubey, *Power semiconductor controlled Drives*, Prentice Hall Inc., New Jersey, 1989.
2. R.Krishnan, *Electric Motor Drives- Modeling, Analysis and Control*, Prentice-Hall of India Pvt. Ltd., New Delhi, 2010.

REFERENCE BOOKS:

1. Gopal K.Dubey, *Fundamentals of Electrical Drives*, Narosa Publishing House, New Delhi, 2001.
2. Bimal K.Bose, *Modern Power Electronics and AC Drives*, Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2002.
3. M.D.Singh, *Power Electronics*, Tata McGraw-Hill publishing company Ltd., New Delhi, 2008.

M. Tech. (PED) – II Semester

(16MT22305)SPECIAL ELECTRICAL MACHINES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES: Courses on Electrical Machines, Control Systems and power electronics at UG level and Modelling of electrical machines at PG level

COURSE DESCRIPTION:

Construction, operation, types, characteristics and applications of Stepper Motors, Switched Reluctance Motor, PM Brushless DC Motor, Synchronous Reluctance, Linear Induction and synchronous Motors.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- construction and operation of various types of special electrical machines.
- characteristics of special electrical machines.
- open loop and closed loop operation of special electrical machines.

CO2. analyze the operation and performance of special electrical machines for various operating conditions.

CO3. design suitable accessories / controllers for desired operation and control of special electrical machines.

CO4. solve engineering problems pertaining to special electrical machines to provide feasible solutions.

CO5. select and apply appropriate technique and tools for control and operation of special electrical machines in domestic and industrial applications.

CO6. apply the conceptual knowledge of special electrical machines in relevance to industry and society.

DETAILED SYLLABUS:

UNIT-I:STEPPER MOTOR (09 periods)

Types of construction and working principle of stepping motor.Various configurations for switching the phase windings, torque equation and characteristics. Open loop and closed loop control of stepper motor, applications.

UNIT-II:SWITCHED RELUCTANCE MOTOR (09 periods)

Construction details, Principle of operation – Design of stator and rotor pole arcs – torque equation and characteristics, power converter for switched reluctance motor, control of switched reluctance motor, rotor sensing mechanism.

UNIT-III: SYCHRONOUS RELUCTANCE MOTOR (09 periods)

Constructional features, Types – Axial and Radial flux motors. Principle of operation, torque-speed characteristics, Phasor diagram, Characteristics, control of SyRM, advantages and applications.

UNIT-IV:PERMANENT MAGNET BRUSHLESS DC MOTOR (09 periods)

Permanent magnet materials–hysteresis loop, analysis of magnetic circuits. Constructional details, principle of operation, BLDC square wave motor, types of BLDC motor, sensing and switching logic schemes, sensorless and sensor based control of BLDC motors.

UNIT-V:LINEAR MOTORS (09 periods)

Linear Induction Motor (LIM): Construction, principle of operation – single sided and double-sided LIM, thrust equations and performance equations based on current sheet concept, equivalent circuit of LIM, applications.

Linear Synchronous Motor (LSM): Construction, types, principle of operation, thrust equation, control and applications.

Total Periods: 45

TEXT BOOKS:

1. K. Venkata Ratnam, *Special electrical machines*, University press, New Delhi, 2009.
2. E.G. Janardhanan, *Special electrical machines*, PHI learning private limited, 2014.

REFERENCE BOOKS:

1. Takashi Kenjo, *Stepping Motors and their Microprocessor controls*, clarenden press, Oxford, 1984.
2. T. Kenjo and S. Nagamori, *Permanent-Magnet and Brushless DC Motors*, clarenden press, Oxford, 1984.
3. T.J.E. Miller, *Brushless Permanent Magnet and Reluctance Motor Drives*, clarenden press, Oxford 1989.
4. R. Krishnan, *Switched Reluctance Motor Drives – Modeling, Simulation, analysis, Design and Applications*, CRC press, Special Indian Edition, 2015.

M. Tech. (PED) – II Semester

(16MT20701)FLEXIBLE AC TRANSMISSION SYSTEMS

(Common to EPS & PED)

(Professional Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Power Electronics and Power Systems at UG level, Analysis of Power Converters and Analysis of Inverters

COURSE DESCRIPTION:

Need for Flexible AC transmission systems; objectives of shunt and series compensation, phase angle regulators; FACTS controllers: shunt, series and combined; Coordination of various FACTS controllers.

COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1. demonstrate knowledge on:
- compensation schemes for real and reactive power control.
- Static Shunt, Series and Shunt-Series compensation.
- FACTS devices and controllers

CO2. analyze and adopt a suitable FACTS device for the appropriate control.

CO3. develop skills in coordination of multiple FACTS controllers in an interconnected power systems.

CO4. develop new FACTS controllers for reliable and flexible control of power system.

CO5. employ modern techniques in coordination of FACTS devices for reliable and efficient operation.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO AC TRANSMISSION SYSTEMS (08 Periods)

Overview of interconnected power system. Power flow in AC systems – Expression for real and reactive power flow between two nodes of a power system, controllable parameters. Power flow in parallel and meshed system.Overview of compensated transmission lines – shunt and series compensation.Conventional controllers for real and reactive power flows – merits and demerits.

FACTS – benefits, types of FACTS controllers.

UNIT-II: STATIC SHUNT COMPENSATION (12 Periods)

Expression for real and reactive power flow with mid-point voltage regulation. Variable impedance type static VAR generators - V-I characteristics and control schemes of TCR, TSR, TSC. Q_D-Q_O characteristic and control scheme of TSC-TCR. Switching converter type VAR generators – V-I characteristics and control schemes of STATCOM. Hybrid VAR generators – V-I characteristics of SVC and STATCOM, regulation of V-I slope. Applications of static shunt compensators – Voltage regulation, improvement in transient stability, prevention of voltage instability, power oscillation damping. Comparison of static shunt compensators.

UNIT-III: STATIC SERIES COMPENSATION (11 Periods)

Expression for real and reactive power flow with series line compensation. Variable impedance type series compensators: V-I characteristics and control schemes of GCSC, TSSC, TCSC- modes of operation. Sub-synchronous resonance. Switching converter type series compensator – V-I characteristics, internal and external control schemes of SSSC. Applications of static series compensators – improvement in transient stability, power oscillation damping. Comparison of static series compensators.

UNIT-IV: STATIC PHASE ANGLE REGULATORS AND COMBINED COMPENSATORS(12 Periods)

Power flow control by phase angle regulators - Concept of voltage and phase angle regulation. Operation and control of TCVR and TCPAR.Switching converter type phase angle regulators. Objectives of TCPAR - improvement of transient stability, power oscillation damping. UPFC – Principle, expression for real and reactive power between two nodes of UPFC, independent real and reactive power flow control using UPFC, control schemes of UPFC - operating principle and characteristics of IPFC.

UNIT-V: CO-ORDINATION OF FACTS CONTROLLERS (12 Periods)

FACTS controller interactions – interaction between multiple SVC's – interaction between multiple TCSC's – SVC-TCSC interaction – co-ordination of multiple controllers using linear control techniques. Comparative evaluation of different FACTS controllers: performance comparison and cost comparison, Control coordination using Genetic Algorithm, Future direction of FACTS technology.

Total periods: 55

TEXT BOOKS:

1. Narain G. Hingorani, LasziGyugyi, *Understanding FACTS: Concepts and Technology of Flexible AC Transmission Systems,* Wiley-IEEE Press, 1999.
2. R. Mohan Mathur and Rajiv k. Varma, *Thyristor based FACTS controllers for Electrical Transmission Systems,* Wiley-IEEE Press, 2002.

REFERENCE BOOKS:

1. Xiao-Ping, Rehtanz, Christian, Pal, Bikash, *Flexible AC Transmission Systems: Modeling and Control*, Springer Power Systems Series, 2006.
2. T.J.E. Miller, *Reactive Power control in electric systems*, Wiley, 1982.

M. Tech. (PED) – II Semester

(16MT20707)HIGH VOLTAGE DC TRANSMISSION

(Common to EPS & PED)

(Professional Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Power Electronics and Power Systems at UG level, Analysis of Power Converters and Analysis of Inverters.

COURSE DESCRIPTION:

HVDC Transmission: Capabilities, Applications and planning; Analysis and control of power converter; Harmonics and Filters; Types of Multi-Terminal DC Systems and control; Faults and Protection.

COURSE OUTCOMES: On successful completion of the course the students will be able to

CO1. demonstrate knowledge on:
- HVDC transmission systems.
- operation of static converters and its analysis.
- different types of faults and protection schemes in HVDC systems.

CO2. analyze various static converters operation in HVDC systems, harmonics, filters and MTDC systems.

CO3. evaluate the performance of HVDC systems under various operating conditions.

CO4. develop new control techniques forHVDC converter systems.

CO5. follow professional code of ethics.

DETAILED SYLLABUS:

UNIT–I: INTRODUCTION TO HVDC TRANSMISSION (10 periods)

HVDC Transmission– Comparison of HVAC and HVDC transmission, types of DC Links, power handling capabilities of HVDC lines, applications of HVDC Transmission, planning for HVDC transmission, modern trends in DC Transmission, basic conversion principles.

UNIT–II: STATIC POWER CONVERTOR ANALYSISIS AND CONTROL (12 periods)

Static Power Converters: Static converter configuration- 6 pulse & 12 pulse converters, converter station and terminal equipment. Rectifier and inverter operation,converter bridge characteristics, equivalent circuit for converter.

Control of HVDC converter: Principle of DC link control – constant current, constant extinction angle and constant ignition angle control. Individual phase control and equidistant firing angle control.

UNIT–III: HARMONICS AND FILTERS (11 periods)

Generation of harmonics in HVDC systems, IEEE/IEC standards, methods of harmonics elimination, harmonic instability problems, Causes for instability, remedies for instability problems. Design of AC filters, single frequency tuned filter, Double frequency tuned filter, high pass filter, cost consideration of AC harmonic filter, DC filters.

UNIT–IV: MULTI-TERMINAL DC LINKS AND SYSTEMS (10 periods)

Introduction – Potential applications of MTDC systems – Types of MTDC systems – series, parallel and series-parallel systems, their principle of operation and control - Protection of MTDC systems.

UNIT–V: FAULTS AND PROTECTION: (12 periods)

Over voltages due to disturbance on DC side, over voltages due to DC and AC side line faults – Converter faults, over current protection– Valve group and DC line protection. Over voltage protection of converters – Surge arresters.

Total Periods: 55

TEXT BOOKS:

1. K.R.Padiyar, *High Voltage Direct current Transmission*, New Age International (P) Ltd, Publishers, 2nd edition, 2011.
2. Sunil S. Rao, *EHV-AC, HVDC Transmission & Distribution Engineering*, Khanna Publishers, 3rd edition, 2001.

REFERENCE BOOKS:

1. E.Uhlman, *Power Transmission by Direct Current*, Springer Verlag, Berlin, Heedelberg, 1975.
2. E. W. Kimbark, *Direct current Transmission*, John Wiely& sons, New York.
3. JosArillaga, *HVDCTranmission*, the Institute of Electrical Engineers, 2nd edition, London UK, 1998.

M. Tech. (PED) – II Semester

(16MT20708)POWER QUALITY

(Common to EPS & PED)

(Professional Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES: --

COURSE DESCRIPTION:
Power Quality concepts; harmonics and voltage regulation using conventional methods; power quality enhancement using custom power devices; power quality issues in distributed generation.

COURSE OUTCOMES: On successful completion of the course the students will be able to

CO1. demonstrate knowledge on:
- various power quality issues and mitigation.
- operating conflicts in distributed generation.

CO2. analyze
- harmonic distortion due to commercial and industrial loads.
- the suitability of various custom power devices.

CO3. evaluate various power quality indices.

CO4. initiate research to develop/design new schemes and techniques for power quality enhancement.

CO5. apply the appropriate principles and techniques for integration of distributed generation and utilities.

DETAILED SYLLABUS:

UNIT-I: FUNDAMENTALS OF POWER QUALITY (12 Periods)
Definition of Power Quality, Classification of Power Quality Issues, Power Quality Standards, Categories and Characteristics of Electromagnetic Phenomena in Power Systems: Impulsive and Oscillatory Transients, Interruption, Sag, Swell, Sustained Interruption, Under Voltage, Over Voltage, Outage. Sources and causes of different Power Quality Disturbances.

UNIT-II: HARMONICS & APPLIED HARMONICS (12 Periods)
Harmonic Distortion, Voltage Vs Current Distortion, Harmonics Vs Transients, Power System Qualities under Non Sinusoidal Conditions, Harmonic Indices, Harmonic Sources from Commercial Loads, Harmonic Sources from Industrial Loads.

Applied Harmonics**:** Effects Of Harmonics, Harmonic Distortion Evaluations, Principles of Controlling Harmonics, Devices for Controlling Harmonic Distortion.

UNIT-III: VOLTAGE REGULATION USING CONVENTIONAL METHODS (08 Periods)
Principles of Regulating the Voltage, Devices for Voltage Regulation: Utility step-voltage regulators, Ferro-resonant transformers, Magnetic synthesizers, On-line UPS systems, Motor-generator sets, Static VAR compensators, shunt capacitors, series capacitors.

UNIT-IV: POWER QUALITY ENHANCEMENT USING CUSTOM POWER DEVICES (13 Periods)
Introduction to Custom Power Devices-Network Reconfiguring Type: Solid State Current Limiter (SSCL) -Solid State Breaker (SSB) -Solid State Transfer Switch (SSTS).

Compensating Type: Dynamic Voltage Restorer, Distribution STATCOM and Unified Power Quality Conditioner –operation, realization and control of DVR, DSTATCOM and UPQC –load compensation. Power quality monitoring-Power quality monitoring standards.

UNIT V: POWER QUALITY ISSUES IN DISTRIBUTED GENERATION (10 Periods)
DG Technologies, Perspectives on DG benefits- Interface to the Utility System - power quality issues affected by DG - Operating Conflicts: Utility fault-clearing, Reclosing, Interference with relaying, Voltage regulation issues, Islanding - siting DG.

Total periods: 55

TEXT BOOKS:

1. Roger C. Dugan, Mark E. Mc. Granaghan, Surya Santosoh and H. Wayne Beaty, *Electrical Power Systems Quality*, 2nd edition, TATA Mc Graw Hill, 2010.
2. ArindamGhosh, Gerard Ledwich, *Power Quality Enhancement Using Custom Power Devices,* Springer, 2002.

REFERENCE BOOKS:

1. Math H J Bollen, *Understanding Power Quality Problems*, IEEE Press, 1998.
2. C. Sankaran, *Power Quality*, CRC press, 2000.

M. Tech.(PED) – II Semester

(16MT20709)SMART GRID TECHNOLOGY

(Common to EPS & PED)

(Professional Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES:--

COURSE DESCRIPTION:

Concept of smart grid; various information and communication technologies for Smart Grid; Smart metering; Demand side integration; Energy management systems

COURSE OUTCOMES: On successful completion of the course the students will be able to

CO1. demonstrate knowledge in
- Smart grid initiatives and technologies
- Information and communication technologies for the smart grid.
- Sensing, measurement, control and automation.

CO2. apply skills in fault calculation and state estimation.

CO3. apply various information security tools in the smart grid technology.

CO4. extend research activities on implementation of smart grid.

CO5. develop usage of modern techniques to integrate renewable energy sources into the smart grid.

DETAILED SYLLABUS:

UNIT–I: SMART GRID (07 periods)

smart grid introduction, ageing assets and lack of circuit capacity, thermal constraints, operational constraints, security of supply, national initiatives, early smart grid initiatives, active distribution networks, virtual power plant, other initiatives and demonstrations, overview of the technologies required for the smart grid.

UNIT–II: COMMUNICATION TECHNOLOGIES FOR THE SMART GRID (13 periods)

Data Communications: Introduction, Dedicated and Shared Communication Channels, Switching Techniques, Circuit Switching, Message Switching, Packet Switching, Communication Channels, Wired Communication, Optical Fiber, Radio Communication, Cellular Mobile Communication, Layered Architecture and Protocols, the ISO/OSI Model, TCP/IP

Communication Technologies: IEEE 802 Series, Mobile Communications, Multi-Protocol Label Switching, Power line Communication, Standards for Information Exchange, Standards for Smart Metering, Modbus, DNP3, IEC 61850

UNIT–III: INFORMATION SECURITY FOR THE SMART GRID (11 periods)

Introduction, Encryption and Decryption, Symmetric Key Encryption, Public Key Encryption, Authentication, Authentication Based on Shared Secret Key, Authentication Based on Key Distribution Center, Digital Signatures, Secret Key Signature, Public Key Signature, Message Digest, Cyber Security Standards, IEEE 1686: IEEE Standard for Substation Intelligent Electronic Devices(IEDs) Cyber Security Capabilities, IEC 62351: Power Systems Management and Association Information Exchange – Data and Communication Security.

UNIT–IV: SMART METERING AND DEMAND SIDE INTEGRATION (13 periods)

Introduction, smart metering – evolution of electricity metering, key components of smart metering, smart meters: an overview of the hardware used – signal acquisition, signal conditioning, analogue to digital conversion, computation, input/output and communication. Communication infrastructure and protocols for smart metering - Home area network, Neighborhood Area Network, Data Concentrator, meter data management system, Protocols for communication. Demand Side Integration- Services Provided by DSI, Implementation of DSI, Hardware Support, Flexibility Delivered by Prosumers from the Demand Side, System Support from DSI.

UNIT–V: TRANSMISSION AND DISTRIBUTION MANAGEMENT SYSTEM (11 periods)

Data Sources, Energy Management System, Wide Area Applications, Visualization Techniques, Data Sources and Associated External Systems, SCADA, Customer Information System, Modeling and Analysis Tools, Distribution System Modeling, Topology Analysis, Load Forecasting, Power Flow Analysis, Fault Calculations, State Estimation, Applications, System Monitoring, Operation, Management, Outage Management System, Energy Storage Technologies, Batteries, Flow Battery, Fuel Cell and Hydrogen Electrolyzer, Flywheels, Super conducting Magnetic Energy Storage Systems, Super capacitors, Energy storage for wind power, Agent-based control of electrical vehicle battery charging.

Total Periods: 55

TEXT BOOKS:

1. JanakaEkanayake, Liyanage, Wu, Akihiko Yokoyama, Jenkins, *Smart Grid,* Wiley Publications, 2012.
2. James Momoh, *Smart Grid: Fundamentals of Design and Analysis,* Wiley, IEEE Press, 2012.
3. Bharat Modi, Anuprakash, Yogesh Kumar, *Fundamentals of Smart Grid Technology* by S.K Kataria & Sons

REFERENCE BOOKS:

1. Raj Samani, *Applied Cyber Security and the Smart Grid,*Syngress Publishers, 2012.
2. Jean Claude Sabonnadiere, NouredineHadjsaid, *Smart Grids,* Wiley Blackwell.
3. Peter S.FoxPenner, *Smart Power: Climate Changes, the Smart Grid, and the future of electric utilities,* Island Press, 2014.

M. Tech. (PED) – II Semester

(16MT22331)ELECTRIC DRIVES LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	--	--	4	2

PREREQUISITES: Courses on Analysis of inverters and converters.

COURSE DESCRIPTION: Design and development of various AC and DC drives.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate practical knowledge on design and development of power converter fed drives.
CO2. analyze and relate physical observations and measurements of various power converter fed drives with theoretical principles.
CO3. solve engineering problems related to power converter fed drives to provide feasible solutions.
CO4. initiate research ideas to provide solutions for design of power converter fed drives.
CO5. select and apply suitable controlling techniques for various power converter fed drives.
CO6. prepare laboratory reports that clearly communicate experimental information.
CO7. practice professional code of ethics.
CO8. function effectively as an individual and as a member in the team to solve various problems.

DETAILED SYLLABUS:

Conduct any Two Experiments from the following:

Design of

1. Single phase half-wave converter fed DC motor.
2. Single phase Semi converter fed DC drive.
3. Single phase full controlled fed DC drive.
4. Single phase inverter fed induction motor drive.
5. Speed control of stepper motor.
6. Speed control of universal motor using AC voltage controller.
7. Step up chopper fed DC drive.
8. Step down chopper fed DC drive.
9. Speed control of single phase induction motor using AC voltage controller.
10. AC/DC/AC converter fed induction motor.

M. Tech. (PED) – II Semester

(16MT22332)ELECTRIC DRIVES SIMULATION LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	--	--	4	2

PREREQUISITES: Courses on Analysis of inverters and Analysis of converters.

COURSE DESCRIPTION: Design and analysis of various converter fed drives.

COURSEOUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on various power converter fed drives.
CO2. analyze the operating characteristics of various power converter fed drives.
CO3. provide feasible solutions pertaining to electric drives.
CO4. initiate research related to applications of electric drives.
CO5. select and apply appropriate speed control techniques for power converter fed drives.
CO6. prepare laboratory reports that clearly communicate experimental information.
CO7. practice professional code of ethics.
CO8. function effectively as an individual and as a member in the team to solve various problems.

DETAILED SYLLABUS:

Conduct any TEN Experiments from the following using MATLAB

Simulation of

1. Single phase half-wave converter fed DC motor.
2. Single phase Semi converter fed DC drive.
3. Single phase full controlled fed DC drive.
4. Single phase inverter fed induction motor drive.
5. Speed control of stepper motor using microcontroller.
6. Speed control of universal motor using AC voltage controller.
7. Step up chopper fed DC drive.
8. Step down chopper fed DC drive.
9. Speed control of single phase induction motor using AC voltage controller.
10. AC/DC/AC converter fed induction motor.

M. Tech. (PED) – II Semester

(16MT22333)SEMINAR

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
--	100	100	--	--	--	2

PREREQUISITES: --

COURSE DESCRIPTION:
Identification of seminar topic; literature survey; preparation of technical report and presentation.

COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1. demonstrate capacity to identify an advanced topic for seminar in core and allied areas.
CO2. extract information pertinent to the topic through literature survey.
CO3. comprehend the extracted information through analysis and synthesis critically on the topic.
CO4. contribute to multidisciplinary scientific workin the field of Power systems.
CO5. manage time and resources effectively and efficiently.
CO6. plan, organize, prepare and present effective written and oral technical report on the topic.
CO7. engage in lifelong learning for development of technical competence in the field of Power Systems.
CO8. understand ethical responsibility towards environment and society in the field of Electrical engineering.
CO9. adapt to independent and reflective learning for sustainable professional growth in Electrical power systems.

M. Tech. (PED) – II Semester

(16MT23810)INTELLECTUAL PROPERTY RIGHTS

(Common to all M. Tech. Programs)

(Audit Course)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	-	2	-	-

PREREQUISITES: -

COURSE DESCRIPTION:
Introduction to Intellectual Property; Trade Marks; Law of Copy Rights; Law of Patents; Trade Secrets; Unfair Competition; New Development of Intellectual Property.

COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1. demonstrate knowledge on
- Intellectual Property,
- Trade Marks & Secrets,
- Law of Copy Rights, Patents,
- New development of Intellectual Property.

CO2. analyze the different forms of infringement of intellectual property rights.
CO3. solve problems pertaining to Intellectual Property Rights.
CO4. stimulate research zeal for patenting of an idea or product.
CO5. write effective reports required for filing patents.
CO6. develop life-long learning capabilities.
CO7. develop awareness of the relevance and impact of IP Law on their academic and professional lives.
CO8. develop attitude for reflective learning.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO INTELLECTUAL PROPERTY (05 Periods)
Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT-II: TRADE MARKS (05 Periods)
Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT-III: LAW OF COPY RIGHTS (06 Periods)
Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.
Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT-IV: TRADE SECRETS (06 Periods)
Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.
Unfair competition: Misappropriation right of publicity, false advertising.

UNIT-V: NEW DEVELOPMENT OF INTELLECTUAL PROPERTY (06 Periods)
New developments in trade mark law; copy right law, patent law, intellectual property audits.
International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

Total Periods: 28

TEXT BOOKS:
1. Deborah, E. Bouchoux, *Intellectual property right*, cengage learning.
2. PrabuddhaGanguli, *Intellectual property right - Unleashing the knowledge economy*, Tata Mc Graw Hill Publishing Company Ltd.

M. Tech. (PED) III & IV-Semester

(16MT32301 & 16MT42301)PROJECT WORK

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
200	200	400	--	--	--	28

PREREQUISITES: --

COURSE DESCRIPTION:
Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Writing of thesis and presentation.

COURSE OUTCOMES: On successful completion of the course, the student will be able to

CO1. demonstrate capacity to identify an advanced topic for project work in core and allied areas.
CO2. analyze the problem and derive an optimal solution pertinent to the chosen topic.
CO3. solve engineering problems and provide a wide range of potential solutions.
CO4. comprehend extracted information through the literature survey for design and development of engineering problems pertinent to the chosen topic.
CO5. use the techniques, skills and modern engineering tools necessary for project work.
CO6. contribute to multidisciplinary scientific workin the field of Electrical power Systems.
CO7. execute the project effectively and efficiently considering economical and financial factors.
CO8. plan, prepare and present effective written and oral technical report on the topic.
CO9. engage in lifelong learning for development of technical competence in the field of Electrical power systems and allied fields.
CO10. understand ethical responsibility towards environment and society in the field of Electrical Engineering.
CO11. adapt to independent and reflective learning for sustainable professional growth.

SREE VIDYANIKETHAN ENGINEERING COLLEGE

Sree Sainath Nagar, Tirupati – 517 102.

SVEC16 M. Tech. SE Course Structure

I-Semester

Course Code	Course Title	L	T	P	Periods per week	Credits	Scheme of Examination Max. Marks		
							Int.	Ext.	Total
16MT12501	Cloud Computing	4	-	-	4	4	40	60	100
16MT12502	Data Structures and Algorithms	4	-	-	4	4	40	60	100
16MT12503	Software Development Methodologies	4	-	-	4	4	40	60	100
16MT12504	Software Measurement and Metrics	4	-	-	4	4	40	60	100
16MT12505	Software Requirements and Estimation	4	-	-	4	4	40	60	100
	Professional Elective-1	4	-	-	4	4	40	60	100
16MT12506	Distributed Databases								
16MT12507	Machine Learning								
16MT12508	Software Reliability and Reuse								
16MT12509	User Interface Design								
16MT12531	Advanced Software Engineering Lab -1	-	-	4	4	2	50	50	100
16MT12532	Cloud Computing Lab	-	-	4	4	2	50	50	100
	Total:	**24**	**-**	**8**	**32**	**28**	**340**	**460**	**800**
16MT13808	Research Methodology (Audit Course)	-	2	-	2	-	-	-	-

II-Semester

Course Code	Course Title	L	T	P	Periods per week	Credits	Scheme of Examination Max. Marks		
							Int.	Ext.	Total
16MT22501	Big Data Technologies	4	-	-	4	4	40	60	100
16MT22502	Service Oriented Architecture	4	-	-	4	4	40	60	100
16MT22503	Software Architecture & Design Patterns	4	-	-	4	4	40	60	100
16MT22504	Software Testing Techniques	4	-	-	4	4	40	60	100
16MT22505	Web Technologies	4	-	-	4	4	40	60	100
	Professional Elective-2	4	-	-	4	4	40	60	100
16MT10502	Advanced Database Management Systems								
16MT22506	Software Process and Project Management								
16MT22507	Software Reverse Engineering								
16MT22508	Software Security								
16MT22531	Advanced Software Engineering Lab-2	-	-	4	4	2	50	50	100
16MT22532	Big Data Technologies Lab	-	-	4	4	2	50	50	100
16MT22533	Seminar	-	-	-	-	2	--	100	100
	Total:	**24**	**-**	**8**	**32**	**30**	**340**	**560**	**900**
16MT23810	Intellectual Property Rights (Audit Course)	--	2	-	2	-		-	-

III-Semester

S. No.	Course Code	Course Title	Contact Periods per Week				Credits	Scheme of Examination Max. Marks		
			L	T	P*	Total		Internal Marks	External Marks	Total Marks
1.	16MT3MOOC	MOOC	-	-	-	-	-	-	-	-
2.	16MT36131	Project Work – Phase I	-	-	-	-	8	50	50	100
		Total:	**-**	**-**	**-**	**-**	**8**	**50**	**50**	**100**

*Fulltime Project Work

IV-Semester

S. No.	Course Code	Course Title	Contact Periods per Week				Credits	Scheme of Examination Max. Marks		
			L	T	P*	Total		Internal Marks	External Marks	Total Marks
1.	16MT46131	Project Work – Phase II	-	-	-	-	20	150	150	300
		Total:	**-**	**-**	**-**	**-**	**20**	**150**	**150**	**300**
						Grand Total:	**86**	**880**	**1220**	**2100**

*Fulltime Project Work

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Information Technology
M.Tech. I Semester
(16MT12501) CLOUD COMPUTING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: Courses on "Operating Systems" and "Computer Networks"
COURSE DESCRIPTION: Virtualization, Case studies – XEN, VMware, Microsoft Hyper-V; Cloud architecture; Services and Applications; Cloud Programming; Industry practices and Case studies – Amazon Web Services, Google App Engine, and Microsoft Azure.
COURSE OUTCOMES:
On successful completion of this course, the students will be able to:
1. Demonstrate knowledge on Virtualization models, Cloud Architecture, Services and Programming concepts.
2. Analyze the problems in existing cloud architectures.
3. Apply concurrent programming, throughput computing and Data intensive computing in Cloud programming.
4. Develop research insights into emerging technologies and energy management.
5. Apply virtualization techniques to optimize resource sharing.

DETAILED SYLLABUS
UNIT-I: INTRODUCTION TO VIRTUALIZATION (Periods: 09)
Characteristics of Virtualized Environments, Taxonomy of Virtualization Techniques, Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology Examples – XEN, VMware, Microsoft Hyper-V.
UNIT-II: CLOUD ARCHITECTURE (Periods: 11)
Introduction to Cloud: Defining Cloud Computing, Cloud Types - The NIST model, The Cloud Cube Model, Deployment models, Service models, Examining the Characteristics of Cloud Computing, Paradigm shift, Benefits of cloud computing, Disadvantages of cloud computing, Assessing the Role of Open Standards.
Cloud Architecture: Exploring the Cloud Computing Stack, Composability, Infrastructure, Platforms, Virtual Appliances, Communication Protocols, and Applications.
UNIT-III: DEFINING CLOUD SERVICES (Periods: 10)
Defining Infrastructure as a Service (IaaS) – IaaS workloads, Pods, aggregation, and silos, **Defining Platform as a Service (PaaS), Defining Software as a Service (SaaS)** – SaaS characteristics, Open SaaS and SOA, Salesforce.com and CRM SaaS, **Defining Identity as a Service (IDaaS)** – what is an identity? Networked identity service classes, Identity system codes of conduct, IDaaS interoperability, **Defining Compliance as a Service (CaaS)**.
UNIT-IV: CLOUD PROGRAMMING CONCEPTS (Periods: 12)
Concurrent Programming – Introduction to Parallelism for Single Machine Computation, Programming Applications with Threads, **High Throughput Computing** – Task Programming, Task based Application Models, **Data Intensive Computing** – What is Data Intensive Computing and Technologies for Data Intensive Computing.
UNIT-V: INDUSTRIAL PLATFORMS AND TRENDING DEVELOPMENTS (Periods: 13)
Case Studies on Cloud Platforms – Amazon Web Services, Google App Engine, and Microsoft Azure, Case Studies on Cloud Applications – Scientific Applications, Business and Consumer Applications.
Enhancements in Cloud – Energy Efficiency in Clouds, Market based Management of Clouds, Federated Clouds / InterCloud, Third Party Cloud Services.

[Total Periods: 55]

TEXT BOOKS:

1. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, "*Mastering Cloud Computing: Foundations and Applications Programming,*" 1st Edition, McGraw Hill, 2013.
2. Barrie Sosinsky, "*Cloud Computing Bible,*" 1st Edition, Wiley India Pvt Ltd, 2011.

REFERENCE BOOKS:

1. Anthony T. Velte, Toby J. Velte Robert Elsenpeter, "*Cloud Computing: A Practical Approach,*" 1st Edition, Tata Mc Graw Hill, 2010.
2. George Reese, "*Cloud Application Architectures,*" 1st Edition, O'Reilly Publishers, 2010.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Information Technology
M.Tech. I Semester

(16MT12502) DATA STRUCTURES AND ALGORITHMS

(Common to M.Tech. (SE and CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Computer Programming".

COURSE DESCRIPTION:

Introduction to Data Structures and Algorithms; Searching and Sorting; Trees and Graphs; Divide and Conquer; Greedy method; Dynamic Programming, Back Tracking; Branch and Bound.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Gain knowledge on:
   - Linear data structures including Stack, Queue and Linked Lists and Non-linear data structures like Trees and Graphs.
   - Divide and Conquer Method, Greedy Method, Dynamic Programming, Backtracking and Branch & Bound algorithms.
2. Analyze the efficiency of algorithms using space and time complexities.
3. Apply algorithm design techniques in providing solutions to real world problems.
4. Apply Dynamic programming techniques to provide software solutions.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO DATA STRUCTURES AND ALGORITHMS (Periods: 10)

Data Structures: Review of Data Structures - Stack, Queue, Circular Queue, Linked Lists, Applications, **Algorithm Analysis:** Efficiency of algorithms, Apriori Analysis, Asymptotic Notations, Polynomial vs Exponential Algorithms, Average, Best and Worst Case Complexities, Analyzing Recursive Algorithms.

UNIT-II: SEARCHING, SORTING AND TREES & GRAPHS (Periods: 09)

Searching and Sorting: Linear Search, Fibonacci Search, Counting Sort, Bucket Sort, Radix Sort, **Trees and Graphs:** Introduction to trees, representation of trees, binary trees, binary tree traversal techniques, Introduction to graphs, representation of graphs, graph traversal techniques.

UNIT-III: BINARY SEARCH TREES, AVL TREES, B- TREES AND HASH TABLES (Periods: 10)

Binary Search Trees: Definition, Operations, Applications, AVL Trees: Definition, Operations, Applications, **Heaps:** Definition, Heap Implementation, Applications, **Hash Tables:** Definition, Hash Functions, Applications.

UNITI-IV: DIVIDE AND CONQUER & GREEDY METHODS (Periods: 10)

Divide and Conquer: General Method, Binary Search, Finding Maximum and Minimum, Quick Sort, Merge sort, Strassen's Matrix Multiplication.

Greedy Method: General Method, Job sequencing with deadlines, Minimum Cost Spanning Tree and Single Source Shortest Path.

UNIT-V: DYNAMIC PROGRAMMING, BACK TRACKING & BRANCH AND BOUND (Periods: 11)

Dynamic Programming: General Method, All Pairs Shortest Path, 0/1 Knapsack problem, Traveling Salesperson Problem, **Back Tracking:** General Method, 8 – Queen's Problem, Graph Coloring, **Branch and Bound:** General Method, LC Search, LIFO and FIFO branch and bound solutions of 0/1 Knapsack Problem. **[Total Periods: 50]**

TEXT BOOKS:

1. G. A. V. Pai, *"Data Structures and Algorithms: Concepts, Techniques and Applications,"* 1st Edition, Tata McGraw Hill, 2008.
2. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, *"Fundamentals of Computer Algorithms,"* 2nd Edition, Universities Press (India) Pvt. Ltd, 2008.

REFERENCE BOOKS:

1. Richard Gileberg, Behrouz A. Forouzan, *"Data Structures: A Pseudocode Approach with C,"* Second Edition, 2007.
2. Mark Allen Weiss, *"Data Structures and Algorithm Analysis in C++,"* 3rd Edition, Pearson Education, 2007.
3. Sartaj Sahni, *"Data structures, Algorithms and Applications in C++,"* 2nd Edition, Universities press (India) Pvt. Ltd., 2005.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Information Technology

M.Tech. (SE) I Semester
(16MT12503) SOFTWARE DEVELOPMENT METHODOLOGIES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Software Engineering".
COURSE DESCRIPTION: Introduction-Software Process; Software Requirements and Analysis; Software Design; Software Implementation- Implementation Issues, Modern Programming Language Features; Software Testing and Maintenance.
COURSE OUTCOMES:
On successful completion of this course, the students will be able to:

1. Demonstrate in depth knowledge on:
   - Software Paradigms, Agile Development, Software Reuse, and Testing
2. Perform requirements analysis and build requirements model.
3. Apply advanced software engineering methods in software development life cycle.

DETAILED SYLLABUS
UNIT-I: INTRODUCTION **(Periods: 12)**
Software Engineering: Software Process-Generic process model, Prescriptive process model, specialized, unified process. Agile development-Agile Process, Extreme Programming, Adaptive Software Development(ASD), Scrum, Dynamic Systems Development Method(DSDM), Crystal, Feature Driven Development(FDD), Lean Software Development(LSD), Agile Modeling(AM), Agile Unified Process (AUP). Software Engineering Knowledge-core Principles, Principles that guide each framework Activity.
UNIT-II: SOFTWARE REQUIREMENTS AND ANALYSIS **(Periods: 10)**
Establishing the Groundwork, Eliciting Requirements, Developing use cases, Building the requirements model, Negotiating, Validating Requirements. Requirements Analysis, Requirements Modeling Strategies.
UNIT-III: SOFTWARE DESIGN **(Periods: 11)**
Design Process, Design concepts - Abstraction, Architecture, Patterns, Separation of Concerns, Modularity, Information Hiding, Functional Independence, Refinement, Aspects, Refactoring, Object Oriented Design Concepts, Design Classes. Design Model- Data, Architectural, Interface, Component, Deployment Level Design Elements. Design Techniques- Stepwise Refinement, Level of Abstraction, Structure Design, Integrated Top-Down Development, Jackson Structured Programming, Summary of Design Techniques.
UNIT-IV: SOFTWARE IMPLEMENTATION **(Periods: 10)**
Implementation Issues: Structured coding Techniques, Coding Styles, Standards and Guidelines, Documentation Guidelines.
Modern Programming Language Features: Type checking, User defined data types, Data Abstraction, Exception Handling, Concurrency Mechanism.
UNIT-V: SOFTWARE TESTING AND MAINTENANCE **(Periods: 12)**
Testing: Strategic Approach to software Testing, Strategic Issues, Testing Strategies for Conventional Software, Object oriented software and Web Apps, Validating Testing, System Testing, Art of Debugging.
Maintenance: Software Maintenance, Enhancing Maintainability during Development, Managerial Aspects of Software Maintenance, Configuration Management, Software Supportability, Reengineering, Business Process Reengineering, Software Reengineering, Reverse Engineering, Restructuring, Forward Engineering, Economics of Reengineering. **[Total Periods: 55]**

TEXT BOOKS:
1. Roger S. Pressman, *"Software Engineering – A Practitioner's Approach,"* 7th Edition, Tata McGraw-Hill, 2009.
2. Richard Fairley, *"Software Engineering Concepts,"* Tata McGraw Hill, 2008.

REFERENCE BOOKS:
1. Ian Sommerville, *"Software Engineering,"* 7th Edition, Pearson Education Asia, 2007.
2. Shari Lwarence Pfleeger, Joanne M. Atlee, *"Software Engineering Theory and Practice,"* 3rd Edition, Pearson Education, 2006.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Information Technology
M.Tech. (SE) I Semester
(16MT12504) SOFTWARE MEASUREMENT AND METRICS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: A course on "Software Engineering".

COURSE DESCRIPTION: Software measurement theory; Models of software engineering measurement; Software products metrics, software process metrics; Measuring & management and Software quality metrics.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Gain knowledge in:
    - Data collection and measures.
    - Product attributes
    - Software quality and Object oriented metrics.
2. Gain skills in analyzing what to measure and complexity assessment in software development.
3. Initiate research to improve Software Estimation and Quality in software development.
4. Apply OO metric tools for software measurement.
5. Apply project cost calculation procedures in software development.

DETAILED SYLLABUS

UNIT-I: FUNDAMENTALS OF MEASUREMENT (Periods: 10)

Measurement and Basics of Measurement - Measurement in Everyday Life, Measurement in Software Engineering, Scope of Software Metrics, Representational Theory of Measurement, Measurement and Models, Measurement Scales and Scale Types.

UNIT-II: ANALYSIS OF MEASUREMENT (Periods: 11)

Goal-Based Frame Work for Software Measurement - Classifying Software Measures, Determining what to measure, Applying Frame Work, Software Measurement Validation

Software Metrics Data Collection - Good Data, Definition of Data, Collecting, Storing and Extracting Data.

UNIT-III: PRODUCT ATTRIBUTES (Periods: 12)

Measuring Internal Product Attributes – Size - Aspects of software size, Length, Reuse, Functionality, Complexity.

Structure - Types of structural measures, Control-flow structure, Modularity and information flow attributes.

UNIT-IV: MEASUREMENT AND MANAGEMENT (Periods: 11)

Measuring External Product Attributes **-** Modeling Software Quality, Measuring Aspects of Quality.

Object-Oriented Metrics - Object-Oriented Concepts and Constructs, Design and Complexity metrics, Productivity Metrics, Quality and Quality Management Metrics.

UNIT-V: QUALITY METRICS (Periods:11)

Software Quality Metrics Overview - Product Quality Metrics, In-Process Quality Metrics, Metrics for Software Maintenance, Examples of Metrics Programs-Motorola, HP, IBM, Collecting Software Engineering Data, Applying the Seven Basic Quality Tools in Software Development.

[Total Periods: 55]

TEXT BOOKS:

1. Fenton, Pfleeger, *"Software Metrics,"* 2nd Edition, Thomson, 2005.
2. Stephen H. Kan, *"Metrics and Models in Software Quality Engineering,"* 2nd Edition, Addison Wesley, 2011.

REFERENCE BOOKS:

1. Linda M. Laird and Carol Brennan, "*Software Measurement and Estimation - A Practical Approach*," IEEE Computer Science Press and Wiley Inter Science, 2006.
2. C Ravindranath Pandian: "*Software Metrics: A guide to Planning Analysis and Implementation*," Auerbach Publications, 2005.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Information Technology
M.Tech. (SE) I Semester

(16MT12505) SOFTWARE REQUIREMENTS AND ESTIMATION

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: Courses on "Software Engineering," and "Object Oriented Analysis & Design".

COURSE DESCRIPTION:

Introduction- Software requirements and risk management, Software Requirements Engineering; Requirements management, Software Requirements Modeling; Software Estimation, Size Estimation; Effort, Schedule and Cost Estimation; Requirements Management Tools, Software Estimation Tools.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Gain knowledge on:
   - Requirements Engineering and Management
   - Estimation of software - size, effort, schedule and cost.
2. Analyze the problems in estimation & factors influencing estimation and build traceability matrix, links in requirement chain.
3. Solve size and cost estimation for software development using COCOMO II, Putnam Estimation and Algorithmic models.
4. Apply requirement management and estimation tools for software development.
5. Gain the understanding of the requirements engineering and management principles for effective software implementation.

DETAILED SYLLABUS

UNIT-I: SOFTWARE REQUIREMENTS **(Periods:15)**

Essential Software requirement, Good practices for requirements engineering, Improving requirements processes, Software requirements and risk management.

Software Requirements Engineering: Requirements elicitation, requirements analysis documentation, review, elicitation techniques, analysis models, Software quality attributes, risk reduction through prototyping, setting requirements priorities, verifying requirements quality.

UNIT-II: SOFTWARE REQUIREMENTS MANAGEMENT **(Periods: 11)**

Requirements management, Principles and Practices, Requirements Attributes, Change Management Process, Requirements Traceability Matrix, Links in requirements chain.

Software Requirements Modeling: Use case modeling, Analysis models, Data flow diagrams, State transition diagrams, Class diagrams, and Object analysis.

UNIT-III: SOFTWARE ESTIMATION **(Periods: 10)**

Components of Software Estimations, Estimation methods, Problems associated with estimation, Key project factors that influence estimation.

Size Estimation-Two views of sizing, Function Point Analysis, Mark II FPA, Full Function Points, LOC Estimation, and Conversion between size measures.

UNIT-IV: EFFORT, SCHEDULE AND COST ESTIMATION **(Periods: 10)**

Introduction to Productivity, Estimation Factors, Approaches to Effort and Schedule Estimation, COCOMO II, Putnam Estimation Model, Algorithmic models, Cost Estimation.

UNIT-V: REQUIREMENTS MANAGEMENT TOOLS **(Periods: 09)**

Benefits of using a requirements management tool, commercial requirements management tool, Rational Requisite Pro, Caliber – RM, Implementing requirements management automation.

SOFTWARE ESTIMATION TOOLS

Desirable features in software estimation tools, IFPUG, USC's COCOMO II, SLIM (Software Life Cycle Management) Tools. **[Total Periods: 55]**

TEXT BOOKS:

1. Karl E. Weigers, *"Software Requirements,"* 2nd Edition, Microsoft Press, 2013.
2. Rajesh Naik and Swapna Kishore, *"Software Requirements and Estimation,"* Tata McGraw Hill, 2001.

REFERENCE BOOKS:

1. Dean Leffingwell and Don Widrig, *"Managing Software Requirements,"* Pearson Education, 2003.
2. Suzanne Robertson and James Robertson, *"Mastering the Requirements Process,"* 2nd Edition, Pearson Education, 2006.
3. Capers Jones, *"Estimating Software Costs,"* 2nd Edition, Tata McGraw-Hill, 2007.
4. M.A. Parthasarathy, "*Practical Software Estimation*," 1st Edition, Pearson Education, 2007.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Information Technology
M.Tech. (SE) I Semester

(16MT12506) DISTRIBUTED DATABASES
(PROFESSIONAL ELECTIVE-I)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: Courses on "Database Management Systems" and "Computer Networks"

COURSE DESCRIPTION: Distributed Databases Overview & Distributed Database Design; Translation of Global Queries to Fragment Queries, Optimization of Access Strategies; Management of Distributed Transactions, Distributed Database administration; Concurrency, Reliability; Case studies.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Gain knowledge on query processing and optimization.
2. Gain analytical skills to implement distributed and parallel databases.
3. Initiate research in advanced Query Optimization, authorization and protection in database.
4. Apply transaction management techniques in distributed environment.

DETAILED SYLLABUS:

UNIT-I: DISTRIBUTED DATABASES OVERVIEW &DISTRIBUTED DATABASE DESIGN (Periods: 10)

Distributed databases:

An overview, Level of Distribution Transparency: Reference Architecture for Distributed databases, Types of Data Fragmentation.

Distributed Database Design

A framework for Distributed Database Design, Design of Database Fragmentation, Allocation of fragments.

UNIT-II: TRANSLATION OF GLOBAL QUERIES TO FRAGMENT QUERIES AND OPTIMIZATION OF ACCESS STRATEGIES (Periods: 12)

Translation of Global Queries to Fragment Queries

Global Queries, fragment Queries, Equivalence Transformations for Queries, transforming Global Queries into Fragment Queries, Distributed Grouping and Aggregate Function Evaluation, Parameter Queries.

Optimization of Access Strategies

Frame Work for Query Optimization, Join Queries, General Queries.

UNIT-III: MANAGEMENT OF DISTRIBUTED TRANSACTIONS & DISTRIBUTED DATABASE ADMINISTRATION (Periods: 09)

Management of Distributed Transactions

Framework for Transaction Management, Supporting Atomicity of Distributed Transactions, Concurrence Control for Distributed Transactions, Architectural aspects of Distributed Transactions.

Distributed Database administration

Catalog management in distributed Databases, authorization and protection.

UNIT-IV: CONCURRENCY & RELIABILITY (Periods: 12)

Concurrency

Foundations of Distributed Concurrency Control, Distributed Deadlocks, Concurrency Control Based on Timestamp.

Reliability

Basic concepts, Nonblocking Commitment Protocols, Reliability and Concurrency Control, Determining a Consistent View of the Network, Detection and Resolution of Inconsistency, Check points and Cold Restart.

UNIT-V: CASE STUDIES (Periods: 07)

Case studies: Tandem's ECOMPASS Distributed Database System, DDM: A distributed database manager based on Adaplex, Distributed –INGRESS, POREL MULTIBASE. **[Total Periods: 50]**

TEXT BOOK:

1. Stefano Ceri. Giuseppe Pelagatti, "*Distributed Databases: Principles and Systems*", 1985, MCG

REFERENCE BOOK:

1. Ozsu, "*Principles of Distributed Database Systems*", 1st Edition, 2002, PEA.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Information Technology
M.Tech. (SE) I Semester
(16MT12507) MACHINE LEARNING
(PROFESSIONAL ELECTIVE-I)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: --Nil--

COURSE DESCRIPTION: Machine learning fundamentals, applications; Multivariate methods, Bayesian networks, Decision tree learning; Support Vector Machines, Statistical learning methods, Unsupervised learning; Kernel Machines; Combining Multiple Learners and Reinforcement learning.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Gain knowledge on supervised, unsupervised, and reinforcement machine learning techniques.
2. Solve real-life problems using Multivariate Methods, Decision Trees, Kernel Machines and Combining Multiple Learners.
3. Initiate research in pattern recognition, classification and clustering techniques.

DETAILED SYLLABUS

UNIT–I: INTRODUCTION **(Periods: 11)**

Introduction to Machine Learning, Examples of Machine Learning Applications. Supervised Learning: Learning a Class from Examples, Vapnik-Chervonenkis (VC) Dimension, Probably Approximately Correct (PAC) Learning, Noise, Learning Multiple Classes, Regression, Model Selection and Generalization and Dimensions of a Supervised Machine Learning Algorithm. Bayesian Decision Theory: Classification, Losses and Risks, Discriminant Functions, Utility Theory and Association Rules.

UNIT–II: MULTIVARIATE METHODS **(Periods: 11)**

Multivariate Data, Parameter Estimation, Estimation of Missing Values, Multivariate Normal Distribution, Multivariate Classification, Tuning Complexity, Discrete Features, Multivariate Regression**.** Dimensionality Reduction: Subset Selection, Principal Components Analysis, Factor Analysis, Multidimensional Scaling, Linear Discriminant Analysis, Isomap, Locally Linear Embedding. Clustering: Mixture Densities, k-Means Clustering, Expectation-Maximization Algorithm, Mixtures of Latent Variable Models, Supervised Learning after Clustering, Hierarchical Clustering, Choosing the Number of Clusters.

UNIT–III: DECISION TREES **(Periods: 11)**

Univariate Trees, Pruning, Rule Extraction from Trees, Learning Rules from Data, Multivariate Trees. Linear Discrimination: Generalizing the Linear Model, Geometry of the Linear Discriminant, Pairwise Separation, Parametric Discrimination Revisited, Gradient Descent, Logistic Discrimination, and Discrimination by Regression. Multilayer Perceptrons: The Perceptron, Training a Perceptron, Learning Boolean Functions, Multilayer Perceptrons, MLP as a Universal Approximator, Back propagation Algorithm, Training Procedures, Tuning the Network Size, Bayesian View of Learning, Dimensionality Reduction, Learning Time.

UNIT-IV: KERNEL MACHINES **(Periods: 11)**

Optimal Separating Hyperplane, The Nonseparable Case: Soft Margin Hyperplane, v-SVM, Kernel Trick, Vectorial Kernels, Defining Kernels, Multiple Kernel Learning, Multiclass Kernel Machines, Kernel Machines for Regression, One-Class Kernel Machines, Kernel Dimensionality Reduction. Bayesian Estimation: Estimating the Parameter of a Distribution, Bayesian Estimation of the Parameters of a Function, Gaussian Processes. Hidden Markov Models: Discrete Markov Processes, Hidden Markov Models, Three Basic Problems of HMMs, Evaluation Problem, Finding the State Sequence, Learning Model Parameters, Continuous Observations, The HMM with Input, Model Selection in HMM.

UNIT–V: COMBINING MULTIPLE LEARNERS **(Periods: 11)**

Rationale, Generating Diverse Learners, Model Combination Schemes, Voting, Error-Correcting Output Codes, Bagging, Boosting, Mixture of Experts Revisited, Stacked Generalization, Fine-Tuning an Ensemble, Cascading. Reinforcement Learning: Single State Case: K-Armed Bandit, Elements of Reinforcement Learning, Model-Based Learning, Temporal Difference Learning, Generalization, Partially Observable States.

[Total Periods: 55]

TEXT BOOK:

1. Ethem Alpaydin, *"Introduction to Machine Learning,"* 2nd Edition, MIT Press, 2009.

REFERENCE BOOKS:

1. Tom M. Mitchell, *"Machine Learning,"* McGraw-Hill, 2013.
2. Christopher M. Bishop, *"Pattern Recognition and Machine Learning,* 2nd Edition, Springer-Verilog,*"* 2006.
3. Kevin P. Murphy, *"Machine Learning: A Probabilistic Perspective,"* MIT Press, 2012.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Information Technology
M.Tech. (SE) I Semester
(16MT12508) SOFTWARE RELIABILITY AND REUSE
(PROFESSIONAL ELECTIVE-I)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: Courses on “Software Engineering” and “Probability and Statistics”.

COURSE DESCRIPTION: Software reliability engineering process, Software reliability strategies, availability; Software reliability modeling; Software metrics for reliability assessment; Best practice of software reliability engineering, and neural networks for software reliability, software system failures, free software intensive system and reusable components.

COURSE OUTCOMES:

On successful completion of this course, the student will be able to:

1. Gain knowledge on:
   - Software Reliability Modeling.
   - Software metrics for Reliability Assessment.
   - Software Reliability Estimation.
   - Best practices of Software Reliability Engineering.
2. Analyze software system failures and operational profile.
3. Solve Software system reliability issues using optimum reliability models.
4. Initiate research in producing failure free software intensive system.
5. Apply advanced methods to analyze complex legacy software systems and identify reusable components.

DETAILED SYLLABUS

UNIT – I: SOFTWARE RELIABILITY (Periods: 10)

Software Reliability Ideas of Software Reliability, Computation of software reliability, Classes of software reliability Models.

Time Dependent Software Reliability Models: Time between failure reliability Models, Fault Counting Reliability Models.

UNIT – II: TIME INDEPENDENT SOFTWARE RELIABILITY MODELS (Periods: 08)

Fault injection model of Software Reliability, Input Domain Reliability Model, Orthogonal defect classification, Software availability Models.

Software Reliability Modeling: A general procedure for reliability modeling.

UNIT – III: SOFTWARE REUSE (Periods: 10)

Introduction Software Reuse and Software Engineering, Concepts and Terms, Software Reuse products, Software Reuse processes, Software reuse paradigms. State of the Art and the Practice: Software Reuse Management, Software Reuse Techniques, Aspects of Software Reuse, Organizational Aspects, Technical Aspects and Economic Aspects.

UNIT –IV: PROGRAMMING PARADIGMS AND REUSABILITY (Periods: 10)

Usability Attributes, Representation and Modeling Paradigms, Abstraction and Composition in development paradigm.

Object - Oriented Domain Engineering: Abstraction and parameterization techniques, Composition techniques in Object Orientation.

UNIT-V: APPLICATION ENGINEERING (Periods: 10)

Component Storage and Retrieval, Reusable Asset Integration. Software Reuse technologies: Component Based Software Engineering, COTS based development, Software Reuse Metrics, Tools for Reusability.

[Total Periods: 48]

TEXT BOOKS:

1. Michael R. Lyu, “*Handbook of Software Reliability Engineering*,” IEEE Computer Society Press, McGraw-Hill Book Company, 2005.
2. Ivar Jacobson, Martin Gress, Patrick Johnson, “*Software Reuse*,” Pearson Education, 2004.

REFERENCE BOOKS:

1. John D. Musa, “*Software Reliability Engineering*,” 2nd Edition, Tata Mc GrawHill, 2011.
2. Eve-Andre Karisson, “*Software Reuse – A Holistic Approach*,” John Wiley and Sons, 1996.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Information Technology

M.Tech. (SE) I Semester
(16MT12509) USER INTERFACE DESIGN
(PROFESSIONAL ELECTIVE-I)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Software Development Methodologies"
COURSE DESCRIPTION: Characteristics & principles of User Interface Design; Requirement analysis-direct & indirect methods; Design- using Formatting menus & windows; Design-using Text boxes, multimedia and Windows layout.
COURSE OUTCOMES:
On successful completion of this course, the students will be able to:
1. Gain the knowledge on concepts of user interfaces and related business functions.
2. Analyze user requirements necessary for UI development.
3. Design interfaces using appropriate menus, windows, interfaces.
4. Solve real world problems by applying theoretical user interface concepts.
5. Usage and customize of advanced tools for various window layouts in project management and development of UI computing systems.

UNIT-I: INTRODUCTION (Periods: 09)
Human–Computer Interface – Characteristics of Graphics Interface –Direct Manipulation Graphical System – Web User Interface –Popularity –Characteristic & Principles- User Interface Design Process – Obstacles -Usability

UNIT-II: HUMAN COMPUTER INTERACTION (Periods: 12)
Human Characteristics In Design – Human Interaction Speed –Business Functions –Requirement Analysis – Direct –Indirect Methods – Basic Business Functions – Design Standards – System Timings – Human Consideration In Screen Design – Structures of Menus – Functions of Menus–Contents of Menu

UNIT-III: FORMATTING MENUS AND WINDOWS (Periods: 09)
Formatting – Phrasing the Menu – Selecting Menu Choice–Navigating Menus– Graphical Menus.
Windows: Characteristics– Components– Presentation Styles– Types– Managements– Organizations– Operations– Web Systems– Device– Based Controls Characteristics– Screen – Based Controls – Operate Control.

UNIT-IV: TEXT BOXES AND MULTIMEDIA (Periods: 11)

Text Boxes– Selection Control–Combination Control– Custom Control– Presentation Control
Text for Web Pages – Effective Feedback– Guidance & Assistance–Internationalization– Accessibility–Icons– Image– Multimedia – Coloring.

UNIT-V: WINDOWS LAYOUT (Periods:09)
Prototypes – Kinds of Tests – Retest – Information Search – Visualization –Hypermedia – WWW–Software Tools.

[Total Periods: 50]

TEXT BOOKS:

1. Wilbent. O. Galitz, "*The Essential Guide To User Interface Design*", John Wiley& Sons, 2001.
2. Ben Sheiderman, "*Design the User Interface", Pearson Education*, 1998.

REFERENCE BOOK:

1. Alan Cooper, "*The Essential Of User Interface Design*", Wiley – Dream Tech Ltd., 2002.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Information Technology
M.Tech. (SE) I Semester
(16MT12531) ADVANCED SOFTWARE ENGINEERING LAB-1

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PREREQUISITES: Courses on "Software Development Methodologies", "Software Requirements and Estimation", Data Structures and Algorithms" and "Object Oriented Analysis & Design"

COURSE DESCRIPTION: Software development life cycle activities- requirements specification using open source Requirement documentation tool, modeling using AgroUML tool; Implementation of various linear and non-linear data structures using C++; Refactoring using InsRefactor and SafeRefactor Eclipse Plugins.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Demonstrate hands-on experience on:
   - Requirements Engineering and Management
   - Estimation of software-size, effort, schedule and cost.
2. Identify key entities and relationships in the problem domain and write succinct textual descriptions of problems, modeling and Implement linear and non-linear data structures using C++.
3. Identify and apply designing, estimating tools and methodologies for complex engineering problems.
4. Apply algorithm design approaches and C++ programming skills to solve real world applications.
5. Work individually and in teams collaboratively in implementing mini projects.
6. Demonstrate communication skills both oral and written for preparing and presenting reports.
7. Engage in life-long learning and enthusiasm to upgrade knowledge and skills in latest technologies and tools.

LIST OF EXERCISES:

1. Prepare the Software Requirement Specification (SRS), High Level Design (HLD) and Detailed Design (DD) for the following experiments

   (i) Employee Information System (ii) Online Airline Reservation

   Note: For the reference of SRS, HLD and DD templates refer department manual and use any open source Requirement documentation tool.
2. Estimate project parameters such as size, effort and time for development for a Library Information system using Basic COCOMO model.
3. Model UML Use case, Sequence, Collaboration and Component diagrams for the following experiments using Argo UML tool (i) Students Marks Analyzing System (ii) Course Registration System.
4. Study and prepare a report on the following tools: (i) Raptor-Flowchart based programming tool (ii) Microsoft Visio 2010 (iii) Jenkins tool.
5. Write C++ program to implement the following data structures using a singly linked list.

   a) Stack b) Queue
6. Write C++ program to implement the operations of doubly linked list.

7. Write a C++ program to perform the following operations of BST:

   a) Node Insertion   b) Node Deletion   c) Key Search

8. Write C++ program to traverse the given binary tree in Pre-order, In-order and Post-order using recursion.

9. Write C++ program for the implementing BFS and DFS graph traversal techniques using queue and stack data structures.

10. Write C++ program for implementing the following search and sorting techniques.

    a) Binary search   b) Fibonacci Search   c) Quick Sort d) Shell Sort

11. Write C++ program to construct the Minimum Cost Spanning Tree using Kruskal's algorithm.

12. Write a C++ program to implement 0/1 Knapsack problem.

13. Mini Project on any web based application using Refactoring

    Note: Use InsRefactor and SafeRefactor Eclipse Plugins for refactoring

REFERENCE BOOKS:

1. Roger S. Pressman, "*Software Engineering, A practitioner's Approach*," 6th Edition, Tata McGraw-Hill, Edition, 2010.
2. Sommerville, "*Software Engineering*," 8th Edition, Pearson Education, 2007.
3. Rajesh Naik and Swapna Kishore, "Software Requirements and Estimation," Tata McGraw Hill, New Delhi, 2001.
4. Sartaj Sahni "*Data structures, Algorithms and Applications in C++,*" 2nd Edition, Universities press (India) Pvt. Ltd, 2005.
5. Adam Drozdek "*Data Structures and Algorithms in C++,*" 4th Edition, Delmar Cengage Learning, 2012.
6. "*Estimation of Project Metrics*," http://vlssit.iitkgp.ernet.in/isad/isad/2/, drafted on July 01, 2016 at 11:30 AM.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Information Technology

M.Tech. I Semester
(16MT12532) CLOUD COMPUTING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PREREQUISITES: Courses on "Cloud Computing" and "Operating Systems".

COURSE DESCRIPTION: Hands-on experience on creating Virtual machines on Windows and Linux platforms, Development of Service based web applications & their deployment and Mobile app development.

COURSE OUTCOMES:
On successful completion of this course, the students will be able to:
1. Gain hands-on experience on Virtualization models and Cloud Environment.
2. Analyze the given experiment and relate to existing architectures.
3. Apply API development skills in web applications for Cloud deployment.
4. Initiate research to develop novel Service based web solutions.
5. Gain knowledge on investigative approach and identify suitable Cloud platforms for SOA based problems.
6. Devise virtual environments based on virtualization techniques.
7. Develop written and oral communications in preparing and presenting reports

LIST OF EXCERCISES:
1. Create Virtual machines with given set of configuration on Hyper-V: "Ubuntu 14 LTS OS, with 2 GB RAM and 200 GB HDD". (IaaS)
2. Create Virtual machines with given set of configuration on Hyper-V: "Windows 7 OS with 4 GB RAM and 500 GB HDD". (IaaS)
3. Create Virtual machines with given set of configuration on Ubuntu OS: "Any Unix OS with 2 GB RAM and 200 GB HDD". (IaaS)
4. Create Virtual machines with given set of configuration on Ubuntu OS: "Windows 7 OS with 4 GB RAM and 500 GB HDD". (IaaS)
5. Develop a simple web application for performing Calculator operations and deploy it on cloud platform. (SaaS)
6. Develop a Design document for a web application, to perform operations based on service calls and to be deployed on cloud environment. (Design Doc)
7. Develop a web application for performing Calculator operations be selecting relevant services. Deploy it on cloud platform. (SaaS)
8. Develop a HTTPS web application with social media interfaces (Facebook / Twitter / Instagram / Google+ APIs). (SaaS)
9. Develop a mobile app on Google App Engine for uploading a resume into a website, collaborated with Drop box. The resume should be encrypted. (PaaS)
10. Develop a service call to run on Drop box resumes for picking the resumes of given skill set. (PaaS)
    i. 6+ years of Exp in Java Development.
    ii. 10 years of experience in Automation Testing.
    iii. 15+ years of Managerial experience with technical background.
    iv. 5-7 years of on-site experience in .NET support and programming.

REFERENCE BOOKS:

1. Ivanka Menken and Ivanka Menken, "*Cloud Computing Virtualization Specialist Complete Certification Kit - Study Guide Book,*" 1st Edition, Emereo Pty. Ltd., 2009.
2. Barrie Sosinsky, "*Cloud Computing Bible,*" 1st Edition, Wiley India Pvt Ltd, 2011.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Information Technology

M.Tech. (SE) I Semester

(16MT13808) RESEARCH METHODOLOGY

(**Common to all M. Tech. Programs**)
(**Audit Course**)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	-	2	-	-

PREREQUISITES: --

COURSE DESCRIPTION: Overview of Research, research problem and design, various research designs, data collection methods, statistical methods for research, importance of research reports and its types.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Acquire in-depth knowledge on
   - Research design and conducting research
   - Various data collection methods
   - Statistical methods in research
   - Report writing techniques.
2. Analyze various research design issues for conducting research in core or allied areas.
3. Formulate solutions for engineering problems by conducting research effectively in the core or allied areas.
4. Carryout literature survey and apply research methodologies for the development of scientific/technological knowledge in one or more domains of engineering.
5. Select and Apply appropriate techniques and tools to complex engineering activities in their respective fields.
6. Write effective research reports.
7. Develop attitude for lifelong learning to do research.
8. Develop professional code of conduct and ethics of research.

DETAILED SYLLABUS

UNIT-I: INTRODUCTION TO RESEARCH METHODOLOGY (Periods: 07)

Objectives and Motivation of Research, Types of Research, Research Approaches, Research Process, Criteria of good Research, Defining and Formulating the Research Problem, Problem Selection, Necessity of Defining the Problem, Techniques involved in Defining a Problem.

UNIT-II: RESEARCH PROBLEM DESIGN AND DATA COLLECTION METHODS (Periods: 09)

Features of Good Design, Research Design Concepts, Different Research Designs, Different Methods of Data Collection, Data preparation: Processing Operations, Types of Analysis.

UNIT-III: STATISTICS IN RESEARCH (Periods: 09)

Review of Statistical Techniques - Mean, Median, Mode, Geometric and Harmonic Mean, Standard Deviation, Measure of Asymmetry, ANOVA, Regression analysis.

UNIT-IV: HYPOTHESIS TESTING (Periods: 09)

Normal Distribution, Properties of Normal Distribution, Basic Concepts of Testing of Hypothesis, Hypothesis Testing Procedure, Hypothesis Testing: t-Distribution, Chi-Square Test as a Test of Goodness of Fit.

UNIT-V: INTERPRETATION AND REPORT WRITING (Periods: 06)

Interpretation – Techniques and Precautions, Report Writing – Significance, Stages, Layout, Types of reports, Precautions in Writing Reports. **[Total Periods: 40]**

TEXT BOOK:

1. C.R. Kothari, *"Research Methodology: Methods and Techniques,"* New Age International Publishers, New Delhi, 2nd Revised Edition, 2004.

REFERENCE BOOKS:

1. Ranjit Kumar, *"Research Methodology: A step-by-step guide for beginners,"* Sage South Asia, 3rd ed., 2011.
2. R. Panneerselvam, *"Research Methodology,"* PHI learning Pvt. Ltd., 2009.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Information Technology
M.Tech. (SE) II Semester
(16MT22501) BIG DATA TECHNOLOGIES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: Courses on "Database Management Systems, Data Warehousing and Data Mining"
COURSE DESCRIPTION: Fundamentals of Big Data; Data-parallel programming model- Hadoop, Hadoop I/O; MapReduce features, HDFS; Hive, HBase, Zookeeper; Sqoop and Case studies.
COURSE OUTCOMES:
On successful completion of this course, the students will be able to:
1. Gain knowledge on Big Data storage, processing, querying and reporting.
2. Analyze complex analytical problems to provide optimal solutions.
3. Apply Big Data Technologies to solve real-world problems.
4. Initiate research using HDFS and MapReduce programming model for the implementation of parallelism.
5. Apply various Big Data tools: Sqoop, HBase, MapReduce and Mahout for data analytics.

DETAILED SYLLABUS

UNIT-I: INTRODUCTION TO BIG DATA (Periods: 11)
The Evolution of Big Data, Characteristics of Big Data, Big Data Sources, The Big Data Revolution, Security, Compliance, Auditing and Protection, Advantages and disadvantages, Challenges of Big Data. **Meet Hadoop**: Data Storage and Analysis, Comparison with Other Systems, Hadoop Ecosystem. **MapReduce**: Analyzing the Data with UNIX Tools, Analyzing the Data with Hadoop, Scaling Out, Hadoop Streaming, Hadoop Pipes. Hadoop Distributed File system.
UNIT-II: HADOOP I/O (Periods: 11)
Data Integrity, Compression, Serialization, File-Based Data Structures. **Developing a MapReduce Application**: The Configuration API, Configuring the Development Environment, Writing a Unit Test, Running Locally on Test Data, Running on a Cluster, Tuning a Job, MapReduce Workflows. **Working with MapReduce**: Anatomy of a MapReduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution. MapReduce Types and Formats: MapReduce Types, Input Formats, Output Formats.
UNIT-III: MAPREDUCE FEATURES (Periods: 11)
Counters, Sorting, Joins, Side Data Distribution, MapReduce Library Classes. **Setting Up a Hadoop Cluster**: Cluster Specification, Cluster Setup and Installation, SSH Configuration, Hadoop Configuration, YARN Configuration, Security, Benchmarking a Hadoop Cluster, Hadoop in the Cloud. **Administering Hadoop:** HDFS, Monitoring, Maintenance. Pig: Installing and Running Pig, Comparison with Databases.
UNIT-IV: HIVE, HBase, ZOOKEEPER (Periods: 11)
Installing Hive, Running Hive, Comparison with Traditional Databases, HiveQL, Tables, Querying Data, User - Defined Functions. HBase: HBasics, Concepts, Installation, Clients, HBase versus RDBMS, Praxis. ZooKeeper: Installing and Running ZooKeeper, the ZooKeeper Service, Building Applications with ZooKeeper, ZooKeeper in Production.
UNIT-V: SQOOP, MAHOUT and CASE STUDIES (Periods: 11)
Getting Sqoop, Generated Code, Database Imports: A Deeper Look, Working with Imported Data, Importing Large Objects, Performing an Export, Exports: A Deeper Look. Mahout: The Three C's of Mahout – Mahout Concepts: Classification, Clustering and Collaborative Filtering (CF). Case Studies: Best Practices for Big Data Analytics, Hadoop Usage at Last.fm, Hadoop and Hive at Facebook, Nutch Search Engine, Log Processing at Rackspace, Cascading, and TeraByte Sort on Apache Hadoop, Using Pig and Wukong to Explore Billion-edge Network Graphs. **[Total Periods: 55]**
TEXT BOOKS:
1. Tom White, *"Hadoop: The Definitive Guide,"* Oreilly and Yahoo Press, 3rd Edition, 2012.
2. Frank J. Ohlhorst, *"Big Data Analytics: Turning Big Data into Big Money,"* Wiley Publication, December 2012.
REFERENCE BOOKS:
1. Kevin Roebuck, *"Big Data: High-Impact Strategies - What You Need to Know: Definitions, Adoptions, Impact, Benefits, Maturity, Vendors,"* Tebbo Publisher, 2011.
2. Alex Holmes, *"Hadoop in Practice,"* Manning Publications Publisher, 2012.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Information Technology
M.Tech. (SE) II Semester
(16MT22502) SERVICE ORIENTED ARCHITECTURE

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: Courses on "Software Engineering" and "Web Technologies"
COURSE DESCRIPTION: Introduction to SOA, Web services & Primitive SOA, Contemporary SOA, Principles of SOA, Service Layers, Delivery strategies, Service Modeling, Service and Business process design- Simple Object Access Protocol (SOAP), Web Services Description Language (WSDL), and Web Services- Business Process Execution Language (WS-BPEL), SOA support in .NET and J2EE.

COURSE OUTCOMES:
On successful completion of this course, the students will be able to:
1. Gain knowledge on:
   - Fundamentals of web services
   - Development strategies, Principles, Services, Layers and characteristics of service orientation.
2. Analyze complex business process critically in identifying appropriate service model logic.
3. Solve real time problems related to design the Web Services using XML Schema, WSDL, SOAP and BPEL.
4. Initiate research using XML Schema, WSDL, SOAP, BPEL and Service Oriented Enterprise model.
5. Apply the modern tools and techniques of .NET and J2EE to modeling the web services.

DETAILED SYLLABUS
UNIT-I: SOA AND WEB SERVICES FUNDAMENTALS (Periods: 10)
Introducing SOA: Fundamental SOA, Common Characteristics of Contemporary SOA, Common tangible benefits of SOA, Common pitfalls of adopting SOA.
Web Services and Primitive SOA: The Web Services frame work, Services, Service descriptions, Messaging.
UNIT-II: SOA AND WS-* EXTENSIONS (Periods: 11)
Web Services and Contemporary SOA (Part-I Activity Management and Composition): Message Exchange Patterns, Service Activity, Coordination, Atomic transactions, Business Activities, Orchestration, Choreography.
Web Services and Contemporary SOA (Part-II Advanced Messaging, Metadata and Security): Addressing, Reliable messaging, Correlation, Policies, Metadata exchange, Security, Notification and eventing.
UNIT-III: PRINCIPLES, SERVICE LAYERS AND PLANNING (Periods: 11)
Principles of Service-Orientation: Anatomy of SOA, Common principles of Service Orientation, Service Orientation and Object Orientation.
Service Layers: Service-Orientation and Contemporary SOA, Service Layer Abstraction, Application Service Layer, Business Service Layer, Orchestration Service Layer, Agnostic Services, Service Layer Configuration Scenarios.
SOA Delivery Strategies: SOA delivery lifecycle phases, The Top-down strategy, The bottom-up strategy, The agile strategy.
UNIT-IV: BUILDING SOA (ANALYSIS & DESIGN) (Periods: 12)
Analysis Introduction: Introduction to Service Oriented Analysis, Benefits of a Business Centric SOA, Deriving Business Services.
Service Modeling: Service Modeling, Service Modeling guidelines, Classifying Service model logic, Contrasting Service modeling approaches.
Design Introduction: Introduction to Service-Oriented design, WSDL related XML Schema language basics, WSDL language basics, SOAP language basics, Service interface design tools.
UNIT-V: BUILDING SOA (DESIGN & TECHNOLOGY) (Periods: 11)
Service Design: Service Design overview, Entity-centric business Service Design, Application Service Design, Task-centric business Service Design, Service Design guidelines.
Business Process Design: WS-BPEL language basics, Service Oriented Business process Design.
SOA Platforms: SOA platform basics, SOA Support in J2EE, SOA Support in .NET

[Total Periods: 55]

TEXT BOOK:
1. Thomas Erl, *"Service-Oriented Architecture - Concepts, Technology and Design,"* Pearson, 2008.

REFERENCE BOOKS:
1. Shankar Kambhampaty, *"Service Oriented Architecture for Enterprise and Cloud Applications,"* Wiley- India, 2012
2. Eric Newcomer and Greg Lomow, *"Understanding SOA with Web Services,"* Pearson Education, 2007.
3. M. Rosen et al., *"Applied SOA,"* Wiley India Pvt. Ltd, 2009.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Information Technology
M.Tech. (SE) II Semester

(16MT22503) SOFTWARE ARCHITECTURE AND DESIGN PATTERNS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: Courses on "Software Development Methodologies," and "Object Oriented Programming".

COURSE DESCRIPTION: Envisioning Architecture - Software Architecture, Pattern System; Creating Architecture – Understanding the Requirements, Designing the Architecture, Documenting Software Architectures, Reconstructing Software Architectures; Analyzing Architectures and moving from one system to many – Evaluating the Architecture; Introduction to Design Patterns and Creational Patterns; Structural and behavioral patterns.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Gain knowledge on:
    - Software architecture styles and business life cycle.
    - Various design issues and patterns.
2. Analyze and identify architectural styles and patterns to solve software design problems.
3. Solve Software Architecture design problems using design patterns.
4. Apply appropriate novel software pattern to solve real world problems in object oriented software design process

DETAILED SYLLABUS

UNIT I: ENVISIONING ARCHITECTURE (Periods: 12)

Introduction to Software Architecture, Software Processes and the ABC, Architectural Patterns, Reference Model and Reference Architecture.

Pattern System – Introduction to Pattern System, Pattern Classification, Pattern Selection, Introduction to Architectural Patterns, Pipes & Filter, Model-View-Controller.

UNIT II: CREATING ARCHITECTURE (Periods: 14)

Understanding the Requirements: Functionality and Architecture, Architecture and Quality Attributes (QA), System QAs, QA Scenarios in Practice, Business and Architecture Qualities, Achieving Qualities.

Designing the Architecture: Architecture in the Life Cycle, Attribute Driven Design (ADD).

Documenting Software Architectures: Uses of Architectural Documentation, Views. **Reconstructing Software Architectures:** Information Extraction, Database Construction, View Fusion and Reconstruction.

UNIT III: ANALYZING ARCHITECTURES AND MOVING FROM ONE SYSTEM TO MANY (Periods: 10)

Evaluating the Architecture: The ATAM, The CBAM. The World Wide Web-A Case Study in Interoperability

Moving From one System to Many: Software Product Lines, Celsius Tech- A Case Study in Product Line Development, Building Systems from off the shelf components, Software Architecture in the future.

UNIT IV: INTRODUCTION TO DESIGN PATTERN AND CREATIONAL PATTERNS (Periods: 08)

Introduction to Design Patterns: Design Patterns in Smalltalk MVC, Describing DPs, The Catalog of DPs, Organizing the Catalog, Design Pattern to Solve Design Problem, Select and Use of a DP.

Creational Patterns: Abstract Factory, Builder, Factory Method, Prototype.

UNIT V: STRUCTURAL AND BEHAVIORAL PATTERNS (Periods: 10)

Structural Patterns: Adapter, Composite, Decorator, Flyweight.

Behavioral patterns: Command, Iterator, Mediator, Observer, State.

[Total Periods: 54]

TEXT BOOKS:

1. Len Bass, Paul Clements and Rick Kazman, *"Software Architecture in Practice,"* 2nd Edition, Addison-Wesley, 2003.
2. Erich Gamma, Richard Helm, Ralph Johnson, and John Vlissides *"Design Patterns: Elements of Reusable Object-Oriented Software,"* Pearson Education, 1995.

REFERENCE BOOKS:

1. Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad and Michael Stal, *"Pattern-Oriented Software Architecture: A System of Pattern,"* Volume 1, John Wiley & Sons, 2001.
2. Eric Freeman and Elisabeth Freeman, *"Head First Design patterns,"* O'REILLY, 2004.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Information Technology
M.Tech. II Semester
(16MT22504) SOFTWARE TESTING TECHNIQUES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Software Development Methodologies".
COURSE DESCRIPTION: Basic concepts of Software Testing; Testing Techniques – Levels of Testing; Testing Process – Test Planning; Test Metrics and Reports; Software Test Automation.
COURSE OUTCOMES:
On successful completion of this course, the students will be able to:

1. Gain knowledge on the Software Testing types and Process for different programming environments.
2. Analyze and apply the appropriate testing techniques suitable for testing the software.
3. Design and apply appropriate strategies for selecting test cases to meet requirements of the product.
4. Apply efficient modern software testing tools for automation.
5. Write test cases and perform defect reporting.

DETAILED SYLLABUS
UNIT-I: BASIC CONCEPTS OF SOFTWARE TESTING (Periods: 12)
Fundamentals of software testing - software verification and validation – V test model: V model for software, testing during proposal stage, testing during requirements stage, testing during test-planning phase, test during design phase, VV model, critical roles and responsibilities.

UNIT-II: TESTING TECHNIQUES (Periods: 12)
Levels of testing – Acceptance testing – feature based testing (special tests part – I) – Application based testing (special tests part – II)

UNIT-III: TESTING PROCESS (Periods: 10)
Test planning –test policy, contents, strategy, test plan, Quality plan, test plan template, guidelines, test administration and estimation, standards, building test data, test cases, scenarios, templates for test cases, test scripts, effective test cases, building test data, generation of test data, roles and responsibilities in testing life cycle, test process monitoring.

UNIT-IV: TEST METRICS AND REPORTS (Periods: 10)
Testing related data, defect data, efficiency data, categories of test metrics, estimated, budgeted, approved and actual, resources, effectiveness in testing, defect density, defect leakage ratio, residual defect density, test team efficiency, test case efficiency, rework, MTBF/ MTTR, test reports, status reports, integration test reports, system test reports, final test reporting, test status report, Bench marking

UNIT-V: SOFTWARE TEST AUTOMATION (Periods: 10)
Test Automation: Scope of Automation, Design and Architecture of automation, Process Model for Automation, challenges in automation. Load Runner, Selenium, QTP, RFT and RQM.

[Total Periods: 54]

TEXT BOOKS:

1. M. G. Limaye, *"Software Testing: Principles and Techniques and Tools,"* Tata McGraw – Hill Education, 1st Edition, 2012.
2. Srinivasan Desikan, Gopalaswamy Ramesh, "*Software Testing: Principles and Practices*", Pearson 2012

REFERENCE BOOKS:

1. Dr. K. V. K. K. Prasad, *"Software Testing Tools,"* Dreamtech, 1st Edition, 2004.
2. Aditya P. Mathur, "*Foundations of Software Testing*", Pearson, 2008

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Information Technology

M.Tech. II Semester

(16MT22505) WEB TECHNOLOGIES

(Common to M.Tech. (SE and CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Object Oriented Programming".

COURSE DESCRIPTION: Web Technologies: HTML5, CSS, JavaScript, JQuery; Open source server-side scripting language- PHP; MySQL database concepts; and AJAX.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Gain knowledge on web technologies.
2. Analyze the functionality of client as well as server side web technologies for validating web pages.
3. Gain programming skills to design and develop novel web applications
4. Apply web technologies to make web pages more interactive, scalable and user friendly web applications.

DETAILED SYLLABUS

UNIT–I: HTML5 AND CSS3 **(Periods: 14)**

HTML5: Overview of HTML and XHTML, HTML5 - Introduction, HTML5 Document Structure, Creating Editable Content, Checking Spelling Mistakes, Exploring Custom Data Attributes, Microdata, Client-Side Storage, Drag and Drop Feature, ARIA Accessibility, Offline Web Applications, Web Communications, Cross-Document Messaging and Desktop Notifications, 2D and 3D Graphics. **CSS3**: Introduction, Features of CSS3, Syntax of CSS, Exploring CSS selectors, Inserting CSS in HTML Document, State of CSS3.

UNIT–II: JAVASCRIPT AND JQUERY **(Periods: 10)**

JavaScript: Overview of JavaScript**,** JavaScript Functions, Events, Image Maps and Animations, JavaScript Objects. **JQuery**: Fundamentals of JQuery, JQuery Selectors, JQuery Methods to Access HTML Attributes and Traversing, JQuery Manipulators, Events and Effects.

UNIT–III: INTRODUCTION TO PHP **(Periods: 10)**

Introduction, Data Types, Variables, Constants, Expressions, String Interpolation, Control Structures, Functions, Arrays, Embedding PHP Code in Web Pages, Object Oriented PHP.

UNIT–IV: PHP AND MYSQL **(Periods: 10)**

PHP and Web Forms, Sending Form Data to a Server, Authenticating Users with PHP, Session Handlers, PHP with MySQL, Interacting with the Database, Database Transactions.

UNIT–V: AJAX **(Periods: 08)**

Exploring Different Web Technologies, Exploring AJAX, Creating a Sample AJAX Application, Displaying Date and Time using AJAX, Creating the XMLHttpRequest Object, Reading a File Synchronously and Asynchronously, Reading Response Headers, Loading List Boxes Dynamically using XMLHttpRequest Object, JQuery with AJAX, Validating a Field using AJAX and PHP.

[Total Periods: 52]

TEXT BOOKS:

1. Kogent Learning Solutions Inc, *"HTML 5 Black Book: Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP and JQuery,"* 1st Edition, Dreamtech Press, 2011.
2. W. Jason Gilmore, *"Beginning PHP and MySQL,"* 4th Edition, APress, 2011.

REFERENCE BOOKS:

1. Andrea Tarr, *"PHP and MySQL,"* 1st Edition, Willy India, 2012.
2. Thomas A. Powell, *"The Complete Reference: HTML and CSS,"* 5th Edition, Tata McGraw Hill, 2010.
3. Steve Suehring, Tim Converse and Joyce Park, "*PHP6 and MySQL,"* 1st Edition, Willy India, 2009.
4. P. J. Deitel and H. M. Deitel, "*Internet & World Wide Web How to Program*," 4th Edition, Pearson, 2009.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Information Technology
M.Tech. (SE) II Semester

(16MT10502) ADVANCED DATABASE MANAGEMENT SYSTEMS
(PROFESSIONAL ELECTIVE-II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: *A Course on "Database Management Systems".*
COURSE DESCRIPTION: Concepts of Database System Concepts and Architectures, Data modeling using ER-Model;SQL, Objects Relational Database and XML, Database Design and File Organizations, Query Processing, Concurrency and Recovery, Distributed DBMS Architecture and Design.

COURSE OUTCOMES:
On successful completion of this course, the students will be able to:
1. Gain Advanced knowledge in:
   - Database System Concepts , Languages , Interfaces and Architectures
   - Query Languages , Relational Databases and XML
   - Database Design and File Organization.
   - Query Processing and Recovery
   - Distributed Database Architecture and Design
2. Analyze database management architecture and categorize languages and database objects.
3. Design a wide range of potential solutions for the database problems using ER-diagrams, SQL, Normalization and XML.
4. Apply higher order skill and contribute for the development of technical knowledge to solve the problems innovatively.
5. Apply appropriate modern techniques, resources and tools for the real world problems in databases.

DETAILED SYLLABUS:
UNIT-I: DATABASE SYSTEM CONCEPTS AND ARCHITECTURES, DATA MODELING USING ER-MODEL (Periods: 11)
Database System Concepts and Architectures: Architecture And Data Independence, Database Languages and Interfaces, Database System Environment, Centralized and Client/server Architectures for DBMS.
Data modeling using ER-Model: Using High-Level Conceptual data Model for Database Design, A Sample Database Application, Entity Types, Entity Sets, Attributes, and Keys, Relationship Types, Relationship Sets, Roles, and Structural Constraints, Weak Entity Types, Refining the ER Design for the COMPANY Database, ER Diagrams, Naming Conventions, and Design Issues, Relationship Types of Degree Higher than Two, Relational Database Design using ER-to-Relational Model.
UNIT-II: SQL, OBJECTS RELATIONAL DATABASE AND XML (Periods: 12)
SQL: Schema Definition, Constraints, Queries, Joins, Assertions, Triggers and Views
Object Relational Databases: Concepts for Object Databases, Standards, Languages and Design.
XML: Hierarchical data model, Documents, DTD, XML Schema, Documents and Databases, Querying.
UNIT-III: DATABASE DESIGN AND FILE ORGANIZATIONS (Periods: 11)
Database Design: Functional Dependencies, Types of Normal Forms, properties of relational decompositions, Algorithms for Relational Database Design.
File Organizations: Introduction, Secondary Storage Devices, Buffering of Blocks, Placing File Records on Disk, Operations on Files, Files of Unordered Records, Files of Ordered Records, Hashing Techniques, Other Primary File Organizations, Parallelizing Disk Access Using RAID Technology, New Storage Systems.
UNIT-IV: QUERY PROCESSING, CONCURRENCY AND RECOVERY (Periods:13)
Query Processing: Problem, Objectives, Characterization, Layers and Query Optimization and Query Optimization Algorithms: INGRES, System R, Distributed INGRES, R*, SDD-1.
Concurrency Control: Transaction management types and properties, Algorithms, Deadlock Management.
Recovery: Concepts, Techniques Based on Deferred Update and Immediate Update, Shadow paging and ARIES Algorithm.
UNIT-V: DISTRIBUTED DBMS ARCHITECTURE AND DESIGN (Periods: 09)
Distributed DBMS Architecture: Architectural Models and Architectures.
Distributed Database Design: Alternative Design Strategies, Distribution Design Issues, Fragmentation and Allocation. **[Total Periods: 56]**

TEXT BOOKS:
1. Ramez Elmasri & Shamkant B. Navathe, *"Database Systems: Models, Languages, Design and Application Programming,"* 6th Edition, New Delhi, Pearson Education, 2013.
2. M. Tamer Ozsu, Patrick Valduriez, *"Principles of Distributed Database System,"* 2nd Edition, New Delhi, Pearson Education, 2006.

REFERENCE BOOKS:
1. Abraham Silberchatz, Henry F. Korth, S. Sudarsan, *"Database System Concepts,"* 5th Edition, N.Y, McGraw-Hill, 2006.
2. Thomas M. Connolly, Carolyn E. Begg, *"Database Systems – A Practical Approach to Design, Implementation and Management,"* 3rd Edition, New Delhi, Pearson Education, 2003.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Information Technology
M.Tech. (SE) II Semester
(16MT22506) SOFTWARE PROCESS AND PROJECT MANAGEMENT
(PROFESSIONAL ELECTIVE-II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Software Engineering"

COURSE DESCRIPTION: Software Process Maturity Levels-Initial and the repeatable process, The Defined Process, The Managed Process and the Optimizing Process; Software management Renaissance, Software Management Disciplines and Framework, Next Generation Software Economics and Case Studies.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Gain knowledge on:
   - Software process maturity levels and activities
   - Software project management strategies
2. Perform analysis of project management techniques for deploying software systems quickly.
3. Apply the skills to solve problems in modern software process and project management.
4. Conduct research to improve software process and project Controlling activities.
5. Apply software process management techniques to measure the quality of the software.
6. Learn how to optimize software project cost and schedule estimation techniques

DETAILED SYLLABUS:

UNIT-I: SOFTWARE PROCESS MATURITY AND THE REPEATABLE PROCESS (Periods: 12)

A Software Maturity Framework, The Principles of Software Process Change, Software Process Assessment, The Initial Process, The Project Plan, Software Configuration Management-I.

UNIT-II: THE DEFINED PROCESS, THE MANAGED PROCESS AND THE OPTIMIZING PROCESS (Periods: 14)

Software Standards, Software Configuration Management-II, Defining the Software Process, Data Gathering and Analysis, Managing Software Quality, Defect Prevention, Automating the software Process.

UNIT-III: SOFTWARE MANAGEMENT RENAISSANCE AND PROCESS FRAMEWORK (Periods:10)

Conventional Software Management, Evolution of Software Economics, Improving software Economics, Life cycle phases, Workflows of the process, Checkpoints of the Process.

UNIT-IV: SOFTWARE MANAGEMENT DISCIPLINES (Periods:08)

Iterative process planning, Project organizations and responsibilities, Process Automation, Project control and Process Instrumentation, Tailoring the Process.

UNIT-V: NEXT GENERATION SOFTWARE ECONOMICS AND CASE STUDIES (Periods: 08)

Modern Project Profiles, Next Generation Software Economics, Modern Process Transitions.

Case studies: CCPDS-R and Process Improvement and Mapping to the CMM.

[Total Periods: 52]

TEXT BOOKS:

1. Watts S. Humphrey, *"Managing the Software Process,"* Pearson Education, 2009
2. Walker Royce, *"Software Project Management,"* Pearson Education, 2005.

REFERENCE BOOKS:

1. Bob Hughes and Mike Cotterel, *"Software Project Management,"* Tata McGraw- Hill, 1st Edition, 2006.
2. Joel Henry, *"Software Project Management,"* Pearson Education, 2003.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Information Technology

M.Tech. (SE) II Semester

(16MT22507) SOFTWARE REVERSE ENGINEERING

(PROFESSIONAL ELECTIVE-II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: Courses on “Software Engineering,” and “Object Oriented Concepts”.

COURSE DESCRIPTION: Foundations – Software Reverse Engineering, Applications and Tools, Low level software; Reverse Engineering Tools and applied Reversing; Object Flow Graph, Class and Object diagrams; Interaction, State and Package diagrams; Reversing Malware and Anti-reversing Techniques.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Gain knowledge on:
    - Finding malicious code.
    - Discovering unexpected flaws and faults.
    - Finding the use of others code.
    - Learning from others products of a different domain or purpose.
2. Analyze Software System and discover new opportunities for improving existing system.
3. Apply Anti-reversing techniques for Code obfuscation.
4. Design and develop Object Flow Graph, UML diagrams necessary for code reversing.
5. Apply Disassemblers, Debuggers and Decompilations tools and algorithms to implementing Reverse Engineering.
6. Exhibit ethical attitude in software reverse engineering.

DETAILED SYLLABUS

UNIT-I: FOUNDATIONS (Periods: 10)

Need for Reverse Engineering, Software Reverse Engineering, Reverse Applications, Low Level Software, The Reversing Process, The Tools, Is Reversing Legal.

Low Level Software: High Level Perspectives, Low Level Perspectives, Assembly Language, A Primer on Compilers and Compilation, Execution Environments.

UNIT-II: REVERSE ENGINEERING TOOLS AND APPLIED REVERSING (Periods: 12)

Reverse Engineering Tools: Different Reversing Approaches, Disassemblers, Debuggers, Decompilers, System-Monitoring Tools, Patching Tools, Miscellaneous Reversing Tools.

Beyond the Documentation: Reversing and Interoperability, Laying the Ground Rules, Locating Undocumented APIs, Case Study.

UNIT-III: OBJECT FLOW GRAPH, CLASS AND OBJECT DIAGRAMS (Periods: 10)

Object Flow Graph: Abstract Language, Object Flow Graph, Containers, Flow Propagation Algorithm, Object Sensitivity, The elib Program.

Class Diagram: Class Diagram Recovery, Declared Vs Actual Types, Containers, The elib Program.

Object Diagram: The Object Diagram, Object Sensitivity, Dynamic Analysis, The elib Program.

UNIT-IV: INTERACTION, STATE AND PACKAGE DIAGRAMS (Periods: 13)

Interaction Diagram: Interaction Diagram, Interaction Diagram, Interaction Diagram Recovery, Dynamic Analysis, The elib Program.

State Diagram: State Diagram, Abstract Interpretation, State Diagram Recovery, The elib Program.

Package Diagram: Package Diagram Recovery, Clustering, Concept Analysis, The elib Program, Tool Architecture, The elib Program, Perspectives.

UNIT-V: REVERSING MALWARE AND ANTI-REVERSING TECHNIQUES (Periods: 10)

Reversing Malware: Types of malware, Sticky software, Future malware, Uses of malware, Malware vulnerability, Polymorphism, Metamorphism, establishing a secure environment.

Anti Reversing Techniques : Anti reversing?, Basic approaches to anti reversing, Eliminating symbolic information, Code encryption, Active anti debugger techniques, Confusing Disassemblers, Code obfuscation, Control flow transformations, Data transformations.

[Total Periods: 55]

TEXT BOOKS:

1. Paolo Tonella &Alessandra Potrich, “*Reverse Engineering of Object Oriented Code*,” Springer-2005.
2. Eldad Eilam, “*Reversing: Secrets of Reverse Engineering*,” Wiley, 2005.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Information Technology
M.Tech. II Semester
(16MT22508) SOFTWARE SECURITY
(PROFESSIONAL ELECTIVE-II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: Courses on "Software Engineering," and "Network Security".

COURSE DESCRIPTION: Importance of Security in Software - Security a Software Issue, Secure Software; Requirements Engineering for Secure Software; Security Principles in SDLC - Secure Software Architecture and Design, Secure Coding and Testing; Security and Complexity - System Assembly Challenges; Governance and Managing for more Secure Software.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Gain knowledge on security issues in:
   - Requirement Engineering
   - Architecture and Design
   - Coding and Testing
2. Analyze complex software projects to describe security risks and mitigation techniques.
3. Applying methods to detect software security defects, SQUARE process model for requirement gathering and coding practices & security testing for identifying security failures.
4. Initiate research issues in code analysis techniques to improve software security.

DETAILED SYLLABUS

UNIT-I: IMPORTANCE OF SECURITY IN SOFTWARE (Periods: 11)

Security a Software Issue: Introduction, The problem, Software Assurance and Software Security, Threats to software security, Sources of software insecurity, Benefits of detecting software security defects early, managing secure software development.

Secure Software: Introduction, Properties of Secure Software, Influencing the security properties of software, Asserting and specifying the desired security properties.

UNIT-II: REQUIREMENTS ENGINEERING (Periods: 10)

Requirements Engineering for Secure Software: Introduction, Misuse and abuse cases, the SQUARE process Model, SQUARE sample outputs, Requirements elicitation, Requirements prioritization.

UNIT-III: SECURITY PRINCIPLES IN SDLC (Periods: 11)

Secure Software Architecture and Design: Introduction, Software Security practices for Architecture and Design - architectural risk analysis, Software security knowledge for Architecture and Design - Security principles, Security guidelines and Attack patterns.

Secure Coding and Testing: Introduction, Code analysis, Coding Practices, Software Security testing, Security testing considerations throughput the SDLC.

UNIT-IV: SECURITY AND COMPLEXITY (Periods: 10)

System Assembly Challenges: Introduction, Security failures, functional and attacker perspectives for security analysis in web services and identity management, system complexity drivers and security, Deep technical problem complexity.

UNIT-V: GOVERNANCE AND MANAGING (Periods: 10)

Governance and Managing for more Secure Software: Introduction, Governance and security, adopting an enterprise software security framework, Defining adequate security, Risk Management framework for software security, Security and Project Management, Maturity of Practice.

[Total Periods: 52]

TEXTBOOK:

1. Julia H. Allen, Sean Barnum, Robert J. Ellison, Gary McGraw, and Nancy R. Mead, *"Security Engineering: A Guide for Project Managers,"* Pearson Education, 2009.

REFERENCE BOOKS:

1. Gary McGraw, *"Software Security: Building Security In,"* Addison-Wesley, 2006.
2. Mark Dowd, John McDonald and Justin Schuh, *"The Art of Software Security Assessment: Identifying and Preventing Software Vulnerabilities,"* 1st Edition, Addison-Wesley, 2006.
3. John Viega and Gary McGraw, *"Building Secure Software: How to Avoid Security Problems the Right Way,"* Addison-Wesley, 2001.
4. G. Hoglund and G. McGraw, *"Exploiting Software: How to Break Code,"* Addison-Wesley, 2004.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Information Technology
M.Tech. (SE) II Semester
(16MT22531) ADVANCED SOFTWARE ENGINEERING LAB-2

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PREREQUISITES: Courses on "Software Development Methodology" and "Object Oriented Programming"

COURSE DESCRIPTION: Software development life cycle activities- Implementation of design patterns using enterprise architect; Creation of web service client; Implementation of Orchestration with BPEL; Test plan document; Regression testing, functional testing using QTP, RFT and Selenium; Performance testing using Load Runner, RPT and Web Performance Tool.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Gain hands-on experience on:
   - Web services
   - Design issues and patterns
2. Analyze software design problems, complex business process and identify architectural styles, patterns and appropriate service model logic to solve.
3. Gain software testing skills and practical experience by conducting software testing processes.
4. Apply various testing phases and automate testing process for the given application using Software Engineering concepts and practices to:
   i. Identify customer's needs.
   ii. Evaluate system for feasibility.
   iii. Perform economic and technical analysis.
   iv. Allocate functions to system elements.
   v. Establish schedule, constraints and estimate cost.
   vi. Create system definitions.
5. Apply QTP and RFT tools for automation testing of software process.
6. Work individually and in teams collaboratively in implementing mini projects.
7. Gain communication skills both oral and written for preparing and presenting reports.

LIST OF EXERCISES:

1. Study and prepare a report on the Enterprise Architect 12.0.
2. Write the Java program for Abstract Factory design pattern.
3. Write the Java program for Decorator design pattern.
4. Creation of web services and client applications to consume the following services:
   (i) Addition operation (ii) Finding factorial number
5. Implementation of orchestration with BPEL for authenticating user credentials.
6. Create a test plan document for a Desktop based application.
7. Write the Functional test cases for a Desktop based application.

8. Conduct Functional testing for a Desktop based application using QTP.
9. Conduct Functional testing for a Desktop based application using RFT.
10. Conduct Performance testing for a Desktop based application using Load Runner.
11. Write the Regression test cases for a Web based application.
12. Conduct Functional Testing using Selenium for a Web based application.
13. Develop a mini project for any web based application.

    Note: Use above tools in the process of developing the project

REFERENCE BOOKS:

1. James W.Cooper, "Java Design Patterns- A Tutorial," Pearson Education, 2000
2. Eric Newcomer and Greg Lomow, "Understanding SOA with Web Services," Pearson Education, 2007.
3. Ilene Burnstein, "Practical Software Testing," Springer-Verilog Internation Edition, 2003.
4. Dr. K. V. K. K.Prasad, "Software Testing Tools," Dreamtech, 1st Edition, 2004.
5. "Introduction to IBM Rational Functional Tester 6.1,"

   http://www.ibm.com/developerworks/rational/library/04/r-3228/3228.html, drafted on July 01, 2016 at 2:30 PM.
6. "Selenium Documentation," http://docs.seleniumhq.org/docs/, drafted on July 10, 2016 at 3:30 PM.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Information Technology
M.Tech. (SE) II Semester
(16MT22532) BIG DATA TECHNOLOGIES LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PREREQUISITES: Courses on “Database Management Systems”, “Data Mining and Data Warehousing”, and “Big Data Technologies”.

COURSE DESCRIPTION: Hands on Java Programs; Data-parallel programming model- Hadoop, Hadoop I/O; MapReduce features, HDFS; Hive, HBase, Zookeeper; Sqoop and Case studies.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Gain hands-on experience on:
   - Map-Reduce, Sqoop, HBase and Mahout
2. Apply Big Data Technologies to solve contemporary problems
3. Gain skills on HDFS and MapReduce programming model concepts.
4. Initiate research insights into latest technologies of Big Data Analytics.
5. Apply various Big Data tools: Sqoop, HBase, MapReduce and Mahout.
6. Work individually and in teams collaboratively in implementing mini projects.
7. Demonstrate communication skills both oral and written for preparing and presenting reports.

LIST OF EXERCISES:

1. Practice Hadoop installation, Hadoop Cluster Configuration, Name node Safe mode, Secondary Name node, Hadoop File system Shell, Java API ,Configuration, Reading Data and Writing Data in Hadoop Distributed File System.

2. Practice on MapReduce to Implement first MapReduce Job, Running MapReduce Locally, Running MapReduce on Cluster, Packaging MapReduce Jobs, MapReduce CLASSPATH, Submitting Jobs, Logs and Web UI, Input and Output Formats, Implement a Streaming Job, Contrast with Java Code and Create counts in Streaming application.

3. Practice on Pig Programming with Execution Modes, Installation, Pig Latin Basics, Developing Pig Script: Most Occurred Start Letter, Resources, Joining data-sets and User Defined Functions (UDF).

4. Practice on Hive Installation, Table Creation and Deletion, Loading Data into Hive, Partitioning, Bucketing and Joins.

5. Practice on Sqoop with Importing and Exporting data from using RDBMS.

6. Practice on HBase Management Console, HBase Shell: Define Schema and Create, Read, Update and Delete, create via Put method, Read via Get method, Update via Put method, Delete via Delete method, Create Table, Drop Table, Scan API, Scan Caching, Scan Batching and Filters.
7. Practice on Oozie Installation, Write Oozie Workflow, Deploy and Run Oozie Workflow.

8. Practice on Flume properties, Flume sinks and Flume Channels

9. Practice on Zookeeper with Stand alone operation, Managing zookeeper storage and Programming to Zookeeper

10. **Case Study 1: Insurance Domain:** A US-based insurance provider has decided to launch a new medical insurance program targeting various customers. To help this customer understand the current realities and the market better, perform a series of data analytics tasks using Hadoop. The customer has provided pointers to the data set that can be used. For the Insurance company data set, perform the following analysis tasks
    i) Find maximum insurance
    ii) Find minimum insurance
    iii) Find average insurance
    iv) Find Total insurance

11. **Case Study 2: Retail Domain:** An Indian-based online retailer wants to launch a new product category and wants to understand the potential growth areas and areas that have stagnated over a period of time. It wants to use this information to ensure its product focus is aligned to opportunities that will grow over the next 5–7 years. The customer has also provided pointers to the data set that can used to:
    i) Find maximum retail
    ii) Find minimum retail
    iii) Find average retail
    iv) Find Total retail

12. **Case Study 3: Education Domain:** The company has recently bagged a large assignment from a US-based customer that is into training and development. The larger outcome deals with launching a suite of educational and skill development programs to consumers across the globe. As part of the project, the customer wants the company to analyze a series of data sets to arrive at a prudent product mix, product positioning, and marketing strategy that will be applicable for at least a decade.

    i) Find maximum students
    ii) Find minimum students
    iii) Find average students
    iv) Find Total students

REFERENCE BOOKS:

1. Tom White, "*Hadoop: The Definitive Guide*," Oreilly and Yahoo Press, 3rd Edition, 2012.
2. Frank J. Ohlhorst, "*Big Data Analytics: Turning Big Data into Big Money*," Wiley Publication, December 2012.
3. Kevin Roebuck, "*Big Data: High-Impact Strategies - What You Need to Know: Definitions, Adoptions, Impact, Benefits, Maturity, Vendors*," Tebbo Publisher, 2011.
4. Alex Holmes, "*Hadoop in Practice*," Manning Publications Publisher, 2012.

M. Tech. (SE) – II Semester
(16MT22533) SEMINAR

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
--	100	100	--	--	--	2

PRE-REQUISITES: -Nil**-**

COURSE DESCRIPTION: Identification of seminar topic; literature survey; preparation of technical report and presentation.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Demonstrate capacity to identify an advanced topic for seminar in core and allied areas.
2. Extract information pertinent to the topic through literature survey.
3. Comprehend extracted information through analysis and synthesis critically on the topic.
4. Plan, organize, prepare and present effective written and oral technical report on the topic.
5. Adapt to independent and reflective learning for sustainable professional growth in Software Engineering.
6. Contribute to multidisciplinary scientific work in the field of Software Engineering.
7. Understand ethical responsibility towards environment and society in the field of Software Engineering.
8. Engage in lifelong learning for development of technical competence in the field of Software Engineering.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (Autonomous)
Department of Information Technology
M.Tech. (SE) II Semester
(16MT23810) INTELLECTUAL PROPERTY RIGHTS
(Common to all M. Tech. Programs)
(Audit Course)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	-	2	-	-

PREREQUISITES: --

COURSE DESCRIPTION: Introduction to Intellectual Property; Trade Marks; Law of Copy Rights; Law of Patents; Trade Secrets; Unfair Competition; New Development of Intellectual Property.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Demonstrate in-depth knowledge on
    - Intellectual Property
    - Trade Marks & Secrets
    - Law of Copy Rights, Patents
    - New development of Intellectual Property
2. Analyze the different forms of infringement of intellectual property rights.
3. Solve problems pertaining to Intellectual Property Rights.
4. Stimulate research zeal for patenting of an idea or product.
5. Write effective reports required for filing patents.
6. Develop life-long learning capabilities.
7. Develop awareness of the relevance and impact of IP Law on their academic and professional lives.
8. Develop attitude for reflective learning.

DETAILED SYLLABUS

UNIT - I: INTRODUCTION TO INTELLECTUAL PROPERTY

Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT - II: TRADE MARKS

Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT - III: LAW OF COPY RIGHTS

Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT - IV: TRADE SECRETS

Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.

Unfair competition: Misappropriation right of publicity, False advertising.

UNIT - V: NEW DEVELOPMENT OF INTELLECTUAL PROPERTY

New developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

REFERENCE BOOKS:

1. Deborah, E. Bouchoux, "*Intellectual property right",* Cengage learning.
2. Prabuddha ganguli, "*Intellectual property right - Unleashing the knowledge economy",* Tata Mc Graw Hill Publishing Company Ltd.

M. Tech. (SE) – III & IV Semesters
(16MT32531 & 16MT42531) PROJECT WORK

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
200	200	400	--	--	--	28

PRE-REQUISITES: -Nil-

COURSE DESCRIPTION: Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Writing of thesis and presentation.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Demonstrate capacity to identify an advanced topic for project work in core and allied areas.
2. Extract information pertinent to the topic through literature survey.
3. Comprehend extracted information through analysis and synthesis critically on the topic.
4. Solve engineering problems pertinent to the chosen topic for feasible solutions.
5. Use the techniques, skills and modern engineering tools necessary for project work.
6. Do time and cost analysis on the project.
7. Plan, prepare and present effective written and oral technical report on the topic.
8. Adapt to independent and reflective learning for sustainable professional growth.
9. Contribute to multidisciplinary scientific work in the field of Software Engineering.
10. Understand ethical responsibility towards environment and society in the field of Software Engineering.
11. Engage lifelong learning for development of technical competence in the field of Software Engineering.

ACADEMIC REGULATIONS

COURSE STRUCTURE

AND

DETAILED SYLLABI

OF

MASTER OF COMPUTER APPLICATIONS

CHOICE BASED CREDIT SYSTEM

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(AUTONOMOUS)

(Affiliated to JNTUA Ananthapuramu, Approved by AICTE)

Sree Sainath Nagar, A.Rangampet, Near Tirupati - 517 102. A.P.

VISION

To be one of the Nation's premier Engineering Colleges by achieving the highest order of excellence in Teaching and Research.

MISSION

- To foster intellectual curiosity, pursuit and dissemination of knowledge.
- To explore students' potential through academic freedom and integrity.
- To promote technical mastery and nurture skilled professionals to face competition in ever increasing complex world.

QUALITY POLICY

Sree Vidyanikethan Engineering College strives to establish a system of Quality Assurance to continuously address, monitor and evaluate the quality of education offered to students, thus promoting effective teaching proce es for the benefit of students and making the College a Centre of Excellence for Engineering and Technological studies.

VISION AND MISSION OF THE DEPARTMENT

VISION

To become a nation's center of excellence in the field of computer science and applications through teaching, training, and research.

MISSION

- The department of computer applications is established to provide solutions through computer applications.
- Through contemporary curriculum the knowledge of the diverse group of students in dissemination.
- Creating a talent pool of faculty in diverse domains of computer applications through continuous training.
- Domain and transferable skill development for holistic personality of students and employability.
- Inculcating values and Ethics for effective professional practice.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PE01. Enrolled or completed research studies of societal importance in the core and allied areas of Computer Science.

PE02. Assume key positions in research, industry and academia.

PE03. Continued to learn and to adapt to world of constantly evolving technologies in the core or allied areas of Computer Science.

PROGRAM OUTCOMES (POs)

After completion of the program, a successful student will be able to:

P01. Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.

P02. Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.

P03. Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

P04. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

P05. Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the imitations.

P06. Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practices.

P07. Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.

P08. Demonstrate knowledge and understanding of the computing and management principles and apply hese to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

P09. Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make presentations, and give and understand clear instructions.

P010. Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practices.

P011. Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.

P012. Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.

PROGRAM SPECIFIC OUTCOMES (PSOS)

On successful completion of M.C.A Program, MCA graduates will be able to:

PS01. Apply the knowledge of Mathematical foundation, Business Management and Information Technology to the solutions of real world problems.

PS02. Analyze, Design and Develop solutions in real time in the domains of technical, managerial, economical and social constraints by using current technologies in Information Management, Software Engineering, Platform Based Development, and Computer Networks skills.

PS03. Use innovative ideas to create better environment in order to solve complex problems in the domains of Information Management, Software Engineering, Platform Based Development and Computer Networks for the excellence of an individual and society.

PS04. Apply appropriate techniques, resources, and modern tools to complex real time problems in the domains of Information Management, Software Engineering, Platform Based Development and Computer Networks.

The Challenge of Change

__"M__astery of change is in fact the challenge of moving human attention from an old state to a new state. Leaders can shift attention at the right time and to the right place. The real crisis of our times is the crisis of attention. Those who lead are the ones who can hold your attention and move it in a purposeful way. Transformation is nothing but a shift in attention from one form to another. The form of a beautiful butterfly breaks free from a crawling caterpillar. If you pay enough attention, you would be able to see how the butterfly hides within the caterpillar. The leader points out a butterfly when the follower sees only a caterpillar__"__.

- Debashis Chatterjee

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(Autonomous)

(Affiliated to J.N.T. University Anantapur, Ananthapuramu)

ACADEMIC REGULATIONS

[Choice Based Credit System]

M.C.A Regular Three Year Post graduate Program

(for the batches admitted from the academic year 2016–17)

For pursuing three year postgraduate Program of study in Master of Computer Applications (MCA) offered by Sree Vidyanikethan Engineering College under Autonomous status and hereinafter referred to as SVEC (Autonomous):

1. Applicability : All the rules specified herein, approved by the Academic Council, shall be in force and applicable to students admitted from the academic year 2016-2017 onwards. Any reference to "College" in these rules and regulations stands for SVEC (Autonomous).

2. Extent: All the rules and regulations, specified hereinafter shall be read as a whole for the purpose of interpretation and as and when a doubt arises, the interpretation of the Chairman, Academic Council is final. It shall be ratified by Academic Council in the forthcoming meeting. As per the requirements of statutory bodies, Principal, Sree Vidyanikethan Engineering College shall be the Chairman, Academic Council.

3. Admission:

3.1. Admission into the Three Year MCA Degree Program of study:

3.1.1. Eligibility: Admission to the MCA post graduate program shall be made subject to the eligibility, qualifications prescribed by the competent authority from time to time. Admissions shall be made on the basis of rank obtained by the qualifying candidates at the Entrance Test, subject to reservations or policies framed by the Government of Andhra Pradesh from time to time.

3.1.2. Admission Procedure: Admissions are made into the three year MCA Degree Program as per the stipulations of A.P State Council of Higher Education (APSCHE), Government of Andhra Pradesh.

(a) By the Convener, ICET, (for Category-A Seats).

(b) By the Management (for Category-B Seats).

4. Duration of the Program:

4.1. Minimum Duration: The program will extend over a period of three years leading to the Degree of Master of Computer Applications (M.C.A) of the JNTUA, Anathapuramu. The three academic years will be divided into six semesters with two semesters per year. An academic year shall consist of two semesters. Each semester shall normally consist of 22 weeks (>="90 working days) having - Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)'. Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as suggested by UGC, and Curriculum/ Course Structure as suggested by AICTE are followed.

4.2. Maximum Duration: The student shall complete all the passing requirements of the M.C.A Program within a maximum duration of 6 years, these durations reckoned from the commencement of the semester to which the student was first admitted to the program.

First Semester (22 weeks)	Instruction Period : I Spell : 7 weeks II Spell : 9 weeks	16 weeks
	Mid-term Examinations: I Mid : 1 week II Mid : 1 week	2 weeks
	Preparation & Practical Examinations	2 weeks
	Semester-end examinations	2 weeks
Semester Break		2 weeks
Second Semester (22 weeks)	Instruction Period: I Spell : 7 weeks II Spell : 9 weeks	16 weeks
	Mid-term Examinations: I Mid : 1 week II Mid : 1 week	2 weeks
	Preparation & Practical Examinations	2 weeks
	Semester-end examinations	2 weeks
Summer Vacation		6 weeks
Project Work (22 weeks)	Submission of Abstract to the DC for Approval	2 Weeks
	Phase-I: Inception and Elaboration	9 Weeks
	Phase-II: Construction and Transition	9 Weeks
	Project Work Viva-voce Examination	2 Weeks

5. Structure of the Program: Each Program of study shall consist of:

(a) Foundation Courses

(b) Core Courses and Elective Courses

- Foundation Courses are further categorized as :
  - i) HS (Humanities and Social Sciences)
  - ii) BS (Basic Sciences)
  - iii) FC (Foundation Courses)
- Core Courses and Elective Courses are categorized as Professional Courses, which are further subdivided as:
  - i) PC (Professional Core Courses)
  - ii) PE (Professional Electives)
  - iii) Comprehensive Assessment
  - iv) Seminar
  - v) Mini Project
  - vi) PW (Project Work)

S. No	Broad Course Classification	Course Group/ Category	Course Description	Range of Credits
1	Foundation Courses	HS– Humanities and Social Sciences	Includes courses related to Humanities, Accounting and Financial Management and Management.	5%-10%
2		BS– Basic Sciences	Includes – Mathematical Foundations of Computer Science, etc.	10%-15%
3		FC– Foundation Courses	Includes fundamental Computer Application courses.	20%-25%
4	Core Courses	PC– Professional Core	Includes core courses related to the suggestions of the experts, to impart broad based knowledge needed in the Program of study.	55%-70%
5		Mini Project	A course of planned minor Project work.	
6		Comprehensive Assessment	A review of foundations and key concepts of the courses studied.	
7		Seminar	A course of seminar is suggested to enable the students to appreciate the software developments which are going on in industries.	
8		Project Work	A course of planned Application /research work in the form of major project work.	
9	Elective Courses	PE– Professional Electives	Includes Elective courses related to diversify their spectrum of knowledge. The electives can be chosen based on the interest of the student to broaden his individual skills and knowledge.	10% - 20%

Contact Periods: Depending on the complexity and volume of the course, the number of contact periods per week shall be assigned.

6. Credit Courses: All Courses are to be registered by a student in a Semester to earn Credits. Credits shall be assigned to each Course in an L: P: C (Lecture Periods: Practical Periods: Credits) Structure, based on the following general pattern.

- Ø One Credit - for One Period/ Week/ Semester for Theory/Lecture (L) Courses;
- Ø Two Credits - for Three Periods/ Week/ Semester for Laboratory/ Practical (P) Courses.
- Ø Other student activities like NCC, NSS, Sports, Study Tour, Guest Lecture etc. will not carry Credits.
- Ø For courses like Seminar/Mini Project / Comprehensive Assessment /Project Work, where formal contact periods are not specified, credits are assigned based on the complexity of the work to be carried out.
- Ø The Three year curriculum of M.C.A Program of study shall have total of **144** credits (26 credits in each semester from I Semester to V Semester and 14 credits in VI Semester).

7. Choice Based Credit System (CBCS):

- Ø Choice Based Credit System (CBCS) is introduced based on UGC guidelines in order to promote:
  - · Student centered learning
  - · Cafeteria approach
  - · Students to learn courses of their choice
  - · Learning at their own pace
  - · Interdisciplinary learning
- Ø A student is introduced to "Choice Based Credit System (CBCS)"
- Ø The total credits for the program is 144 for regular students.
- Ø A student has a choice of registering for credits from the theory courses offered in the program ensuring the total credits in a semester are between 22 and 30.
- Ø From the II to V semesters, the student has the option of registering for one additional theory course from the later semesters or dropping one existing theory course of the current semester within the course structure of the program. However the maximum number of credits the student can register in a particular semester cannot exceed 30 credits.
- Ø Grade points, based on percentage of marks awarded for each course will form the basis for calculation of SGPA (Semester Grade Point Average) and CGPA (Cumulative Grade Point Average).
- Ø All the registered credits will be considered for the calculation of final CGPA.

8. Course Enrollment and Registration:

8.1. Each student, on admission shall be assigned to a Faculty Advisor (Mentor) who shall advice and counsel the student about the details of the academic Program and the choice of courses considering the student's academic background and career objectives.

8.2. Each student on admission shall register for all the courses prescribed in the curriculum in the student's first semester of study. The student shall enroll for the courses with the help of the student's Faculty Advisor (Mentor). The enrollment for the courses of the Semesters II to V will commence 10 days prior to the last instructional day of the preceding semester for registration process. If the student wishes, the student may drop or add courses (vide clause 7) within **Ten** days before commencement of the concerned semester and complete the registration process duly authorized by the Chairman, Board of studies of concern department.

8.3. If any student fails to register the courses in a semester, he shall undergo the courses as per the program structure.

8.4. After registering for a course, a student shall attend the classes, satisfy the attendance requirements, earn Continuous Assessment marks and appear for the Semester-end Examinations.

8.5. No course shall be offered by a department unless a minimum of 20 students register for that course.

9. Massive Open Online Course (MOOC):

A Massive Open Online Course (MOOC) is an online course aimed at unlimited participation and open access via the web. MOOC is a model for delivering learning content online to any person who takes a course, with no limit on attendance.

- Ø A student shall undergo a "Massive Open Online Course (MOOC)" for award of the degree besides other requirements.
- Ø A student is offered this Online Course at the beginning of his III semester of study and the course has to be completed by the end of IV semester. If the student fails to complete the course by the

end of IV Semester, it shall be treated as a backlog and needs to be completed before completion of the program for the award of the degree.

- Ø The student shall confirm registration by enrolling the course within 10 days prior to the last instructional day of the II semester like other courses.
- Ø The courses will be approved by the Chairman, Academic Council, SVEC based on the recommendations of the Chairman, Board of Studies of concerned program considering current needs.
- Ø A student has a choice of registering for only one MOOC with the recommendation of Chairman, Board of studies of concerned program and duly approved by the Chairman, Academic Council, SVEC.
- Ø The student shall undergo MOOC without disturbing the normal schedule of regular class work.
- Ø One faculty member assigned by the Head of the Department shall be responsible for the periodic monitoring of the course implementation.
- Ø No formal lectures need to be delivered by the faculty member assigned to the students.
- Ø If any student wants to change the MOOC course already registered, he will be given choice to register a new MOOC course in MCA III / IV Semester only, with the recommendation of Chairman, Board of studies of concerned program and duly approved by the Chairman, Academic Council, SVEC.
- Ø Finally, the performance of the student in the course will be evaluated as stipulated by the course provider. A certificate will be issued on successful completion of the course by the course provider.
- Ø The performance in the MOOC will not be considered for the calculation of SGPA and CGPA of the student.
- Ø The MOOC course will be listed in the grade sheets of the student.

10. Break of Study from a Program (Gap Year)

10.1. A student is permitted to go on break of study for a maximum period of one year.

10.2. The student shall apply for break of study in advance, in any case, not later than the last date of the first assessment period of any semester. The application downloaded from website and duly filled by the student shall be submitted to the Head of the Department. In the case of start-up for incubation of idea only, the application for break of study shall be forwarded by the Head of the Department to the Principal, SVEC. A sub- committee appointed by the principal shall give recommendations for approval.

10.3. The students permitted to rejoin the Program after break of study shall be governed by the Curriculum and Regulations in force at the time of rejoining. The students rejoining in new regulations shall apply to the Principal, SVEC in the prescribed format through Head of the Department at the beginning of the readmitted semester itself for prescribing additional/equivalent courses, if any, from any semester of the regulations in-force, so as to bridge the curriculum in-force and the old curriculum.

10.4. The total period for completion of the Program reckoned from, the commencement of the first semester to which the student was admitted shall not exceed the maximum period specified in clause 4.2 irrespective of the period of break of study in order that the student may be eligible for the award of the degree (vide clause 18).

10.5. If a student has not reported to the department after approved period of break of study without any intimation, the student is treated as detained in that semester. Such students are eligible for readmission for the semester when offered next.

11. **Examination System:** All components in any Program of study shall be evaluated through internal evaluation and / or an external evaluation conducted as semester-end examination.

11.1. Distribution of Marks:

<table>
<tr><th>Sl. No.</th><th>Course</th><th>Marks</th><th colspan="2">Examination and Evaluation</th><th>Scheme of examination</th></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Theory</td><td>60</td><td colspan="2">Semester-end examination of 3 hours duration (External evaluation)</td><td>The examination question paper in theory courses shall be for a maximum of 60 marks. The question paper shall be of descriptive type with 5 questions, taken one from each unit of syllabus, having internal choice and all 5 questions shall be answered. All questions carry equal marks.</td></tr>
<tr><td>40</td><td colspan="2">Mid-term Examination of 2 hours duration (Internal evaluation).</td><td>The question paper shall be of descriptive type with 5 essay type questions out of which 4 are to be answered and evaluated for 40 marks where each questionis evaluated for 10 marks.
Two mid-term examinations each for 40 marks are to be conducted. For a total of 40 marks, 75% of better one of the two and 25% of the other one are added and finalized.
Mid-I: After first spell of instruction (I to II Units).
Mid-II: After second spell of instruction (III to V Units).</td></tr>
<tr><td rowspan="3">2</td><td rowspan="3">Laboratory</td><td>50</td><td colspan="2">Semester-end Lab Examination for 3 hours duration (External evaluation)</td><td>50 marks are allotted for laboratory examination during semester-end.</td></tr>
<tr><td rowspan="2">50</td><td>30</td><td>Day-to-Day evaluation for Performance in laboratory experiments and Record. (Internal evaluation).</td><td rowspan="2">Two laboratory examinations which includes Day-to-Day evaluation and Practical test, each for 50 marks are to be evaluated. For a total of 50 marks 75% of better one of the two and 25% of the other one are added and finalized.
Laboratory examination-I: Shall be conducted just before I mid-term examinations.
Laboratory examination-II: Shall be conducted just before II mid-term examinations.</td></tr>
<tr><td>20</td><td>Practical test (Internal evaluation).</td></tr>
<tr><td>3</td><td>Seminar</td><td>100</td><td colspan="2">Semester-end Examination</td><td>Seminar shall be evaluated at semester-end by the DC as given in 11.2.1.</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Mini Project</td><td rowspan="2">100</td><td>50</td><td>External evaluation</td><td>Semester-end Viva-Voce Examination by IDC as given in 11.2.2.</td></tr>
<tr><td>50</td><td>Internal evaluation</td><td>Continuous evaluation by the DC as given in 11.2.2.</td></tr>
<tr><td>5</td><td>Comprehensive Assessment</td><td>100</td><td colspan="2">Semester-end Examination</td><td>Comprehensive Assessment shall be conducted as given in 11.2.3.</td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">Project Work</td><td rowspan="2">200</td><td>100</td><td>External evaluation</td><td>Semester-end Project Viva-Voce Examination by Committee as detailed in 11.2.4.</td></tr>
<tr><td>100</td><td>Internal evaluation</td><td>Continuous evaluation by the DC as detailed in 11.2.4.</td></tr>
</table>

11.2. Seminar/Mini Project / Comprehensive Assessment /Project Work Evaluation:

11.2.1. For the seminar, the student shall collect information through literature survey on a specialized topic and prepare a technical report, showing his understanding over the topic, and submit to the Department just before presentation. The report and the presentation shall be evaluated at the end of the semester (during Preparation and Practical period) by the Departmental Committee (DC), consisting of concerned supervisor and two senior faculty members. The DC is constituted by the Principal on the recommendations of the Head of the Department.

11.2.2. The Mini project Viva-Voce examination shall be conducted by an Inter Departmental Committee (IDC) consisting of an Expert from relevant departments in S.V.E.C (nominated by the H.O.D), HOD and concerned Supervisor. The IDC is constituted by the Principal on the recommendations of the Head of the Department. The evaluation of mini project shall be made at the end of the semester (during Preparation and Practical's period). The Internal Evaluation shall be made by DC.

11.2.3. Comprehensive Assessment shall be conducted by the department through (i) online with 50 objective questions for 50 marks and (ii) viva-voce for the remaining 50 marks, covering all the courses from MCA I Semester to V Semester. The Viva-voce will be conducted by the DC. The HOD of the department is given the responsibility of preparing question bank/question paper for conducting the online examination.

11.2.4. Project Work

The project work Viva-Voce examination shall be conducted by a Committee consisting of External examiner (nominated by the Chief Controller of Examinations), HOD and concerned Supervisor. The evaluation of project work shall be conducted at the end of the M.C.A VI Semester. The Internal Evaluation shall be made by the DC on the basis of two project reviews conducted on the topic of the project.

- A candidate shall be allowed to submit the project report only after passing all the courses up to V semester including MOOC course and then take viva-voce examination of the project. The viva-voce examination may be conducted once in three months for all the eligible candidates.
- Three copies of the dissertation certified in the prescribed form by the concerned supervisor and HOD shall be submitted to the Department. One copy is to be submitted to the Chief Controller of Examinations, SVEC and one copy to be sent to the examiner. The examiner shall be nominated by the Chief Controller of the Examinations from the panel of three examiners submitted by the department for a maximum of 10 students at a time for adjudication.
- If the report of the examiner is favorable, Viva-Voce examination shall be conducted by a board consisting of the concerned Supervisor, Head of the Department and the examiner who adjudicated the dissertation. The board shall jointly evaluate the candidates project work. If the report of the examiner is not favorable, the candidate should revise and resubmit the project report followed by Viva-Voce examination.
- The candidates who fail in Viva-Voce examination shall have to re-appear the Viva-Voce examination after three months. Extension of time within the total permissible limit for completing the project is to be obtained from the Chairman, Academic Council, SVEC (Autonomous).
- If a candidate desires to change the topic of the project already chosen, during Phase–II, he has to re-register for Project work with the approval of the DC and repeat Phases–I & II. Marks already earned in Phase–I stand cancelled.
- If a candidate unable to complete the project work after Phase–II and desires to change the topic of the project already chosen, he has to re-register for Project work with the approval of the DC and repeat Phases–I & II. Marks already earned in Phase–I & II stand cancelled.

11.3. Eligibility to appear for the semester-end examination:

11.3.1. A student shall be eligible to appear for semester end examinations if he acquires a minimum of 75% of attendance in aggregate of all the courses in a semester.

11.3.2. Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee.

11.3.3. Shortage of Attendance below 65% in aggregate shall in no case be condoned.

11.3.4. Student whose shortage of attendance is not condoned in any semester is not eligible to take their end examination of that class and their registration shall stand cancelled.

11.3.5. A student shall not be promoted to the next semester unless he satisfies the attendance requirements of the current semester, as applicable. The student may seek readmission for the semester when offered next. He will not be allowed to register for the courses of the semester while he is in detention. A student detained due to shortage of attendance, will have to repeat that semester when offered next.

11.3.6. A stipulated fee shall be payable to the College towards condonation of shortage of attendance.

11.4. Evaluation:

Following procedure governs the evaluation.

11.4.1. Marks for components evaluated internally by the faculty shall be submitted to the Controller of Examinations one week before the commencement of the End examinations. The marks for the internal evaluation components shall be added to the external evaluation marks secured in the Semester-end examinations, to arrive at total marks for any course in that semester.

11.4.2. Performance in all the courses is tabulated course-wise and shall be scrutinized by the Results Committee and moderation is applied if needed and course-wise marks are finalized. Total marks obtained in each course are converted into letter grades.

11.4.3. Student-wise tabulation shall be done and individual grade sheet shall be generated and issued to the student.

11.5. Personal verification / Revaluation / Recounting: Students shall be permitted for personal verification/request for recounting/ revaluation of the Semester-end examination answer scripts within a stipulated period after payment of prescribed fee. After recounting or revaluation, records are updated with changes if any and the student shall be issued a revised grade sheet. If there are no changes, the student shall be intimated the same through a notice.

11.6. Supplementary Examination: In addition to the regular semester-end examinations conducted, the College may also schedule and conduct supplementary examinations for all the courses of other semesters when feasible for the benefit of students. Such of the candidates writing supplementary examinations may have to write more than one examination per day.

12. Re-Registration for Improvement of Internal Marks:

Following are the conditions to avail the benefit of improvement of internal evaluation marks.

12.1. The candidate should have completed the course work and obtained examinations results for I and II semesters.

12.2. Out of the courses the candidate has failed in the examinations due to internal evaluation marks secured being less than 50%, the candidate shall be given one chance for a maximum of 3 theory courses for improvement of internal evaluation marks.

12.3. He should have passed all the remaining courses for which the internal evaluation marks secured more than or equal to 50%.

12.4. The candidate has to register for the chosen courses and fulfill the academic requirements.

12.5. For each course, the candidate has to pay a fee equivalent to one third of the semester tuition fee and the amount is to be remitted in the form of D.D/Challan in favour of the Principal, Sree Vidyanikethan Engineering College payable at Tirupati along with the requisition through the concerned Head of the Department.

12.6. In the event of availing the Improvement of Internal evaluation marks, the internal evaluation marks as well as the semester-end examinations marks secured in the previous attempt(s) for the re-registered courses stand cancelled.

13. Academic Requirements for promotion/ completion of regular M.C.A Program of Study:

The following academic requirements have to be satisfied in addition to the attendance requirements for promotion/ completion of regular M.C.A Program of study.

For students admitted into M.C.A (Regular) Program:

13.1. A student shall be deemed to have satisfied the minimum academic requirements for each theory, laboratory course, Mini-Project and project work, if he secures not less than 40% of marks in the semester-end examination and a minimum of 50% of marks in the sum total of the internal evaluation and Semester-end examination taken together. For the Seminar and Comprehensive Assessment, he should secure not less than 50% of marks in the semester-end examination.

13.2. A student shall register for all the **144** credits and earn all the **144** credits. Marks obtained in all the **144** credits shall be considered for the calculation of the DIVISION based on CGPA.

13.3. A student who fails to earn **144** credits as indicated in the course structure within **six** academic years from the year of their admission shall forfeit his seat in M.C.A Program and his admission stands cancelled.

14. Transitory Regulations:

Students who got detained for want of attendance (**or**) who have not fulfilled academic requirements (**or**) who have failed after having undergone the Program in earlier regulations (**or**) who have discontinued and wish to continue the Program are eligible for admission into the unfinished semester from the date of commencement of class work with the same (**or**) equivalent courses as and when courses are offered and they will be in the academic regulations into which they are presently readmitted. A regular student has to satisfy all the eligibility requirements within the maximum stipulated period of **six years** for the award of M.C.A Degree.

15. Grades, Semester Grade Point Average and Cumulative Grade Point Average:

15.1. Grade System: After all the components and sub-components of any course (including laboratory courses) are evaluated, the final total marks obtained shall be converted into letter grades on a "10 point scale" as described below.

Grades conversion and Grade points attached

Pass Marks: A student shall be declared to have passed theory course, laboratory course and project work if he secures minimum of 40% marks in external examination, and a minimum of 50% marks in the sum total of internal evaluation and external examination taken together. For the seminar and comprehensive assessment, he shall be declared to have passed if he secures minimum of 50% of marks in the semester-end examination. Otherwise he shall be awarded fail grade - **F** in such a course irrespective of internal marks. **F** is considered as a fail grade indicating that the student has to pass the semester-end examination in that course in future and obtain a grade other than **F** and **N** for passing the course.

15.2. Semester Grade Point Average (SGPA):

SGPA shall be calculated as given below on a "10 point scale" as an index of the student's performance at the end of each semester:

$$SGPA = \frac{\sum (C \; X \; GP)}{\sum C}$$

Where ***C*** denotes the credits assigned to the courses undertaken in that semester and ***GP*** denotes the grade points earned by the student in the respective courses.

Note: SGPA is calculated only for the candidates who passed all the courses in that Semester.

15.3. Cumulative Grade Point Average (CGPA):

The CGPA for any student is awarded only when he completes the Program i.e., when the student passes in all the courses prescribed in the Program. The CGPA is computed on a 10 point scale as given below:

$$CGPA = \frac{\sum (C \; X \; GP)}{\sum C}$$

Where ***C*** denotes the credits assigned to courses undertaken up to the end of the Program and ***GP*** denotes the grade points earned by the student in the respective courses.

16. Grade Sheet: A grade sheet (Marks Memorandum) shall be issued to each student indicating his performance in all courses registered in that semester indicating the SGPA.

17. Consolidated Grade Sheet: After successful completion of the entire Program of study, a Consolidated Grade Sheet containing performance of all academic years shall be issued as a final record. Duplicate Consolidated Grade Sheet will also be issued, if required, after payment of requisite fee.

18. Award of Degree: The Degree shall be conferred and awarded by Jawaharlal Nehru Technological University Anantapur, Ananthapuramu on the recommendations of the Chairman, Academic Council of SVEC (Autonomous).

18.1. Eligibility: A student shall be eligible for the award of M.C.A Degree if he fulfills all the following conditions:

- Registered and successfully completed all the components prescribed in the Program of study to which he is admitted.
- Successfully acquired the minimum required credits as specified in the curriculum corresponding to the branch of study within the stipulated time.
- Obtained CGPA greater than or equal to 5.0 (Minimum requirement for declaring as passed).
- Has no dues to the College, Hostel, and Library etc. and to any other amenities provided by the College.
- No disciplinary action is pending against him.

18.2. Award of Division: Declaration of Division is based on CGPA.

Awarding of Division

CGPA	Division
> = 7.0	First Class with Distinction
> = 6.0 and < 7.0	First Class
> = 5.0 and < 6.0	Second Class
> = 4.0 and < 5.0	Pass Class

19. Additional academic regulations:

19.1 A student may appear for any number of supplementary examinations within the stipulated time to fulfill regulatory requirements for award of the degree.

19.2 In case of malpractice/improper conduct during the examinations, guidelines shall be followed as given in the **Annexure-I**.

19.3 Courses such as Project Work, Seminar, Mini Project and Comprehensive Assessment may be repeated only by registering in supplementary examinations.

19.4 When a student is absent for any examination (Mid-term or Semester-end) he shall be awarded **zero** marks in that component (course) and grading will be done accordingly.

19.5 When a component is cancelled as a penalty, he shall be awarded zero marks in that component.

20. Withholding of Results:

If the candidate has not paid dues to the College/University (or) if any case of indiscipline is pending against him, the result of the candidate shall be withheld and he will not be allowed/promoted to the next higher semester.

21. Amendments to regulations:

The Academic Council of SVEC (Autonomous) reserves the right to revise, amend, or change the Regulations, Scheme of Examinations, and / or Syllabi or any other policy relevant to the needs of the society or industrial requirements etc., with the recommendations of the Board of Studies.

22. Attendance for student development activity periods indicated in the class time tables shall be considered as in the case of a regular course for calculation of overall percentage of attendance in a semester.

23. **General:** The words such as “he”, “him”, “his” and “himself” shall be understood to include all students irrespective of gender connotation.

Note: ***Failure to read and understand the regulations is not an excuse.***

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(AUTONOMOUS)

Sree Sainath Nagar, A. Rangampet – 517 102

COURSE STRUCTURE

REGULATIONS: SVEC-16

MASTER OF COMPUTER APPLICATIONS

S. No	Course Code	Course Title	L	T	P	Credits	Max. Marks		
							IE	EE	Total
MCA I- Semester									
Theory									
1.	16MC1HS01	Accounting and Financial Management	4	-	-	4	40	60	100
2.	16MC1BS01	Mathematical Foundations of Computer Science	4	-	-	4	40	60	100
3.	16MC10101	Computer Organization	4	-	-	4	40	60	100
4.	16MC10102	Operating Systems	4	-	-	4	40	60	100
5.	16MC10103	Programming in C	4	-	-	4	40	60	100
Practical									
6.	16MC1HS31	English Language Laboratory	-	-	3	2	50	50	100
7.	16MC10131	IT Lab	-	-	3	2	50	50	100
8.	16MC10132	Programming in C Lab	-	-	3	2	50	50	100
TOTAL			**20**	**-**	**9**	**26**	**350**	**450**	**800**

S. No	Course Code	Course Title	L	T	P	Credits	Max. Marks		
							IE	EE	Total
MCA II- Semester									
Theory									
1.	16MC2BS01	Probability and Statistics	4	-	-	4	40	60	100
2.	16MC20101	Database Management Systems	4	-	-	4	40	60	100
3.	16MC20102	Data Structures	4	-	-	4	40	60	100
4.	16MC20103	Object Oriented Programming through JAVA	4	-	-	4	40	60	100
5.	16MC20104	Software Engineering	4	-	-	4	40	60	100
Practical									
6.	16MC20131	Database Management Systems Lab	-	-	3	2	50	50	100
7.	16MC20132	Data Structures Through C Lab	-	-	3	2	50	50	100
8.	16MC20133	Object Oriented Programming Through JAVA Lab	-	-	3	2	50	50	100
TOTAL			**20**	**-**	**9**	**26**	**350**	**450**	**800**

S. No	Course Code	Course Title	L	T	P	Credits	Max. Marks		
							IE	EE	Total
MCA III- Semester									
Theory									
1.	16MC3HS01	Organizational Behavior and Human Resource Management	4	-	-	4	40	60	100
2.	16MC3BS01	Operations Research	4	-	-	4	40	60	100
3.	16MC30101	Computer Networks	4	-	-	4	40	60	100
4.	16MC30102	Data Warehousing and Data Mining	4	-	-	4	40	60	100
5.	16MC30103	Object Oriented Analysis and Design	4	-	-	4	40	60	100
Practical									
6.	16MC30131	Computer Networks Lab	-	-	3	2	50	50	100
7.	16MC30132	Data Warehousing and Data Mining Lab	-	-	3	2	50	50	100
8.	16MC30133	Object Oriented Analysis and Design Lab	-	-	3	2	50	50	100
TOTAL			**20**	-	**9**	**26**	**350**	**450**	**800**

S. No	Course Code	Course Title	L	T	P	Credits	Max. Marks		
							IE	EE	Total
MCA IV- Semester									
Theory									
1	16MC40101	Big Data Analytics	4	-	-	4	40	60	100
2	16MC40102	LINUX Programming	4	-	-	4	40	60	100
3	16MC40103	Web Programming	4	-	-	4	40	60	100
4	**Professional Elective – I**		4	-	-	4	40	60	100
	16MC40104	i. Service Oriented Architecture							
	16MC40105	ii. Internet of Things							
	16MC40106	iii. Computer Forensics							
	16MC40107	iv. E-Commerce							
5	**Professional Elective – II**		4	-	-	4	40	60	100
	16MC40108	i. Software Project Management							
	16MC40109	ii. Information Retrieval Systems							
	16MC40110	iii. Wireless Networks							
	16MC40111	iv. Business Intelligence							
Practical									
6	16MC4HS31	Soft Skills Laboratory	-	-	3	2	50	50	100
7	16MC40131	Big Data Analytics Lab	-	-	3	2	50	50	100
8	16MC40132	LINUX and Web Programming Lab	-	-	3	2	50	50	100
9	16MC4MOOC	**Massive Open Online Course (MOOC)**	--	-	-	--	--	--	--
TOTAL			**20**	**-**	**9**	**26**	**350**	**450**	**800**

<table>
<tr><th rowspan="2">S. No</th><th rowspan="2">Course Code</th><th rowspan="2">Course Title</th><th rowspan="2">L</th><th rowspan="2">T</th><th rowspan="2">P</th><th rowspan="2">Credits</th><th colspan="3">Max. Marks</th></tr>
<tr><th>IE</th><th>EE</th><th>Total</th></tr>
<tr><td colspan="10">MCA V- Semester</td></tr>
<tr><td colspan="10">Theory</td></tr>
<tr><td>1</td><td>16MC50101</td><td>Cloud Computing</td><td>4</td><td>-</td><td>-</td><td>4</td><td>40</td><td>60</td><td>100</td></tr>
<tr><td>2</td><td>16MC50102</td><td>Mobile Application Development</td><td>4</td><td>-</td><td>-</td><td>4</td><td>40</td><td>60</td><td>100</td></tr>
<tr><td>3</td><td>16MC50103</td><td>Software Testing</td><td>4</td><td>-</td><td>-</td><td>4</td><td>40</td><td>60</td><td>100</td></tr>
<tr><td rowspan="5">4</td><td colspan="2">Professional Elective – III</td><td rowspan="5">4</td><td rowspan="5">-</td><td rowspan="5">-</td><td rowspan="5">4</td><td rowspan="5">40</td><td rowspan="5">60</td><td rowspan="5">100</td></tr>
<tr><td>16MC50104</td><td>i. Software Quality Assurance</td></tr>
<tr><td>16MC50105</td><td>ii. Semantic Web</td></tr>
<tr><td>16MC50106</td><td>iii. Information Security</td></tr>
<tr><td>16MC50107</td><td>iv. Enterprise Resource Planning</td></tr>
<tr><td rowspan="5">5</td><td colspan="2">Professional Elective –IV</td><td rowspan="5">4</td><td rowspan="5">-</td><td rowspan="5">-</td><td rowspan="5">4</td><td rowspan="5">40</td><td rowspan="5">60</td><td rowspan="5">100</td></tr>
<tr><td>16MC50108</td><td>i. Management Information Systems</td></tr>
<tr><td>16MC50109</td><td>ii. Bioinformatics</td></tr>
<tr><td>16MC50110</td><td>iii. Ethical Hacking</td></tr>
<tr><td>16MC50111</td><td>iv. Multimedia and Rich Internet Application Development</td></tr>
<tr><td colspan="10">Practical</td></tr>
<tr><td>6</td><td>16MC50131</td><td>Cloud Computing Lab</td><td>-</td><td>-</td><td>3</td><td>2</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td>7</td><td>16MC50132</td><td>Mini Project</td><td>-</td><td>-</td><td>-</td><td>2</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td>8</td><td>16MC50133</td><td>Comprehensive Assessment</td><td>-</td><td>-</td><td>-</td><td>2</td><td>-</td><td>100</td><td>100</td></tr>
<tr><td colspan="2"></td><td>TOTAL</td><td>20</td><td>-</td><td>3</td><td>26</td><td>300</td><td>500</td><td>800</td></tr>
</table>

S. No.	Course Code	Course Title	Credits	Max. Marks		
				IE	EE	Total
VI Semester						
1.	16MC60131	Seminar	2	--	100	100
2.	16MC60132	Project Work	12	100	100	200
TOTAL			**14**	**100**	**200**	**300**

Total Credits : 144

Total Marks : 4300

MCA I - SEMESTER

(16MC1HS01) ACCOUNTING AND FINANCIAL MANAGEMENT

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITE: —

COURSE DESCRIPTION:

General accounting principles; Computerized Accounting; Financial Management; Break Even Analysis and Capital Budgeting; Financial Statements.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate Knowledge in:

- Basic Principles and concepts of Financial Accountancy.
- Basic concepts of Financial Management.

CO2. Develop skills in:

- Managerial decision making of an organization.
- Practice of Financial Accounting and Financial Management.

CO3. Ascertain the profitability and soundness of the organization.

CO4. Analyze and synthesize financial information to provide valid conclusions.

DETAILED SYLLABUS:

UNIT – I: INTRODUCTION TO ACCOUNTING (11 Periods)

Principles, concepts and conventions, double entry system of accounting, classification of accounts, journal, ledger and trial balance.

UNIT – II: PREPARATION OF FINANCIAL STATEMENTS (11 Periods)

Trading account, profit and loss account and balance sheet (with simple adjustments).

UNIT – III: FINANCIAL MANAGEMENT (11 Periods)

Meaning and scope, role and objectives. Goals of Financial Management: Capital and its significance: Types of capital and cost of capital, methods and sources of raising capital.

UNIT – IV: FINANCIAL STATEMENT ANALYSIS THROUGH RATIOS (11 Periods)

Liquidity Ratios – Profitability Ratios – Solvancy Ratios – and Activity Ratios (Simple Problems).

Business Analysis: Concept of Break Even Point (BEP), cost-volume-profit analysis, determination of BEP, margin of safety and profit/volume (P/V) ratio – (Simple Problems).

UNIT – V: CAPITAL BUDGETING (11 Periods)

Features, proposals, methods of capital budgeting, payback period method, Accounting Rate of Return (ARR), time value of money, Net Present Value method (NPV), Profitability Index (PI) and Internal Rate of Return (IRR) – simple problems.

Total Periods: 55

TEXT BOOKS:

1. A.R. Aryasri, "*Accounting and Financial Management*," Tata McGraw Hill Education Pvt. Ltd., 2010.
2. James C Van Horne, "*Financial Management and Policy*," Prentice-Hall of India/Pearson, 12th Edition, 2001.

REFERENCE BOOKS:

1. S.P. Jain and K.L. Narang*, "Financial Accounting,"* Kalyani Publishers, Ludhiana, 6th Edition, 2002.
2. P.C. Tulsian, *"Financial Accounting,"* Pearson Education, 2004.
3. I.M. Pandey," *Financial Management,*" Vikas Publishing House Pvt. Ltd., 10th Edition, 2010.

MCA I - SEMESTER

(16MC1BS01) MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: —

COURSE DESCRIPTION:

Mathematical logic and predicates, functions and relations; algebraic structures; mathematical reasoning; recurrence relations; graphs and trees.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Gain knowledge in
- Mathematical concepts
- Mathematical logic
- Programming languages
- Discrete mathematical structures
- Recurrence relations and
- Graph theory

CO2. Formulate Complex Computing problems with substantial conclusions using:
- Mathematical reasoning
- Recurrence relations and
- Graph theory

CO3. Design and develop mathematical models in Computer Science for real time problems/ business applications.

CO4. Express statements with the precision of formal logic and synthesize arguments to test their validity and prove a given statement using mathematical induction or using direct and indirect methods.

CO5. Apply the principles of discrete mathematical Structures to solve complex Application Software.

DETAILED SYLLABUS:

UNIT-I: MATHEMATICAL LOGIC AND PREDICATES (12 Periods)

Mathematical Logic and Predicates: Statements and notations, Connectives, Well formed formulas, Truth Tables, Tautology, Normal forms.

Predicates: Predicate calculus, Rules of inference, Consistency, Proof of contradiction.

UNIT-II: FUNCTIONS AND RELATIONS (10 Periods)

Relations: Properties of binary relations, Equivalence relations, Partial ordering relations, Hasse diagrams.

Functions: Inverse Functions, Composition of functions, Recursive functions, Lattice and its Properties.

UNIT-III: ALGEBRAIC STRUCTURES AND MATHEMATICAL REASONING (12 Periods)

Algebraic structures: Algebraic system Examples and general properties, Semi groups and monoids, Groups, Homomorphism, Isomorphism.

Mathematical Reasoning: Methods of Proof, Mathematical Induction, The Inclusion- Exclusion Principle, The Pigeonhole principle.

UNIT-IV: RECURRENCE RELATIONS (10 Periods)

Recurrence Relation: Generating functions of Sequences, Calculating co-efficient of Generating function, Homogeneous Recurrence relation, solving recurrence relations by substitution and generating functions, methods of characteristic roots.

UNIT-V: GRAPHS AND TREES (11 Periods)

Graphs: Introduction to Graphs, Types of Graphs, Graphical representations, Paths and Circuits, Euler and Hamiltonian Paths and Circuits, Graph Coloring.

Trees: Introduction to Trees, Binary Search Trees, Spanning Trees, Depth-First Search, Breadth-First Search, Minimum Spanning Trees, Kruskal's Algorithm, Prim's Algorithm. **Total Periods: 55**

TEXT BOOKS:

1. Trembly J.P. and Manohar.P, "*Discrete Mathematical Structures with applications to computer science*," Tata Mc Graw Hill: New Delhi, 2003.
2. Kenneth H. Rosen, "*Discrete Mathematics and its Applications*," Tata McGraw Hill: New Delhi, 6th edition, 2008.

REFERENCE BOOKS:

1. J.L. Mott, A. Kandel, T.P Baker, "*Discrete Mathematics for Computer Scientists and Mathematicians,*" Prentice Hall India, 2004.
2. Dr. D. S. Chandrasekharaiaha, "*Mathematical Foundations of computer science (discrete Structures)*," Prism Books Pvt. Ltd: India, 2006.

MCA I - SEMESTER

(16MC10101) COMPUTER ORGANIZATION

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES:—

COURSE DESCRIPTION: Representation of data types used in digital computers; implementation of types of codes; construction of logical circuits by using logic gates; representation of types of instructions, instruction formats; description of the complete computer; representation of memory organization and input-output organization.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Understand the basic components of a system that optimizes resources:

- Processor
- Memories
- Input/output and Organization

CO2. Solve arithmetic operations on different types of number systems.

CO3. Design the system that must be cost effective with respect to the business needs.

CO4. Synthesize the system that can face new technical challenges.

CO5. Select an innovative system that works with diverse environments.

DETAILED SYLLABUS:

UNIT - I: DATA REPRESENTATION (10 Periods)

Data types, complements, fixed-point representation, floating-point representation, other binary codes and error detection codes, digital computers, logic gates, Boolean algebra and map simplification.

UNIT - II: DIGITAL LOGIC CIRCUITS AND DIGITAL COMPONENTS (11 Periods)

Combinational circuits, flip-flops, sequential circuits, integrated circuits, decoders, multiplexers, shift registers, binary counters.

UNIT - III: CENTRAL PROCESSING UNIT (10 Periods)

Introduction, general register organization, stack organization, instruction formats, addressing modes, data transfer and manipulation, program control, Reduced Instruction Set Computer (RISC), CISC.

UNIT - IV: BASIC COMPUTER ORGANIZATION AND DESIGN (12 Periods)

Instruction codes, computer registers, computer instructions, timing and control, instruction cycle, Memory Reference Instructions, input-output and interrupt, complete computer description, design of basic computer.

UNIT- V: MEMORY ORGANIZATION AND INPUT-OUTPUT ORGANIZATION (12 Periods)

Memory Organization: Memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory.

Input-Output Organization: Peripheral devices, input-output interface, asynchronous data transfer, modes of transfer, priority interrupts, Direct Memory Access (DMA) and Input-Output Processor (IOP).

Total Periods: 55

TEXT BOOK:

1. M. Morris Mano, "*Computer System Architecture*", Pearson Education, 3rd Edition, 2008.

REFERENCE BOOKS:

1. Andrew S. Tanenbaum, "*Structured Computer Organization,*" Pearson Education, 5th Edition, 2007.
2. William H. Gothmann, "*Digital Electronics – An Introduction to Theory and Practice,*" Prentice Hall, 2nd Edition, 1982.

MCA I - SEMESTER

(16MC10102) OPERATING SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES:—

COURSE DESCRIPTION: Design and implementation of operating system structure; Evaluation of Multithreading and CPU scheduling algorithms; Solving deadlocks and synchronization problems ; Implementation of memory management techniques; security threats ;

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Explore knowledge in-
- Operating system structure
- Process scheduling
- Process and thread synchronization

CO2. Analyze the performance of-
- CPU scheduling algorithms
- Page replacement Algorithms and
- Deadlocks

CO3. Design and implement software solutions for process and memory management.
CO4. Compare and contrast paging techniques using virtual memory.
CO5. Evaluate the key trade-offs between multiple approaches of operating system design.
CO6. Communicate effectively with operating system through application programs.

DETAILED SYLLABUS:

UNIT – I: OPERATING SYSTEM INTRODUCTION (11 periods)

System Structures: Role of Operating Systems, Operating-system services, user operating system interface, System calls, types of system calls, System programs, Operating System design and implementation, Operating system structure, virtual machines.

Processes: Process concept, Process scheduling, Operations on processes, Interprocess communication, Examples of IPC systems

UNIT - II: PROCESS MANAGEMENT (11 periods)

Multithreaded Programming: Multithreaded models, thread libraries, threading issues, operating System Examples.

Process Scheduling: Basic concepts, scheduling criteria, scheduling algorithms, Multiple-processor scheduling, algorithm evaluation.

UNIT - III: PROCESS COORDINATION (11 periods)

Synchronization: Background, The Critical-section problem, Peterson's Solution, Synchronization hardware, Semaphores, classic problems of Synchronization, Critical regions, Monitors.

Deadlocks: System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from Deadlock.

UNIT – IV: MEMORY MANAGEMENT (11 periods)

Memory Management strategies: Background, Swapping, Contiguous memory allocation, Paging, Structure of page table, Segmentation.

Virtual Memory Management: Background, Demand paging, Copy on write, Page replacement, Allocation of frames, Thrashing.

UNIT – V: PROTECTION AND SECURITY (11 periods)

System Protection: Goals of Protection, Principles of Protection, Domain of Protection, Access Matrix, Implementation of Access Matrix, Access Control, Revocation of Access Rights.

System Security: The Security problem, Program threats, System and Network Threats.

Total Periods: 55

TEXT BOOK:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, *"Operating System Concepts,"* John Wiley & Sons. Inc, 8th Edition, 2010.

REFERENCE BOOKS:

1. Achyut S. Godbole, *"Operating Systems,"* Tata McGrawHill, 2nd Edition, 2005.
2. William Stallings, *"Operating Systems: Internals and Design Principles,"* Pearson Education, 6th Edition, 2008.

MCA I-SEMESTER

(16MC10103) **PROGRAMMING in C**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: —

COURSE DESCRIPTION:

Computer systems and Environments; Analysis and Efficiency of algorithms done with problem solving approaches; basic elements of C and data types; working with conditional and unconditional statements along with iterations; Handling strings and derived data types using modular programming; Handling files and dealing with preprocess directives; Command line argument and its usage; develop programs to solve real world problems.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Exhibit knowledge in
- C Tokens
- Input/output Formatting styles
- Control statements
- Data types
- Dynamic allocation functions
- Preprocess Directives

CO2. Analyze the efficiency of algorithms to solve computational problems using top down approach.

CO3. Design and develop the solutions using the techniques-parameter passing mechanism, command line arguments and recursion for real world problems.

CO4. Implement the concepts of modular programming language which includes functions, pointers and structures to solve complex problems.

CO5. Adapt preprocess directives, sequential and random access to text/binary files for persistent data storage for real world applications using Turbo C.

CO6. Engage lifelong learning and develop programming competency.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO COMPUTERS, PROBLEM SOLVING AND C LANGUAGE (11 Periods)

Computer Systems, Computing Environments, The Problem, Solving Aspect, Creating and Running Programs; Implementation of Algorithms, The Efficiency of Algorithms, The Analysis of Algorithms; Introduction to the C Language: Structure of a C Program, Identifiers, Types, Variables, Constants, keywords, Expressions, precedence and Associativity, Evaluating Expressions, Type Conversion.

UNIT - II: PROGRAM CONTROL STATEMENTS, ARRAYS AND STRINGS (11 Periods)

Program Control Statements: Two way selection: if, if else, nested if else. Multi way selection- else if ladder and switch statement. Repetition: concept of loop, for loop, while loop, do while loop. Break, continue and goto statement.

Arrays, Strings: Array concept, types of array: one dimensional, two dimensional and multi-dimensional arrays. Introduction to string, string representation and initialization, array of strings, string manipulation functions.

UNIT - III: MODULAR PROGRAMMING (11 Periods)

Pointers: Introduction, declaration and initialization, arithmetic operations on pointers, Array of pointers, pointer to an array, Dynamic memory management functions: malloc, calloc and realloc and free.

Functions: Introduction to function, system defined and user defined function. Local and global variable. Parameter passing mechanism: pass by value and pass by reference. Scope, Storage classes, Recursion: recursive function, application of recursion: factorial calculation and Fibonacci number generation.

UNIT -IV: DERIVED DATA TYPES (11 Periods)

Derived Data Types: Introduction to structure: structure declaration and initialization, anonymous structure, accessing operators, nested structure**.** Array of structure, array within a structure, pointer to structure, passing structures through function. Union: declaration, initialization and its usage. Typedef, enumerated types and bit field. Application of structure with pointer: static and dynamic linked list representation.

UNIT-V: FILES AND PREPROCESSOR DIRECTIVES (11 Periods)

Introduction to files, types of files: binary and text file. Operations on File: open, close, read, write, seek, and etc., read data from files, writing data to files. Program to implement sequential access and random access. Preprocessor directive statements and its usage. Command line argument and its usage.

Total Periods: 55

TEXT BOOKS:

1. B.A. Forouzan, *"A Structured programming approach using C,"* Cengage learning, 3rd Edition, 2007.
2. R.G.Dromey, "*How to Solve it by Computer*", Pearson Education, 2007.

REFERENCE BOOKS:

1. Herbert Schiltz,*"Turbo C/C++ The complete Reference,"* Tata McGraw-Hill, 2007.
2. BS Gottrifried, A. Mittal, *"Programming in C – A practical approach,"* PHI, Tata MC Grawhill, 2007.

MCA I - SEMESTER
(16MC1HS31) ENGLISH LANGUAGE LABORATORY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: English at Under Graduation level.
COURSE DESCRIPTION: Phonetics; Vocabulary Building; Functional Grammar; Just a Minute; Elocution/Impromptu; Giving Directions/Conversation Starters; Role Play; Public Speaking; Describing People, Places, Objects and Events; Reading Comprehension; Listening Comprehension; Information Transfer.
COURSE OUTCOMES: On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge in
- Phonetics
- Information Transfer

CO2. Analyse the functional knowledge in
- Vocabulary
- Grammar

CO3. Design and develop functional skills for professional practice.
CO4. Apply the techniques of Listening and Reading skills to comprehend listening and Reading comprehension.
CO5. Function effectively as an individual and as a member in diverse teams to demonstrate
- Just A Minute
- Role Play

CO6. Communicate effectively in public speaking in formal and informal situations.
CO7. Recognize the need to engage in lifelong learning to upgrade competence of knowledge and communication.

LIST OF EXERCISES:
1. Phonetics
2. Vocabulary Building
3. Functional Grammar
4. Just a Minute
5. Elocution/Impromptu
6. Giving Directions/Conversation Starters
7. Role Play
8. Public Speaking
9. Describing People, Places, Objects and Events.
10. Reading Comprehension
11. Listening Comprehension
12. Information Transfer

Total Lab Slots: 10

REFERENCE BOOKS:

1. D. Sudha Rani, *"A Manual for English Language Laboratories,"* Pearson, Noida, 2010.
2. D. Sudha Rani, *"Advanced Communication Skills Laboratory Manual,"* Pearson, Noida, 2012.
3. R. Manivannan and G. Immanuel, *"Communication Skills Laboratory,"* VK Publications, Sivakasi, 2013
4. Nira Kumar, *"English Language Laboratories,"* PHI Learning Pvt. Ltd., New Delhi, 2011.

SUGGESTED SOFTWARE:
1. ETNL Language Lab Software Version 4.0
2. GEMS – Globarena E- Mentoring System
3. Speech Solutions
4. English Pronunciation Dictionary by Daniel Jones
5. Learning to Speak English 8.1, The Learning Company – 4 CDs.
6. Mastering English: Grammar, Punctuation and Composition.
7. English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
8. Dorling Kindersley Series Grammar.
9. Language in Use 1, 2 & 3
10. Cambridge Advanced Learner's Dictionary - 3rd Edition
11. Centronix - Phonetics
12. Let's Talk English, Regional Institute of English South India.
13. The Ultimate English Tutor.

MCA I - SEMESTER

(16MC10131) **IT LAB**

Int. Marks	**Ext. Marks**	**Total Marks**	**L**	**T**	**P**	**C**
50	50	100	-	-	3	2

PREREQUISITES: —

COURSE DESCRIPTION: Peripherals of a computer and disassembling & assembling the PC; Linux file system and File handling utilities & Text processing utilities; Productivity tools including Word, Excel, Power Point, Access, publisher.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Acquire skills in:
- Identification of Functional parts of PC
- Operating Systems

CO2. Identify the appropriate features to design documents, excel spread sheets and power point presentations.

CO3. Design documents, excel spread sheets, power point presentations, Access database and personal websites effectively.

CO4. Update knowledge and skills in PC maintenance and usage of latest Operating Systems and MS-Office.

CO5. Practice of ethical code of conduct in the usage of computer hardware and software.

CO6. Engage in life-long learning and attitude to work in teams.

CO7. Work together to customize the existing tools.

LIST OF EXERCISES:

PC Hardware

1. Identify the peripherals of a computer, components in a CPU and its functions. Block diagram of CPU along with the configuration of each peripheral.
2. Demonstrating disassembling and assembling the PC back to working condition.
3. Introduction to Operating Systems, important of Operating System, components of OS, Installation of Microsoft Windows-XP Operating Systems.
4. Basic MS-DOS commands – Internal and External Commands.
5. Introduction to Linux file system, perform File handling utilities and Text processing utilities.
6. Introduction to Linux - vi editor and Shell Script
7. a) Write a shell Script to generate Fibonacci series.
   b) Write a Shell Script to find factorial of a given number.

MS-Office

MS Word

8. a) Design a visiting card in MS-Word (2''x3.5").
   b) Perform Mail merge in MS-Word.

MS Excel

9. a) Create a spreadsheet for generating student mark list.
   b) Create a spreadsheet for generating all charts
   c) Import external data to Ms-excel, perform sorting and filter operations on that data.

MS Power Point

10. a) Create text and images with effects.
    b) Prepare a power point presentation on department of MCA which includes Animations, design, sound effects and images.

MS Access

11. Create Access database which consists of at least 3 tables
12. Perform Queries, form design and Reports on above tables.

MS Publisher

13. Create a website using the features**:** Home page, About us, Department, Contact page etc.

REFERENCE BOOKS:

1. ITL Education, *"Introduction to Information Technology,"* Pearson, 2nd Edition, 2005.
2. John Walken bach, *"Microsoft Office 2010 Bible,"* Wiley India Pvt. Ltd, 2010.
3. Peter Norton, *"Introduction to Computers,"* Tata McGraw-Hill, 7th edition, New Delhi 2012.
4. Vikas Gupta, *"Comdex Information Technology Course Tool Kit,"* WILEY Dreamtech, 2nd edition, New Delhi 2006.
5. Sumitabha Das, *"UNIX Concepts and Applications,"* 4th Edition, TMH, 2008.

MCA I - SEMESTER
(16MC10132) PROGRAMMING IN C LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: A Course on "Programming in C".

COURSE DESCRIPTION: Program design and problem solving using the C programming language; Programming topics include control structures, functions, arrays, Strings, pointers, and file I/O and the usage of the preprocessor.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Solve problems using knowledge in
- C Tokens
- Input/output Formatting styles
- Control statements
- Data types

CO2. Design and develop the solutions using the techniques-parameter passing mechanism, command line arguments and handling files for real world problems making use of analysis of algorithms and verification.

CO3. Demonstrate the concepts of C as modular programming language which includes functions, pointers and structures to solve real world complex problems.

CO4. Engage lifelong learning and develop programming competency.

LIST OF EXERCISES

1. a) Write an Algorithm and flow chart to read the name and print the name
   b) Write an Algorithm and flow chart to add two numbers.
   c) Write an Algorithm and a flow chart to calculate area of square.
   d) Write Algorithm and flow chart to find the largest of two numbers.

2. a) Write a C Program to find the sum of individual digits of a positive integer.
   b) Write a C Program to find the roots of a quadratic equation.
   c) Write a C program to read in a three digit number produce following output (assuming that the input is 347)
      3 hundreds
      4 tens
      7 units
   d) Write a program to generate Fibonacci series.

3. Write a C non recursive and recursive function for the following task
   a) Calculating Factorial
   b) Swapping the values of two variable
   c) Minimum/maximum value from the given input
   d) Nth Fibonacci number
   e) GCD of a Given Number

4. a) Write a C Program to Add, Subtract and Multiply Two Matrices Using Functions (Passing arrays as arguments to the function)
   b) Write a C program to determine if the given string is a palindrome or not

5. a) Write a C Program to Insert a Substring into a Given Main String from a given Position.
   b) Write a C Program to Delete n Characters from a Given Position in a Give String.

6. a) Write a program to swap two numbers using pointers.
   b) Write a program to find sum of given array using pointers.

7. Write a C program that uses functions to perform the following operations:
    a) Reading a complex number
    b) Writing a complex number
    c) Addition of two complex numbers
    d) Multiplication of two complex numbers
8. a) Write a C program for Electricity Bill Tacking different categories of users, different slabs in each category. (Using Nested If Else Statement)
    b) Write a c program to evaluate the following using loops
        i)1+x2/2!+x4/4!+...up to 5 terms
        ii) x+x3/3!+x5/5!+...up to 5 terms
9. a)Write a c program to check whether the given number is
        i) prime or not
        ii) perfect or abundant or deficient
    b) Write a c program to find the mean, mode, median, and variance of list of values by using one dimensional array.
10. a) Write a menu driven program to read a list of numbers and perform the following operations
        i) print the list
        ii) delete duplicates from the list
        iii) reverse the list.
    b) Write a c program that consists of recursive functions to find
        i) factorial of a given number
        ii) print the Pascal triangle using binomial theorem.
11. Write a menu driven program to read list of student names and perform the following operations using array of character pointers.
    a) to insert a student name
    b) to delete a name
    c) to print the names.
12. a) Write a C program which copies one file to another.
    b) Write a C program to reverse the first n characters in a file.

(**Note:** The file name and n are specified on the command line.)

13. a) Write a C program to display the contents of a file.
    b) Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file)

REFERENCE BOOKS:

1. BS Gottrifried, A.Mittal, *"Programming in C – A practical approach,"* PHI, Tata MC Grawhill, 2008.
2. M.T. Somashekara, *"Problem Solving with C",* PHI Learning Private Limited: New Delhi, 2012.

MCA II - SEMESTER

(16MC2BS01) PROBABILITY AND STATISTICS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES:—

COURSE DESCRIPTION: Fundamental concepts of Probability; probability distributions; random variables; sampling, correlation and regression analysis; statistical quality control; testing of hypothesis.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Acquire knowledge of probability and probability distributions, random variables, sampling, testing of hypothesis, correlation and regression analysis and statistical quality control.

CO2. Identify the association between variables using Correlation and Regression Analysis.

CO3. Construct the probability distribution of a random variable, based on a real-world situation, and use it to compute expectation and variance.

CO4. Use testing of hypothesis for drawing valid inferences in research problems and making decisions in industry.

CO5. Adapt and apply theorems and probability distributions to compute solutions based on practical situations.

CO6. Asses the quality of the products produced in an industry using control charts.

DETAILED SYLLABUS:

UNIT-I: PROBABILITY AND RANDOM VARIABLES (13 Periods)

Probability : Random experiment, event, sample space, definitions of probability, Addition and Multiplication theorems of probability, conditional probability, Baye's theorem.

Random Variables: Discrete and continuous random variables, probability mass function and probability density function of a random variable, Distribution function and its properties, problems on random variable and. Mathematical expectation of a random variable.

UNIT-II: PROBABILITY DISTRIBUTIONS AND STATISTICAL QUALITY CONTROL (14 Periods)

Discrete Distributions: Binomial Distribution, Mean and variance of Binomial distribution, Poisson distribution, Mean and variance of Poisson distribution.

Continuous Distributions: Normal Distribution- Mean, variance and area properties.

Statistical Quality Control: Construction of quality control charts, R, p, np and c-charts.

UNIT-III: CORRELATION AND REGRESSION ANALYSIS (09 Periods)

Correlation Analysis: Types of correlation, Karl Pearson's coefficient of Correlation and Spearman's rank correlation coefficient.

Regression Analysis: Fitting of two lines of regression, regression coefficients.

UNIT-IV: SAMPLING DISTRIBUTIONS, ESTIMATION AND TEST OF SIGNIFICANCE FOR LARGE SAMPLES (10 Periods)

Sampling distributions and estimation: Population, sample, parameter, statistic, sampling distribution of sample mean and sample S.D, standard error of a statistic. Point estimation and Interval estimation.

Test of significance for large samples: Null hypothesis and Alternative hypothesis, Type-I and Type-II errors, Level of significance, Critical Region, one tailed and two tailed tests. Test of Significance for single proportion, Difference of two Proportions, Single mean, Difference of two Means.

UNIT-V: TEST OF SIGNIFICANCE FOR SMALL SAMPLES (09 Periods)

Student's t-test: Single Mean, Difference of two sample means. Paired t-test, F-test for equality of two population variances. Chi-square test of goodness of fit and independence of attributes.

Total Periods: 55

TEXT BOOKS:

1. T. K. V. Iyengar, B. Krishna Gandhi etal, *"Probability and Statistics,"* S. Chand and Company LTD: New Delhi, 3rd Edition, 2011.
2. S.P. Gupta, *"Statistical Methods,"* Sultan and Chand, New Delhi, 34th Edition, 2005.

REFERENCE BOOKS:

1. Shanaz Bhatul, *"Text book of Probability and Statistics",* RIDGE Publications, 2nd Edition, 2007.
2. S.C. Gupta and V.K. Kapoor, *"Fundamentals of Applied Statistics,"* S.Chand and Sons: New Delhi, 2010.

MCA II-Semester

(16MC20101) DATABASE MANAGEMENT SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: —

COURSE DESCRIPTION: Concepts of relational database and its design; Representation of ER diagram to Relational model; SQL queries; Normal forms; Recovery and concurrency control mechanism, Storage and indexing mechanism.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Gain in-depth knowledge in
- Database models and database architecture
- Transaction processing and recovery management
- Storage and Indexing mechanism

CO2. Analyze the complex problems of real world applications.
CO3. Design Relational Database Schema for a given Entity Relationship model.
CO4. Interpret the data by applying normalization techniques for the development of database application projects.
CO5. Use Structured Query Language DDL/DML/DCL commands to solve real time applications.

DETAILED SYLLABUS:

UNIT- I: INTRODUCTION TO CONCEPTUAL MODELING AND DATABASE DESIGN (11 Periods)

Introduction and Conceptual Modeling: Database System Applications, database systems versus file systems, view of data: data abstraction, instances and schemas, data models: the entity-relationship model, relational models and other data models, database languages, database users and administrators, database system structure, history of database systems.

Introduction to Database design: Database design and ER diagrams, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Conceptual Design with the ER Model.

UNIT – II RELATIONAL MODEL AND BASIC SQL (10 Periods)

Relational Model: Introduction to the Relational Model, Integrity Constraints over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design: ER to Relational, Introduction to Views, Destroying /altering Tables and Views.

Case Study: ER diagram for banking enterprise and university database

Basic SQL: SQL data definition and data types - CREATE table command in SQL, attribute data types in SQL, Specifying constraints in SQL- specifying attribute constraints and attribute defaults, specifying key and referential integrity constraints, specifying constraints on tuples using CKECK.

UNIT – III: SQL AND SCHEMA REFINEMENT AND NORMAL FORMS (12 Periods)

SQL : Form of Basic SQL Query- Examples of Basic SQL Queries, Introduction to Nested Queries, correlated Nested Queries, Set- Comparison Operators, Aggregate Operators, NULL values-Comparison using Null values- Logical connectives- AND, OR and NOT- Impact on SQL Constructs, Outer Joins, Disallowing NULL values, Triggers and Active Databases.

Schema Refinement and Normal Forms: Introduction to Schema Refinement- Problems Caused by redundancy, Decompositions, Problem related to decomposition, Functional Dependencies, Normal Forms – FIRST, SECOND, THIRD Normal forms, BCNF, Properties of Decompositions- Loss less- join Decomposition, Dependency preserving Decomposition.

UNIT - IV: OVERVIEW OF TRANSACTION MANAGEMENT, CRASH RECOVERY AND CONCURRENCY CONTROL (11 Periods)

Overview of Transaction Management: The ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions, Lock Based Concurrency Control, Performance of Locking.

Concurrency Control: 2PL, Serializability and recoverability, Introduction to Lock Management, Lock Conversions.

Crash recovery: Introduction to ARIES, the Log, Other Recovery related Structures, the Write-Ahead Log Protocol, Check pointing, recovering from a System Crash.

UNIT - V: OVERVIEW OF STORAGE AND INDEXING (11 Periods)

Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing – Clustered Indexes, Primary and Secondary Indexes, Index Data Structures- Hash based Indexing, Tree based Indexing.

Storing Data: The Memory Hierarchy- Magnetic disks, Performance implications of disk structure; Redundant Arrays of Independent Disks.

Tree Structured Indexing: Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

Total Periods: 55

TEXT BOOKS:

1. Raghu Ramakrishnan and Johannes Gehrke, "Data base Management Systems," Tata McGraw-Hill, 3rd Edition, 2007.
2. RamezElmasri, Shamkant B. Navathe, "Database Systems," Pearson Education, 6th Edition, 2013.

REFERENCE BOOKS:

1. A.Silberschatz, H.F. Korth, S.Sudarshan, "Data base System Concepts," McGraw hill, 6th edition, 2006.
2. C. J. Date, "Introduction to Database Systems," Pearson Education, 7th Edition, 2004.
3. M. L. Gillenson, "Fundamentals of Database Management Systems," Wiley Student Edition, 2nd Edition, 2012.
4. Peter Rob and Carlos Coronel, "Database Systems Design, Implementation and Management," Cengage Learning, 8th Edition, 2009.

MCA II-SEMESTER

(16MC20102) DATA STRUCTURES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Programming in C".

COURSE DESCRIPTION: Writing Pseudo code using algorithms for implementing Abstract Data Type; Implementation of Stack, Queue, LIST, Graph, Tree ADT's and its applications; Implementation of Sorting and Searching techniques; Implementation of Binary Search Tree ADT, AVL- height balanced trees and its applications.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Gain knowledge in linear and non-linear data structures to solve computing problems.
CO2. Identify and analyze the usage of various data structures, operations and associated algorithms.
CO3. Design and develop variety of algorithms and programs in order to solve computing problems.
CO4. Choose the appropriate data structure and algorithm design method to get an optimal solution for complex real world problem.
CO5. Apply searching, sorting, tree traversal and graph traversal techniques to optimize the complexities of an application.
CO6. Communicate effectively about complex computing activities by writing documentation.

DETAILED SYLLABUS:

UNIT – I: BASIC CONCEPTS AND STACKS (11 Periods)

Basic Concepts: Algorithm**,** Pseudocode, The Abstract Data Type, Model for an Abstract Data Type, ADT Implementations.

Stacks: Concepts of Stack**,** Basic Stack Operations, Representation of Stack using arrays, Applications-Recursion, Infix to Postfix Transformation, Evaluating Postfix Expressions.

UNIT – II: QUEUES AND GENERAL LINEAR LISTS (12 Periods)

Queues: Concepts of Queue, Basic Queue Operations, Representation of Queue using arrays, Various Queue Structures: Circular Queue, Double ended queue, Priority queue, Applications –Simulation.

General Linear Lists: Basic Operations, Implementations- Single linked list, Double linked list, Circular Linked List, Applications- Stacks using Linked List, Queue using Linked List**,** Polynomial Addition, Sparse Matrix Implementation.

UNIT – III: SORTING AND SEARCHING (10 Periods)

Sorting: Sort Concepts, Sort Stability, Sort Efficiency, Bubble Sort, Insertion Sort, Selection Sort, Quick Sort, Merge sort, Heap Sort.**.**

Searching: Sequential Search, Binary Search, Analyzing Search Algorithms.

UNIT – IV: TREES (12 Periods)

Trees: Basic Tree Concepts, Binary Trees, General Trees; Binary Search Trees: Basic Concepts, BST Operations, Binary Search Tree ADT, BST Applications, Threaded Trees.

AVL Search Trees: AVL Tree Basic Concepts, AVL Tree Implementations, AVL Tree Abstract Data Type, AVL Tree Algorithms.

UNIT – V: GRAPHS (10 Periods)

Graphs: Basic Concepts, Operations, Graph Storage Structures, Graph Algorithms, Graph ADT.

Application of Graph Structures: Dijkstra's Algorithm, Topological Sorting**,** Minimum Spanning Tree: Kruskals, Prim's Algorithm, Euler's and Hamiltonian Circuits**.** **Total Periods: 55**

TEXT BOOKS:

1. Richard F.Gilberg & Behrouz A. Forouzan, "*Data Structures A Pseudocode Approach with C,*" Thomson, 2nd Edition, 2004.
2. D Samanta, "Classic Data Structures," PHI Publications, New Delhi, 2nd Edition, 2009.

REFERENCE BOOKS:

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C," Second Edition, Pearson Education, 2002.
2. Ellis Horowitz, Sartaj Sahni, "Fundamentals of Computer Algorithms", Galgotia book source, New Delhi, 1983.
3. Jean Paul Tremblay and Paul G. Soresson, "An Introduction to Data Structures with Applications", McGraw Hill International editions, 1983.

MCA II-SEMESTER
(16MC20103) OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Programming in C".
COURSE DESCRIPTION: Basic Principles of Object Oriented Programming, Representation of Java Classes and methods; Inheritance and Polymorphism using Java, Creation of Packages and Interfaces; Implementation of Utility Classes and Input/output; Exception handling mechanism and multithreading; Event handling techniques and GUI applications by using AWT and Swings.
COURSE OUTCOMES: On successful completion of the course, students will be able to:
CO1. Understand the usage of Object-Oriented Principles.
CO2. Analyze to solve real world problems by using Java Programming language.
CO3. Develop and execute various GUI Applications using AWT and Swings.
CO4. Adapt and design applications using Java IDE tools.
CO5. Recognize the need to engage independent learning for continual development as an application professional.
CO6. Communicate effectively about complex computing activities by writing documentation.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO JAVA PROGRAMMING (12 Periods)
Introduction to Java Programming: History of Java, Java Buzzwords, Object-Oriented Programming, First Simple Program, Data Type, Variables, Operators, Control Statements, Arrays, Introducing Classes: Class Fundamentals, Declaring Objects, Introducing Methods, Constructors, this Keyword, Garbage Collection, finalize() Method; Overloading Methods, Access Control, static Keyword, final Keyword, Introducing Nested and Inner Classes, String Class.

UNIT - II: INHERITANCE AND POLYMORPHISM (10 Periods)
Inheritance and Polymorphism: Inheritance Basics, Using super, Creating Multilevel Hierarchy, Method Overriding, Dynamic Method Dispatch, Abstract Classes, final with Inheritance, Object Class.
Packages and Interfaces: Packages, Access Protection, Importing Packages, Interfaces; Defining an Interface, Implementing Interfaces, Nested Interfaces, Applying Interfaces, Variables in Interfaces, Interfaces can be Extended.

UNIT - III: UTILITY CLASSES AND INPUT/OUTPUT (10 Periods)
Utility Classes: Introduction to Java Collections, Overview of Java Collection Frame Work, Commonly Used Collection Interfaces: Set, List, Queue, Map; Commonly used Collection Classes: Hash Set, LinkedHashSet, Linked List, Stack, Array List, Vector, Hash table; Iteration over Collections: Iterator Interface, ListIterator Interface and Enumeration Interface; StringTokenizer, Date, Calendar.
Input/output: Stream Classes: Byte Streams, Character Streams, Console Class, Stream I/O, Serialization.

UNIT - IV: EXCEPTION HANDLING AND MULTITHREADING (10 Periods)
Exception Handling: Fundamentals of Exception Handling, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built-in Exceptions, Creating your own Exception Subclasses', Chained Exceptions.
Multithreading: Java Thread Model, Thread life Cycle, Main Thread, Creating a Thread, Creating Multiple Threads, Thread Priorities, Synchronization, Interthread Communication, Suspending, Resuming and Stopping Threads.

UNIT - V: EVENT HANDLING AND GUI PROGRAMMING WITH JAVA (13 Periods)
Event Handling: Delegation Event Model, Event Classes, Sources of Events, Event Listener Interfaces.
GUI Programming with Java: Abstract Window Toolkit (AWT): AWT Classes, Windows Fundamentals, Working with Frame Windows, Graphics and Color, AWT Controls: Labels, Buttons, Check Boxes, Lists, Scroll Bars, Text Field, Text Area, Layout Managers; Applets: Applet Basics, Applet Architecture, Applet Skeleton, Applet Display Methods, Passing Parameters to Applets.
Swings: Introduction to Swings, Hierarchy of Swing Components, JFrame, JWindow, JDialog, JPanel ; Swing Components: JLabel, JTextField, JButton, JToggleButton, Check Boxes, Radio Buttons, JTabbedPane, JScrollPane, JList, JComboBox, Trees, JTable. **Total Periods: 55**

TEXT BOOK:
1. Herbert Schildt, "*The Complete Reference Java*", Tata McGraw-Hill, 7th Edition, 2007.

REFERENCE BOOKS:
1. B. Eswar Reddy, T. V. Suresh Kumar and P. Ragavan, *"Object Oriented Programming with Java,"* Pearson Sanguine Publications, 2nd Edition, 2011.
2. H. M. Dietel and P. J. Dietel, *"Java How to Program,"* Pearson Education/ PHI, 5th Edition, 2009.

MCA II-SEMESTER
(16MC20104) **SOFTWARE ENGINEERING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES:- -

COURSE DESCRIPTION: Software engineering core principles process models and agile process; design concepts and design issues; quality management principles; software configuration and product metrics; project estimation and risk management maintenance.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Understand concepts-process, models, methodologies and principles of software engineering.

CO2. Identify and classify user requirements and software requirement specification.

CO3. Analyze the architecture and Design application software using design engineering principles.

CO4. Estimate and maintain software configuration management by synthesis of development process to provide valid conclusions.

CO5. Apply risk and metrics management principles forquality assurance.

CO6. Test and communicate quality of an application and as per needs of the stakeholder.

DETAILED SYLLABUS:

UNIT-I: SOFTWARE PROCESS AND SOFTWARE PRINCIPLES (12 periods)

The nature of Software , Software Myths, **Software Process Models:** A Generic Process Model, Process Models, Core Principles - Communication Principles, Planning Principles, Modeling Principles, Construction Principles, Deployment Principles.

Understanding Requirements: Requirements Engineering, Eliciting Requirements, Functional and non functional Requirements, Developing Use Cases, Validating Requirements, Introduction to Agile Processes - extreme Programming.

UNIT - II: SOFTWARE DESIGN AND SOFTWARE ARCHITECTURE (12 periods)

Design concepts - Abstraction - Modularity - Refinement - **Architectural design** - Software Architecture, Architecture Design, Architecture Style, Architectural Mapping Using Data Flow. **Component Level Design:** Component, Component Based Development. **User Interface Design:** The Golden Rules, Interface analysis and design, Interface design steps. Design Evaluation. **Web App Design:** Aesthetic, Content, Architecture, Navigation and Component level Design - Design issues.

UNIT - III: QUALITY MANAGEMENT PRINCIPLES (11 periods)

Quality, Quality Control, Quality Assurance, **Review Techniques**-Informal Reviews, Formal Technical Reviews, Software Testing strategies, Unit Testing, Integration Testing, System Testing, Debugging Process, - Equivalence class Partitioning (ECP) , Boundary Value Analysis(BVA), White Box Testing, Black Box Testing. **Testing Web Applications:** Content, User Interface, Navigation, Configuration, Security and Performance Testing.

UNIT - IV: SOFTWARE CONFIGURATION MANAGEMENT AND PROJECT METRICS (10 periods)

Software Configuration Management, **The SCM process:** Identification of objects, Version Control - Change control, Content Management, Change Management. **Software measurement** - - Size-oriented metrics and function point metrics .Object oriented Metrics, Use Case Oriented Metrics

UNIT V – PROJECT ESTIMATION, RISK MANAGEMENT AND MAINTENANCE (10 periods)

Software Sizing, Problem Based Estimation Process Based Estimation, Estimation with Use Cases. Software Risks, Risk Identification, Risk Projection, Risk Refinement, Risk Mitigation, Monitoring and Management, RMMM Plan. Software Maintenance, Software Supportability, Software Reengineering - Software reengineering process model - Reverse engineering to understand data, and processing

Total Periods: 55

TEXT BOOK:

1. Roger S. Pressman, "Software Engineering, A practitioner's Approach", McGraw-Hill International Edition, 7th edition, 2010.

REFERENCE BOOKS:

1. K. K. Aggarwal & Yogesh Singh, "Software Engineering", New Age International Publishers, 3rd edition, 2007.
2. Shely Cashman Rosenblatt, "Systems Analysis and Design", Thomson Publications, 6th edition, 2006.

MCA - II Semester

(16MC20131) DATABASE MANAGEMENT SYSTEMS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: A Course on "Database Management Systems".

COURSE DESCRIPTION: Analyze problems and design of ER diagrams; Creation of Data Definition commands; Normalization techniques; Implementation of functions; Creation of Views, Indexes and Sequences; Implementation of simple and complex queries using Oracle SQL; Creation of packages and triggers.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Impart knowledge in applying normalization techniques for development of application software to realistic problems.

CO2. Formulate queries using SQL DDL/DML/DCL commands.

CO3. Design a database using ER diagrams, convert ER diagrams into relation schemas.

CO4. Improve the database performance by optimizing the queries using Indexing and Hashing techniques.

CO5. Exploit their knowledge in developing database applications using SQL language.

LIST OF EXERCISES

1. Creation of DDL Commands

Using SQL, create simple DDL Commands (CREATE, ALTER, DROP, RENAME, TRUNCATE) on the following schema of tables. EMP (Empno number (5), Ename varchar2 (20), Sal number (8, 2), Designation varchar2 (20), Address varchar2 (20)), DEPT (Deptno number (3), Dname varchar2 (20), Location varchar2 (25))

2. Creation of DML Commands

Implement various DML commands and execute simple SQL queries.

3. Creation of Table level and Column level Constraints

Implement table level and column level constraints like Domain Integrity constraints (NOT NULL, CHECK), Entity integrity constraints (UNIQUE, PRIMARRY KEY) and Referential integrity constraints (FOREIGN KEY).

4. Retrieving of data using comparison operators and logical operators

Practice of simple SQL queries using comparison operators (=, !=, >, <, >=, <=, <>, between, in, not in, null) and logical operators(and, or, not).

5. ER diagram for an University database

Construct an ER diagram for a University database application. Identify the Relations and include necessary integrity constraints.

An University has many departments, where each department has multiple Instructors. An Instructor belongs to only one department. Each department offers multiple Courses, each of which is taught by a single Instructor. A student may enroll for many courses offered by the department.

Implement the following queries:

i. Find the names of all the students whose total credits are greater than 100

ii. Find the course-id and grades of all courses taken by any student named 'Tanaka'

iii. Find the ID and name of instructors who have taught a course in the Computer Science department.

iv. Find the courses which are offered in both 'Fall' and 'Spring' semester (not necessarily in the same year).

v. Find the names of all the instructors from Computer Science department.

vi. Find the course-id and titles of all courses taught by an instructor named 'Srinivasan'

vii. Find names of instructors who have taught at least one course in Spring 2009

6. Single Row Functions

Implement queries using Single row functions such as Numeric functions, Date functions, Conversion functions and String functions.

7. Group functions

Practice Group functions such as Sum, Avg, Max, Min, Count.

8. Group by Having Clause

Implement SQL queries using Group By and Having Clause.

9. Creation of VIEWS

Creation of tables using Simple View and Complex View

10. Synonym and Sequences

Implementation of Synonym and Sequences.

11. JOINS

Practice queries using JOINS and OUTER JOINS.

12. SUBQUERIES

Implementation queries using SUBQUERIES.

13. PL/SQL basic programs

a) Write a simple PL/SQL program to accept a number from user and test whether it is divisible by a number

b) Write a PL/SQL program to check whether the input is a character, number or a special character.

c) Write a PL/SQL code to update the salary of an employee based on given bonus and department number.

14. PL/SQL CURSOR programs

Write a PL/SQL program for generation of Electricity Bill using CURSORS. Create a table for Electricity bill consists of Customer_no, Customer_name, Customer_type, Prev_met_read, Curr_ met_read, Month_name. Assume there are three Customer types namely Industrial, Agriculture and Domestic. Calculate the total charges based on the type of customer.

15. Triggers

Generate a database trigger to update the salary of an employee before/after performing any DML operations.

16. Procedures

Write a procedure which takes the department_id as an input parameter and lists the names of all employees \ belonging to that department.

17. Functions

Write a Pl/Sql block of code that lists the highest salary drawn by an employee in each of the departments. It should make use of a function dept_highest which return the highest salary drawn by an employee for the given department.

18. Packages

Create a package to find the salary of an Employee by providing employee_id as an argument.

REFERENCE BOOKS:

1. Ivan Bayross, "*SQL, PL/SQL The Programming Language of ORACLE,*" BPB Publications, 2002.
2. Dr. P. S. Deshpande, "*SQL & PL/SQL for Oracle 10g Black Book,*" Dreamtech Press, 2007.
3. J. J. Patrick, "*SQL Fundamentals,*" Pearson Education, 2nd Edition, 2002.
4. Rick F. Vander Lans,"*Introduction to SQL*," Addison-Wesley Professional, 4th Edition, 2007.

MCA - II SEMESTER
(16MC20132) DATA STRUCTURES THROUGH C LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Courses on "Programming in C Lab" and "Data Structures".

COURSE DESCRIPTION

Implementing logical and physical representation of data, complexity and their efficiency. Implementing linked lists and their different variations, queues, stacks and their applications; tree structures and their different variations; Solving problems using graphs, sorting and searching techniques.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Apply abstract data type and their basic usability in different applications through C programming language.

CO2. Identify and analyze suitable data structures to solve computing problems.

CO3. Design and develop variety of c programs using data structures in order to solve computing problems.

CO4. Choose the appropriate data structure and algorithm design method to get an optimal solution for complex real world problem.

CO5. Apply searching, sorting, tree traversal and graph traversal techniques to optimize the complexities of an application.

CO6. Work together or as an individual to customize the applications.

LIST OF EXERCISES

1. Write C programs that implement stack and its operations using
   a) Arrays b) Pointers
2. Write C programs that uses Stack operations to perform the following:
   a) Converting infix expression into postfix expression
   b) Evaluating the postfix expression
3. Write C programs that implement Queue and its operations using
   a) Arrays b) Pointers
4. Write a C program that uses functions to perform the following operations on single linked list:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
5. Write a C program that uses functions to perform the following operations on double linked list
   i) Creation ii) Insertion iii) Deletion iv) Traversal
6. Write a C program that uses functions to perform the following operations on Circular linked list
   i) Creation ii) Insertion iii) Deletion iv) Traversal
7. Write a C program that implements the following sorting methods to sort a given list of integers in ascending order
   i) Bubble sort ii) Selection sort
8. Write a C program that implements the following sorting methods to sort a given list of integers in ascending order
   i) Quick sort ii) Merge sort
9. Write C programs that use both recursive and non recursive functions to perform the following searching operations for a Key value in a given list of integers:
   i) Linear search ii) Binary search
10. Write a C program to create Binary Search Tree and perform operations on it.
11. a) Write a C program to implement recursive Tree traversal techniques.
    b) Write a C program to implement non-recursive Tree traversal techniques.
12. Write a C program to create AVL-tree and perform operations on it.
13. Write a C program to implement Heap Sort.
14. Write a C program to implement Graph traversal Techniques (BFS, DFS)
15. Write a C Program to implement Prim's Algorithm

REFERENCE BOOKS:

1. P. Padmanabham, "*C programming and Data Structures,*" BS Publications, 3rd Edition, 2008.
2. M.T. Somashekara, "Problem Solving with C", PHI Learning Private Limited: New Delhi, 2012.
3. E. Karthikeyan, "A Textbook on C Fundamentals, Data Structures and Problem Solving," Prentice Hall of India Private Limited: New Delhi, 2008.

MCA II-SEMESTER

(16MC20133) OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Courses on "Programming in C Lab" and "Object oriented Programming through JAVA".

COURSE DESCRIPTION: Implementation of recursive and non recursive functions; Usage of StringTokenizer class; Implementation of method overloading; Basic String Operations; Creation of package and Interfaces; Handling predefined and user defined exceptions; Creation of File and its Operations; Implementation of multithreading; Creating and testing Applets; Usage of Event handling techniques and GUI applications by using AWT and Swings.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Understand the basic concepts and structure of a Java Program.

CO2. Analyze to solve real world problems by using Java Programming language.

CO3. Develop and execute various GUI Applications using AWT and Swings.

CO4. Adopt and design applications using Java IDEs tools.

CO5. Recognize the need to engage independent learning for continual development as an application professional.

CO6. Work together to customize the existing applications.

LIST OF EXERCISES

1. a) Write a Java program that prints all real solutions to the quadratic equation ax2 + bx+ c = 0. Read in a, b, c and use the quadratic formula. If the discriminant b2 -4ac is negative, display a message stating that there are no real solutions.
   b) The Fibonacci sequence is defined by the following rule: The first two values in the sequence are 1 and 1. Every subsequent value is the sum of the two values preceding it. Write a Java program that uses both recursive and non recursive functions to print the nth value in the Fibonacci sequence.
2. a) Write a Java program that prompts the user for an integer and then prints out all prime numbers up to that integer.
   b) Write a Java Program that reads a line of integers, and then displays each integer, and the sum of all the integers (Use StringTokenizer class of java.util)
3. Write a Java program to find both the largest and smallest number in a list of integers.
4. Write a Java program to illustrate method overloading.
5. Write a Java program to sort a list of names in ascending order.
6. Write a Java program to implement the matrix ADT using a class. The operations supported by this ADT are:
   a) Reading a matrix.
   b) Printing a matrix.
   c) Addition of matrices.
   d) Subtraction of matrices.
   e) Multiplication of matrices.
7. Write a Java Program that uses a recursive function to compute nCr.
   (Note: n and r values are given.)
8. Write a Java program to perform the following operations:
   a) Concatenation of two strings.
   b) Comparison of two strings.
9. Write a Java program to perform the following operations:
   a) Read line of Text and make word cap.
   b) Read a line of text and count number of vowels and consonants.

10. a) Write a Java program that makes frequency count of letters in a given text.
    b) Write a Java program that uses functions to perform the following operations:
       i. Inserting a sub-string in to the given main string from a given position.
       ii. Deleting n characters from a given position in a given string.
11. a) Write a Java program that checks whether a given string is a palindrome or not. Ex: MADAM is a palindrome.
    b) Write a Java program to make frequency count of words in a given text.
12. Write a Java program that illustrates the following:
    a) Creation of simple package.
    b) Accessing a package.
    c) Implementing interfaces.
13. Write a Java program that illustrates the following:
    a) Handling predefined exceptions
    b) Handling user defined exceptions
14. a) Write a Java program that reads a file name from the user, and then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.
    b) Write a Java program that reads a file and displays the file on the screen, with a line number before each line.
    c) Write a Java program that displays the number of characters, lines and words in a text file.

Note: Filename, number of the byte in the file to be changed and the new character is specified on the command line.

15. a) Write a Java program that creates three threads. First thread displays "Good Morning" every one second, the second thread displays "Hello" every two seconds and the third thread displays "Welcome" every three seconds.
    b) Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication.
16. a) Write a java program to demonstrate various GUI components in java (AWT) with appropriate Event Handling.
    b) Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box. (Using SWINGS)
17. a) Develop an applet in Java that displays a simple message.
    b) Develop an applet in Java that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named "Compute" is clicked.
18. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result.
19. Write a Java program for handling mouse events.
20. Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green. When a radio button is selected, the light is turned on, and only one light can be on at a time No light is on when the program starts.

REFERENCE BOOKS:

1. Herbert Schildt, "*The Complete Reference Java*", Tata McGraw-Hill, 7th Edition, 2007.
2. B. Eswar Reddy, T. V. Suresh Kumar and P. Ragavan, "*Object Oriented Programming with Java*," Pearson Sanguine Publications, 2nd Edition, 2011.
3. H. M. Dietel and P. J. Dietel, "*Java How to Program*," Pearson Education PHI, 5th Edition, 2009.

MCA -III Semester

(16MC3HS01) ORGANIZATIONAL BEHAVIOR AND HUMAN RESOURCE MANAGEMENT

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE REQUISITE: —

COURSE DESCRIPTION : Managements; Functions of Management; Elements of Corporate Planning Process; Environmental Analysis; Management of Change; Organizational Behavior; Individual Behavior; Concepts of Personality; Perception; Learning; HRM; Human Resource Planning; Job Design and Job Design; Recruitment; Selection; Training; BPO.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on managing behavior in an organization.

CO2. Develop requisite skills for:

CO3. Effective Human Resource Management.

CO4. Optimum utilization of Human Resource.

CO5. Develops effective communication among the work group of an organization.

CO6. Provide life-long learning for effective operation of an organization.

DETAILED SYLLABUS:

UNIT–I: INTRODUCTION TO MANAGEMENT (11 Periods)

Concepts of Management and organization- Nature and Importance of Management, Functions of Management, Systems Approach to Management, managerial skills.

UNIT-II: ORGANIZATIONAL AND INDIVIDUAL BEHAVIOUR (11 Periods)

Concept and meaning of Organizational Behavior(OB), characteristics of OB, Individual Behavior and individual differences – Behavioral theories affecting organization.

UNIT-III: Group Dynamics: Formal and informal groups – group dynamics – leadership, motivation – attitude and beliefs – management of change.

UNIT-IV: NATURE AND SCOPE OF HRM (11 Periods)

Functions and objectives of HRM. **HR PLANNING** : Nature and importance of HRP, factors affecting HRP, job analysis, nature, process of job analysis, job design, factors affecting job design, contemporary issues in job design.

UNIT-V: RECRUITMENT, SELECTION AND TRAINING (11 Periods)

Nature and importance of recruitment, recruitment process, selection process, barriers to effective selection, - Nature of training and development, Designing Training Programmes, career development, Business Process Outsourcing (BPO).

Total Periods: 55

TEXT BOOKS:

1. Prof. K. Aswathappa, "*Human resource management, text and cases*," McGraw Hill Publishing company ltd., 7th Edition, 2013.
2. L. M. Prasad, *Organizational behavior*, Sultan Chand and Sons', 4th Edition, 2006.

REFERENCE BOOKS:

1. Fred Luthans, "*Organizational behavior*," McGraw Hill Higher Education, 10th Edition, 2011.
2. Shashi K. Gupta and Rosy Joshi, "*Organizational Behavior,*" Kalyani Publications, 4th Edition, 2008.
3. P. Subba rao, "*Personnel and Human resource management*," Himalaya Publishing House Pvt. Ltd., 4th Edition, 2009.

MCA III-Semester

(16MC3BS01) OPERATIONS RESEARCH

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: —

COURSE DESCRIPTION: Operations research techniques; Linear Programming Problems; Transportation problem; Assignment problem; sequencing problem; Replacement problem; Inventory models; simulation models and PERT/CPM in project management.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:
- Linear Programming Problem
- Utilization of Resources
- Transportation Problem, Assignment Problem, sequencing problem and replacement problem
- Inventory models PERT/CPM and
- Simulation

CO2. Analyze literature and solve complex computational problems using Linear Programming Problem (LPP) techniques.

CO3. Design and solve problems using LPP models, Transportation Problem, Assignment Problem, Sequencing Problem that meet optimized utilization of resources.

CO4. Synthesize data transformation by using complex operational models in Inventory, simulation models and Game Theory.

CO5. Apply operational modeling techniques-PERT and CPM in Project Management system.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO OPERATIONS RESEARCH AND LPP (10 Periods)

Introduction to OR: Introduction, modeling in OR- Phases of OR study.

Linear Programming: Formulation of LPP, Graphical solution of LPP, Simplex method, artificial variable technique- Big M-method.

UNIT-II: TRANSPORTATION AND ASSIGNMENT PROBLEM (11 Periods)

Transportation Problem: Finding an initial basic feasible solution using North-West corner rule, Least cost Entry method, Vogel's Approximation Method. Degeneracy in Transportation Problem, Optimality test - MODI method, Unbalanced Transportation Problem.

Assignment Problem: Hungarian method of Assignment Problem, Traveling salesman Problem and its restrictions.

UNIT-III: SEQUENCING PROBLEM AND REPLACEMENT PROBLEM (10 Periods)

Sequencing Problem: Optimal solution for processing n-jobs through two machines, n-jobs through three machines.

Replacement Problem: Introduction, Replacement of items that deteriorate when money value is constant and variable - Individual Replacement policy and group Replacement policy.

UNIT-IV: THEORY OF GAMES AND SIMULATION (11 Periods)

Theory of Games: Introduction, types of games, optimal strategy, Maxmin-Minimax Principle, solution of games with saddle point, Rectangular games without saddle point, principle of dominance.

Simulation: Types of simulation, random variable, Mote-Carlo Technique or Monte-Carlo simulation.

UNIT-V: INVENTORY MODELS AND PROJECT MANAGEMENT BY PERT/CPM (13 Periods)

Inventory Models: Introduction of Inventory–Reasons for maintaining Inventory, Types of inventory costs, Deterministic Inventory Models: EOQ Models with and without shortages - Purchasing and Manufacturing Models with and without shortages.

Project Management by PERT/CPM: Basic steps in PERT/CPM technique, rules of drawing network diagrams, Fulkerson's rule: Critical Path Method (CPM), Programme Evaluation and Review Technique (PERT).

Total Periods: 55

TEXT BOOKS:

1. S. D. Sharma, "*Operations Research*," Kedar Nath Ram Nath and Company, 15th Edition, 2006.
2. S. Kalavathy, "*Operations Research*," Vikas Publishing House Pvt.Ltd, 2nd Edition, 2007.

REFERENCE BOOKS:

1. Prem Kumar Gupta and D.S. HIRA, "*Operations Research*," S.Chand and Company Ltd., 2008.
2. P.K. Gupta and Man Mohan, "*Problems in Operations Research*," Sultan Chand and Sons, 2007.
3. Hamdy A. Taha, "*Operations Research,*" Pearson Publications, 8th Edition, 2007.
4. J.K. Sharma, "*Operations Research Theory and Applications*," Mc Millan India Ltd, 4th Edition, 2009.

MCA – III Semester
(16MC30101) COMPUTER NETWORKS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: —

COURSE DESCRIPTION:
Computer network Applications; The physical layer; The data link layer; The medium access control sub-layer; The network layer; The transport layer; The application layer; Network security.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:
- Concepts of computer networks
- Functionality of reference models and layers
- Interfaces between layers

CO2. Analyze issues related to data link layer and transport layers using channel allocation and connection management schemes.

CO3. Design techniques for error detection and correction mechanisms suitable to ensure data integrity, access control techniques.

CO4. Investigate diverse techniques used in service user and provider layers in terms of reliability, data integrity, collision resistance and access control mechanisms.

CO5. Apply algorithms and use simulators to calculate least-cost paths for a given network.

CO6. Use the skills by using diverse communication standards and networks with the technology advancements in data communication.

DETAILED SYLLABUS:

UNIT- I: INTRODUCTION AND PHYSICAL LAYER (12 Periods)

Introduction: Uses of Computer Networks, Network Hardware-LAN, MAN and WAN, Topologies, Wireless Network-system interconnection, Wireless LAN, Wireless WAN. Internetworks, Network Software-Protocol hierarchies, Design issues for the layers, Connection Oriented and Connection less Service, Service Primitives, The relationship of Services to Protocols, Reference Models-OSI, TCP/IP.

The Physical Layer: Guided Transmission media-Magnetic Media, Twisted Pairs, Coaxial Cable, Fiber Optics. Wireless Transmission-The Electromagnetic Spectrum, Radio Transmission, Microwave Transmission, Infrared Transmission and Light Transmission, Communication Satellites, Multiplexing-Frequency Division Multiplexing, Wavelength Division Multiplexing, Time Division Multiplexing.

UNIT-II: THE DATA LINK LAYER (12 Periods)

The Data Link Layer: Data Link layer design issues, Error Detection and Correction, Elementary Data Link protocols-Unrestricted simplex protocol, Simplex stop-and-wait protocol, Simplex protocol for a noisy channel. Sliding Window protocols-One-bit sliding window protocol, Protocol using Go back N, Protocol using Selective Repeat.

The Medium Access Control Sub layer-The Channel Allocation problem, Multiple access protocols-ALOHA, Pure ALOHA, Slotted ALOHA. Carrier Sense Multiple Access protocols-Persistent and Non persistent CSMA-CSMA with collision detection. Collision-Free protocols- Bit map protocol, Token Passing, Binary countdown, Limited Contention protocols, Wireless LAN Protocols.

UNIT-III: THE NETWORK LAYER (13 Periods)

Network layer design issues, Routing Algorithms-Optimality principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast Routing, Multicast Routing, Routing for Mobile Hosts, Routing in Ad Hoc Networks, Congestion Control Algorithms-Congestion Prevention Policies, Jitter Control, Techniques for achieving good quality of service, Congestion control for multicasting, Internetworking, The Network layer in the Internet.

UNIT-IV: THE TRANSPORT LAYER (11 Periods)

The Transport service, Elements of Transport protocols-Addressing, Connection Establishment, Connection Release, Error Control and Flow Control, Multiplexing and Crash recovery, A simple Transport protocol, The Internet Transport protocols-Introduction to UDP, Remote Procedure Call, Real time transport Protocol, Introduction to TCP, The TCP Service Model, TCP protocol and TCP Segment Header, TCP Connection Establishment, TCP Connection Release, Transmission Policy, TCP Sliding Window, TCP Timer Management, TCP Congestion Control.

UNIT-V: THE APPLICATION LAYER (7 Periods)

The Application Layer: Introduction to Application Layer, DNS-The Domain name space, Resource records and Name servers. Electronic Mail-Architecture and services, the user agent, message formats, message transfer and Final Delivery.

Total Periods: 55

TEXT BOOK:
1. Andrew S Tanenbaum, David J. Wetherall, "*Computer Networks*," Pearson Education, 5th Edition, 2011.

REFERENCE BOOKS:
1. Forouzan Behrouz A and MosharrafFirouz, "*Computer Networks A Top-Down Approach*," Tata McGraw Hill publications, 4th Edition, 2007.
2. William Stallings, "*Data & Computer Communications*," Pearson Education Asia, 6th Edition, 2001.
3. Prakash C. Gupta, "*Data communications and Computer Networks*," Prentice Hall of India,2nd Edition, 2014.

MCA III – Semester
(16MC30102) DATA WAREHOUSING AND DATA MINING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A Course on "Data Base Management Systems".
COURSE DESCRIPTION: Data Warehouse Components and Architecture; Data mining Functionalities; Data Preprocessing; Association Rule Mining; Classification and Clustering; Multimedia, Text, Web Data Mining and Applications.
COURSE OUTCOMES: On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on:
- Schemas of Data warehouse
- Data preprocessing methods
- Classification and Clustering techniques

CO2. Analyze frequent itemsets using Apriori and FP growth algorithms.
CO3. Design and develop solutions for different classification and prediction models.
CO4. Solve complex problems by adapting appropriate analysis and interpretation of different types of text, multimedia and web data.
CO5. Use WEKA tool for creation of weather, hospital, banking dataset and perform preprocessing on these datasets.

DETAILED SYLLABUS:
UNIT-I: INTRODUCTION AND DATA WAREHOUSE COMPONENTS (10 periods)
Introduction: The need for Data Warehousing, Paradigm Shift, Business Problem Definition, operational and informational Data Stores, Data Warehouse Definition and Characteristics, Data Warehouse Architecture.
Data Warehouse Components: Overall Architecture, Data Warehouse Database, Sourcing, Acquisition , Cleanup and Transformation tools, meta data, data marts, Data Warehouse Administration and Management .
UNIT-II: BUILDING A DATA WAREHOUSE AND INTRODUCTION TO DATAMINING (12 periods)
Building A Data Warehouse: Business Consideration, Design considerations, Technical considerations, Implementation considerations, integrated solutions, Benefits of Data Warehousing, Multidimensional Data Model-From tables and spread sheets to Data Cubes and Star, Snowflake and fact constellation Schemas
Introduction to Data Mining: Motivated Data Mining, Definition of Data Mining, Kinds of Data, Data mining Functionalities, classification of Data mining systems, Data mining primitives, Integration of Data mining Systems with a Database or Data Warehouse System, Major issues in Data Mining.
UNIT-III: DATA PREPROCESSING AND ASSOCIATION RULE MINING (12 periods)
Data Preprocessing: Need for Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.
Association Rule Mining: Basic Concepts, The Apriori algorithm for finding frequent itemsets using candidate generation, Generating association rules from frequent itemsets, Mining frequent itemsets without candidate generation.
UNIT-IV: CLASSIFICATION AND CLUSTERING (11 periods)
Classification: Definition of classification, Definition of prediction, issues in classification and prediction, Classification by Decision Tree Induction, Bayesian Classification, Accuracy and Error measures, evaluating the accuracy of a classifier or predictor, bagging.
Clustering: Introduction to cluster Analysis, Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning methods - k-means and k-mediods methods, CLARANS, Hierarchical Methods-Agglomerative and divisive hierarchical clustering.

UNIT-V: MULTIMEDIA, TEXT AND WEB DATA MINING APPLICATION (10 periods)
Mining different types of data: Multimedia Data Mining, Text Mining - Text data analysis and informational retrieval, text mining approaches, Mining the World Wide Web- Mining web page layout structure, Mining web's link structures, Web usage mining.
Data Mining Applications: Financial data Analysis, Retail Industry, Telecommunication Industry.

Total Periods: 55

TEXT BOOKS:

1. Jiawei Han, Micheline Kamber and Jian Pei, *"Data Mining–Concepts and Techniques,"* Morgan Kaufmann Publishers, 2nd Edition, 2006
2. Berson Alex and Stephen J Smith, *"Data Warehousing, Data Mining and OLAP,"* Tata McGraw-Hill, 2004.

REFERENCE BOOKS:

1. Ralph Kimball, Margy Ross, Warren Thornthwaite and Joy Mundy, Bob Becker, *"The Data Warehouse Life cycle Tool kit,"* John Wiley & Sons Inc, 2nd Edition, 2007.
2. William H Inmon, *"Building the Data Warehouse,"* John Wiley & Sons Inc, 4th Edition, 2005.
3. Arun K Pujari, *"Data Mining Techniques,"* Universities Press (India) Pvt. Ltd, 2nd Edition, 2001.

MCA III – Semester

(16MC30103) OBJECT ORIENTED ANALYSIS AND DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: Courses on “Object Oriented Programming Through JAVA” and “Software Engineering”

COURSE DESCRIPTION:

Things and Classes; Relationships; Class Diagrams; Object Diagrams; Usecase Diagrams; Interaction Diagrams; Activity Diagrams; State Chart Diagrams; Component Diagrams; Deployment Diagrams.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on Things, principles of Object Oriented Development.

CO2. Analyze the specifications of Class, Use case, Activity, Sequence and State diagrams and develop models using pre conditions and post conditions.

CO3. Design application artifacts to construct the Logical, Behavioral and Architectural model of an Application.

CO4. Solve complex behavior using common modeling techniques of things.

CO5. Make use of UML Tool such as Rational Rose or Visual Paradigm to design Class, Use Case, Sequence, Collaboration, Activity, State Chart, Component and Deployment Diagrams for the an Application.

DETAILED SYLLABUS:

UNIT -I: INTRODUCTION TO UML **(11 Periods)**

The meaning of Object Orientation, object identity, Importance of modeling, principles of modeling, object oriented modeling, An overview of UML, conceptual model of the UML, Architecture.

Classes - Terms and concepts, Common Modeling Techniques.

Relationships - Modeling simple dependencies, single Inheritance and structural relationships, Common Mechanisms and UML Diagrams.

UNIT-II: STRUCTURAL MODELING **(12 Periods)**

Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages, Instances.

Class Diagrams - Terms, concepts, modeling techniques for Class Diagram, Modeling Simple collaboration, Logical database Schema, Forward and Reverse Engineering.

Object Diagrams – Modeling object structures, Forward and Reverse engineering.

UNIT-III: BASIC BEHAVIORAL MODELING **(11 Periods)**

Use cases - Terms and Concepts, Common Modeling techniques.

Use case Diagrams - Terms and Concepts, Common Modeling Techniques.

Sequence Diagrams - Terms and Concepts, Modeling flows of control by time ordering; **Collaboration Diagrams –** Terms and Concepts, Modeling flows of control by Organization, Forward and Reverse Engineering.

UNIT-IV: ADVANCED BEHAVIORAL MODELING **(11 Periods)**

Activity Diagrams - Terms and Concepts, Modeling a workflow, Modeling an operation, forward and reverse Engineering.

Events and Signals, State Machines, State Chart Diagrams – Modeling Reactive Objects.

UNIT-V: ARCHITECTURAL MODELING **(10 Periods)**

Component Diagrams – Terms and Concepts, Modeling Source Code, Modeling Physical Database, Forward and Reverse Engineering;

Deployment Diagrams – Terms and Concepts, Modeling Embedded System, Modeling Distributed System, Forward and Reverse Engineering.

Case Study: The Unified Library Application. **Total Periods: 55**

TEXT BOOK:

1. Grady Booch, James Ram Baugh and Ivar Jacobson, “*The Unified Modeling Language User Guide*,” Pearson Education, 1999.

REFERENCE BOOKS:

1. John W. Satzinger, Robert B Jackson and Stephen D Burd, “*Object-Oriented Analysis and Design with the Unified Process,”* Cengage Learning, 2004.
2. Hans-Erik Eriksson, Magnus Penker, Brian Lyons and David Fado, “UML 2: Toolkit,” Wiley India Pvt. Ltd., 2004.

MCA – III Semester
(16MC30131) COMPUTER NETWORKS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: A Course on "Computer Networks".

COURSE DESCRIPTION: Implementing error detection and correction techniques; sliding window protocol; simulation of dynamic routing algorithms; congestion controlling mechanism; simulation of various Transport layer protocols.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on the concepts of networks, topologies, network devices and network simulators.

CO2. Analyze Error detection and correction mechanisms to verify and correct the data.

CO3. Develop networking protocols like TCP/IP, UDP, RPC, ARP and RARP.

CO4. Investigate congestion control mechanisms such as Leaky Bucket algorithm to achieve flow control.

CO5. Simulate dynamic routing protocols such as Distance Vector and Link state routing algorithms using NS2 simulator.

CO6. Adapt policies and mechanisms to avoid unauthorized access over the network through access control mechanisms and authentication.

CO7. Effectively communicate the routing paths through network simulators through visualization.

CO8. Advanced communication techniques can be applied by an individual to interact with remote machine through client server programming.

LIST OF EXERCISES:

1. Implement the Data Link layer error detecting method using CRC-CCITT (16-bits).
2. Implement the Data Link layer error detection and correction techniques using Hamming Code.
3. Simulate the Sliding Window Protocols used in Data Link layer to achieve flow control.
4. Simulate the congestion control using Leaky bucket algorithm.
5. Using TCP/IP sockets, write a client-server program to make client sending the file name and the server to send back the contents of the requested file if present.
6. Implementation of Socket Programming using UDP.
7. Write a program to implement subnetting and find the subnet masks.
8. a) Write a program to implement Remote Procedure Call using Remote Command Execution.
   b) Implementation of RMI.
9. Write a program to simulate Address Resolution Protocol (ARP) and Reverse Address Resolution Protocols (RARP) used in Transport Layer.
10. Study of Network Simulator-NS2.
11. Simulate any Dynamic Routing Protocol used to route the packets in Network Layer.
12. **Minor Project:**
    a) Design a simple textual chat application that resembles Talk command in UNIX.
    b) Implementation of ping server and client application using sockets.

REFERENCE BOOKS:

1. Andrew S Tanenbaum, David J. Wetherall, "*Computer Networks*," Pearson Education, 5th Edition, 2011.
2. Forouzan Behrouz A and MosharrafFirouz, "*Computer Networks A Top-Down Approach*," Tata McGraw Hill publications, 4th Edition, 2007.
3. http://www.ns2blogger.in.

MCA III – Semester

(16MC30132) **DATA WAREHOUSING AND DATA MINING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: A course on "Data Warehousing and Data Mining".

COURSE DESCRIPTION:

Develop Transformations using Data Warehouse ETL tool; Creation of Datasets; Data Preprocessing; Association Rule Mining; Classification and Clustering; Multimedia, Text, Web Data Mining and Applications.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:
- Data acquisition process
- Data preprocessing methods
- Data Mining algorithms

CO2. Analyze frequent itemsets using Apriori and FP-growth algorithms.

CO3. Design and construct data acquisition process from one data source to other target data source using data warehouse ETL tool.

CO4. Develop solutions for complex computing problems by applying appropriate data mining algorithms to evaluate the accuracy and error measures using WEKA components.

CO5. Use WEKA tool to preprocess weather, hospital, and banking datasets to discover knowledge for making future predictions effectively.

CO6. Communicate effectively in implementing data mining problems with respect to documentation and visualization of hidden patterns.

CO7. Apply the knowledge of data mining to assess and provide computing solutions for societal issues.

CO8. Function effectively as an individual and as a member in a team to manage and implement data mining application in multidisciplinary environment.

LIST OF EXERCISES

PART –A

Creation of Active/Passive transformations using Data Warehouse (Extract, Transform, Load) ETL Tool

1. Construct data acquisition process to extract, transform and load data from different databases.
2. Design and implement data acquisition process to perform
   a) Expression Transformation
   b) Joiner Transformation
3. Design and implement data acquisition process to perform
   a) Aggregator Transformation
   b) Source Qualifier Transformation
4. Design and implement data acquisition process to perform
   a) Filter Transformation
   b) Router Transformation
5. Design and implement data acquisition process to perform
   a) Ranker Transformation
   b) Sorter Transformation

PART -B

Working with Data Mining - WEKA tool.

6. Creation on weather nominal and student results data sets in .arff and .csv formats
7. Perform data preprocessing steps on weather nominal and student information data sets as follows:
   a) Handling of missing values for categorical and nominal values.
   b) Selection of relevant attributes.
   c) Applying normalization techniques
8. Perform Association rule mining algorithm on preprocessed data set.
9. Perform classification and prediction on processed data set using J48 and ID3 algorithms.
10. Use Experimenter WEKA component to evaluate the accuracy and error measures of a classifier or predictor.
11. Verify ID3 classifier performance using Gain ration and Ranker method using a Knowledge flow WEKA component.
12. Minor Project

    Step 1 : Creation of data set.

    Step 2: Apply preprocessing techniques on constructed data sets.

    Step 3: Implement appropriate data mining algorithms such as:

    a. Apriori algorithm – to find frequent itemsets using various support and confidence levels

    b. FP growth association mining

    c. ID3 decision tree classifier

    d. Build a confusion matrix to compute sensitivity, specificity, precision, recall, weighted accuracy and correlation between the attributes.

    Data sets: Super Market data, Health data, Banking system, Weather forecasting, social media and Iris data.

REFERENCE BOOKS:

1. Ian H. Witten, Eibe Frank, and Mark,"*A Data Mining: Practical Machine Learning Tools and Techniques,"* Hall Morgan Kaufmann, 3rd Edition, 2011.
2. Ralph Kimball, *"The Data Warehouse Toolkit: The Complete Guide to Dimensional Modeling,"* John Wiley & Sons Inc, 3rd Edition, 2013.
3. G. K. Gupta, *"Introduction to Data Mining with Case Studies,"* PHI, New Delhi, 3rd Edition, 2009.

MCA – III Semester

(16MC30133) OBJECT ORIENTED ANALYSIS AND DESIGN LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: A Course on "Object Oriented Analysis and Design".

COURSE DESCRIPTION:

Analyze specifications; Design Class Diagrams; Object Diagrams; Usecase Diagrams; Interaction Diagrams; Activity Diagrams; State Chart Diagrams; Component Diagrams; Deployment Diagrams

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:
- Library Management System
- ATM Application
- Online Bookshop
- Railway Reservation System

CO2. Analyze applications and specifications to develop static and behavioral models.

CO3. Design and construct the Logical, Behavioral and Architectural model of an Application.

CO4. Construct a project from beginning to end using UML Tool, Rational Rose for an Application Software.

CO5. Communicate effectively with all the team members about various logical and behavioral objects of an Application Software.

CO6. Asses the common modeling techniques to be applied for a system for the societal applications.

LIST OF EXERCISES

Design of Applications

- Library Management System
- ATM Application
- Online Bookshop
- Railway Reservation System

1. IDE of Rational Rose or Visual Paradigm.
2. Analyze and construct UseCase diagrams for the above applications.
3. Analyze and construct Class diagrams for the above applications.
4. Construct sequence diagram for use cases of Library Management System and ATM Application.
5. Construct sequence diagram for use cases of Online Bookshop and Railway Reservation System.
6. Construct Collaboration diagram for use cases of Library Management System and ATM Application.
7. Construct Collaboration diagram for use cases of Online Bookshop and Railway Reservation System.
8. Construct Activity diagram for use cases of Library Management System and ATM Application.
9. Construct Activity diagram for use cases of Online Bookshop and Railway Reservation System.
10. Construct State Chart diagram for use cases of Library Management System and ATM Application.
11. Construct State Chart diagram for use cases of Online Bookshop and Railway Reservation System.
12. Analyze and construct Component diagrams for the above applications.
13. Analyze and construct Deployment diagrams for the above applications.

REFERENCE BOOKS:

1. Grady Booch, James Ram Baugh and Ivar Jacobson, "*The Unified Modeling Language User Guide,"* Pearson Education, 1999.
2. www.uml.org.
3. Rational Software Development Training Manual.

MCA IV-SEMESTER

(16MC40101) **BIG DATA ANALYTICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: Courses on "Data warehousing and Data Mining" and "Object Oriented Programming through JAVA".

COURSE DESCRIPTION:
Big data Analytics usage and Outcomes; Types of big data; Challenges of analyzing big data; Analytics tools for big data; Requirements of Hadoop; Adapting Hadoop File systems and I/O; MapReduce Application; Administration of Hadoop; Big data analytics; R Programming on Hadoop.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Acquire knowledge on
- Basic concepts of Big Data Analytics and current trends in Big Data
- MapReduce and R Tool
- HDFS and MapReduce in Big Data Hadoop.

CO2. Analyze the big data types as Structured, unstructured and semi-structured.

CO3. Design and develop methods using Map Reduce technique to solve:
- Varieties of data formats in Hadoop Framework for an application.
- Methods, Dimensions, and practices for Big Data applications.

CO4. Solve complex problems in Big Data by adopting appropriate techniques to provide insights for small and medium business.

CO5. Apply modern tools like HIVE and R to perform analytics in an user friendly environment on Hadoop platform.

CO6. Demonstrate knowledge as an individual to manage Weather sensors application.

DETAILED SYLLABUS:

UNIT- I: INTRODUCTION TO BIG DATA ANALYTICS (11 periods)

Defining Big Data Analytics : Introduction to Big data, Usage of big data- Basic analytics, Advanced analytics, Operationalized analytics, Monetizing analytics; Modifying Business Intelligence Products to Handle Big Data: Analytical algorithms, Infrastructure support; Big Data Analytics Examples , Big Data Analytics Solutions.

Meet Hadoop: Data Storage and Analysis, Comparison with Other Systems, A Brief History of Hadoop, Apache Hadoop and the Hadoop Ecosystem.

UNIT-II: HADOOP (10 Periods)

MapReduce: A Weather Dataset Ecosystem, Analyzing the Data with UNIX Tools, Analyzing the Data with Hadoop, Scaling Out, Hadoop Streaming, Hadoop Pipes.

The Hadoop Distributed File system: The Design of HDFS, HDFS Concepts, The Command-Line Interface, Hadoop File systems.

Hadoop I/O: Data Integrity, Compression, Serialization, File-Based Data Structures.

UNIT – III: APPLICATIONS OF HADOOP MAPREDUCE (11 Periods)

Developing a MapReduce Application: The Configuration API, Configuring the Development Environment, Writing a Unit Test, Running Locally on Test Data, Running on a Cluster.

How MapReduce Works: Anatomy of a MapReduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution.

MapReduce Types and Formats: MapReduce Types, Input Formats, Output Formats.

UNIT -IV: FEATURES AND ADMINISTERING HADOOP (11 Periods)

MapReduce Features: Counters, Sorting, Joins, Side Data Distribution, MapReduce Library Classes.

Setting Up a Hadoop Cluster: Cluster Specification, Cluster Setup and Installation, SSH Configuration, Hadoop Configuration, Security, Benchmarking a Hadoop Cluster.

Administering Hadoop: HDFS, Monitoring, Maintenance.

UNIT -V: R PROGRAMMING ON HADOOP (12 Periods)

Introduction to R: R Data Structures, Help functions in R, Vectors, Scalars, Declarations, Common Vector operations, Using all and any, Vectorised operations: NA and NULL values, Filtering, Vectorised if-then else.

Matrices, Arrays And Lists: Creating matrices, Matrix operations, Applying Functions to Matrix Rows and Columns, Adding and deleting rows and columns, Vector/Matrix Distinction , lists, Creating lists, General list operations, Accessing list components and values – applying functions to lists.

CASE STUDY: Analyze one of the social network data to draw insights for the societal benefit.

Total Periods: 55

TEXT BOOKS:

1. Tom White, "*Hadoop: The Definitive Guide,*" Oreilly and Yahoo press, 3rd Edition, 2012.
2. Judith Hurwitz, Alan Nugent, Dr. Fern Halper, and Marcia Kaufman, "*Big Data for Dummies,*" John Wiley & Sons, Inc., 2013.

REFERENCE BOOK:

1. Frank J. Ohlhorst, "*Big Data Analytics: Turning Big Data into Big Money*," Wiley Publication, December 2012.

MCA IV-Semester
(16MC40102) **LINUX PROGRAMMING**

Int. Marks	**Ext. Marks**	**Total Marks**	**L**	**T**	**P**	**C**
40	60	100	4	-	-	4

PREREQUISITES: A Course on "Computer Networks".
COURSE DESCRIPTION: LINUX operating system features; Architecture of LINUX operating system; LINUX environment; Shell Script; Signals and Sockets.
COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate Knowledge on LINUX operating system and utilities.
CO2. Analyze the Bourne shell, LINUX files, processes and signals to solve problems in Linux operating system.
CO3. Design and develop the programs by using LINUX system tools like vi editor, File, Text, Network and Backup utilities.
CO4. Solve Advanced C and Shell Script Programming problems in Linux Environment. Select and apply appropriate techniques like semaphores, Messages and Shared Memory to develop inter Process communication in Linux.
CO5. Communicate effectively with Linux operating system through different application programs.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO LINUX FILE SYSTEM (11 Periods)
Linux Utilities- Introduction to Linux file system, vi editor, File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking commands, Filters, Text processing utilities and Backup utilities, sed – scripts, operation, addresses, commands, applications, awk – execution, fields and records, scripts, operation, patterns, actions, functions, using system commands in awk.

UNIT-II: SHELL PROGRAMMING (11 Periods)
Working With The Bourne Shell: shell, shell responsibilities, pipes and input Redirection, output redirection, here documents, the shell as a programming language, shell meta characters, shell variables, shell commands, the environment, control structures, shell script examples.

UNIT-III: LINUX FILE APIS (11 Periods)
Linux Files: File types, file systems, File attributes, i-nodes, application program interface to files, kernel support files, relationship of C stream pointers and file descriptors, directory files, hard and symbolic links.
Linux File APIs: General file APIs, file and record locking, directory file APIs, device file APIs, general file class, regfile class for regular class, dirfile class for directory files, FIFO file class , device file class, symbolic link file class, file listing program.

UNIT-IV: LINUX PROCESSES AND SIGNALS (11 Periods)
Linux Processes: LINUX kernel support for processes, process APIs, process attributes, change process attributes, process control - process creation, waiting for a process, process termination, zombie process, orphan process
Signals: LINUX kernel support for signals, signal, signal mask, sigaction, the SIGCHLD Signal and the waitpid API, the sigsetjmp and siglongjmp APIs, kill, alarm, Interval timers, POSIX. 1b timers, timer class.

UNIT- V: INTERPROCESS COMMUNICATION AND SOCKETS (11 Periods)
Interprocess Communications: IPC methods, the UNIX System V IPC methods, UNIX System V messages, Messages Example, UNIX system V semaphores, Semaphore Example, UNIX System V shared memory, Shared memory Example.
Sockets: Introduction to Sockets, Socket Addresses, Socket system calls for connection oriented protocol and connectionless protocol, example-client/server programs. **Total Periods: 55**

TEXT BOOKS:

1. T. Chan, "*UNIX system programming using C++*," PHI, 2008.
2. Sumitabha Das, "*UNIX Concepts and Applications*," TMH, 4th Edition, 2008.

REFERENCE BOOKS:

1. W.R. Stevens, "*UNIX Network Programming*," Pearson Education, 2008
2. Graham Glass, King Ables, "*UNIX for programmers and users,*" Pearson Education, 3rd Edition, 2003.
3. Kernighan and Pike, "*UNIX programming environment*," Pearson Education, 2006.

MCA IV-Semester

(16MC40103) **WEB PROGRAMMING**

Int. Marks	**Ext. Marks**	**Total Marks**	**L**	**T**	**P**	**C**
40	60	100	4	-	-	4

PREREQUISITES: A Course on "Object Oriented Programming through JAVA".

COURSE DESCRIPTION:

Concepts of HTML; Java Script and XML; Developing Web Applications using Servlets, JSP and PHP; Adopting Tomcat Server and XAMP Server for deploying Web Applications.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate Knowledge on

- Client side scripting
- AJAX programming and Application Servers
- HTML, DHTML**,** Java Script and XML

CO2. Analyze 2-tier, 3-tier and MVC architectures for web application development.

CO3. Design and develop web Applications using Dynamic HTML with Java Script, XML technology.

CO4. Investigate and solve complex problems using Server-side technologies like servlets, JDBC technologies and adapt Tomcat Server and XAMPP Server for deployment.

CO5. Use JSP and PHP to implement E-Commerce applications that has potential insights.

DETAILED SYLLABUS:

UNIT- I: HTML, JAVA SCRIPT AND AJAX **(10 periods)**

Introduction to HTML, structure of HTML, Lists, Tables, images, forms, Frames, Cascading Style sheets, Introduction to Java Scripts, Objects in Java Script, Dynamic HTML with Java Script, Introduction to AJAX.

UNIT- II: XML TECHNOLOGY **(11 periods)**

Introduction to XML, XML Basics, DTD, Advanced XML: XML Namespaces, XML CDATA, XML Encoding, XML on the Server, XML Application, XMLHttpRequest Object, XML Technologies: XHTML, Java API for XML Processing, DOM, SAX, XSLT, Xpath.

UNIT-III: SERVLETS **(11 periods)**

Introduction to Servlets, features of Java Servlets, Exploring the Servlet API, Servlet Life Cycle, Configuring Servlet in web.xml, Working with ServletConfig and ServletContext Objects, Creating a Simple Servlet, the HttpServletRequest and HttpServletResponse Interfaces, Session Tracking, Introduction to JDBC, JDBC Drivers, JDBC APIs and Multitier Applications Using JDBC from a Servlet.

UNIT-IV: JSP **(12 periods)**

Introduction to JSP, Describing the JSP Life Cycle, Creating Simple JSP Pages, Working with JSP Basic Tags and Implicit Objects, Using JavaBeans and Action Tags in JSP, Using the JSP Standard Tag Library [JSTL], Describing JSTL Core Tags, Describing the JSTL SQL Tags.

UNIT-V: PHP **(11 periods)**

Introduction to PHP, Working with Variables and Constants, Controlling Program Flow, Working with Functions and Arrays, Working with Files and Directories, Working with Forms and Database, Exploring Cookies and Sessions.

Case Study: On-Line examination conduction using 3-Tier Architecture. **Total Periods: 55**

TEXT BOOK:

1. Kogent Learning Solutions Inc., "*Web Technologies Black Book,*" Dreamtech Press, 2011.

REFERENCE BOOKS:

1. H. M. Deitel, P.J. Deitel, and T. R. Nieto, "*Internet and World Wide Web – How to program,*" Pearson Education, 2006.
2. Steven Holzner, "*The Complete Reference PHP*," Tata McGraw-Hill Education Pvt. Ltd., 2007.
3. Uttam K Roy, "*Web Technologies*," Oxford University Press, 2010.

MCA–IV Semester

(16MC40104) SERVICE ORIENTED ARCHITECTURE

(Professional Elective–I)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Software Engineering".

COURSE DESCRIPTION: Web Services; Principles of SOA; Service Layers; Simple Object Access Protocol (SOAP); Web Services Description Language (WSDL).

COURSE OUTCOMES: On successful completion of this course, the student will be able to:

CO1. Demonstrate knowledge on:
- Principles, services and policies of service orientation.
- Fundamentals of web services.
- XML, WSDL related to SOA

CO2. Analyze complex business process critically in identifying appropriate service model logic.

CO3. Design service oriented architecture suitable for different environments.

CO4. Use XML, SOAP and service interface design tools for building service oriented architecture.

DETAILED SYLLABUS:

UNIT - I: SOA AND WEB SERVICES FUNDAMENTALS (12 Periods)

Introducing SOA: Fundamental SOA, Common Characteristics of Contemporary SOA, Common misperceptions about SOA, Common Tangible benefits of SOA, Common pitfalls of adopting SOA.

The Evolution of SOA: An SOA Timeline, The continuing evolution of SOA, The roots of SOA, Orchestration.

Web Services and Primitive SOA: The Web Services framework, Services, Service descriptions, messaging, Security.

UNIT - II: SOA AND WS-* EXTENSIONS (10 Periods)

WS-* and Contemporary SOA (Part I): Message Exchange Patterns, Service Activity, Coordination, Atomic transactions, Business Activities, Orchestration.

WS-* and Contemporary SOA (Part-II): Addressing, Reliable messaging, Correlation, Policies, Metadata exchange, Security.

UNIT - III: PRINCIPLES, SERVICE LAYERS AND PLANNING (11 Periods)

Principles of Service-Orientation: Anatomy of SOA, Common principles of Service Orientation, Inter relationship of Service Orientation Principles, Service Orientation and Object Orientation, Native web service Support for service orientation principles.

Service Layers: Service-Orientation and Contemporary SOA, Service Layer abstraction, Application Service Layer, Business Service Layer, Orchestration Service Layer, Agnostic Services, Service Layer Configuration Scenarios.

SOA Delivery Strategies: SOA delivery lifecycle phases, The Top-down strategy, the bottom-up strategy, the agile strategy.

UNIT - IV: BUILDING SOA AND SERVICE MODELING (10 Periods)

Service Oriented Analysis: Introduction to service oriented analysis, Comparison of service oriented Architecture and Service Oriented Environment, Benefits of a Business Centric SOA and Deriving Business Services.

Service Modeling: Service Modeling, Service Modeling guidelines, Classifying Service model logic, Contrasting Service modeling approaches.

UNIT - V: BUILDING SOA AND SERVICE DESIGN (12 periods)

Service-Oriented Design: WSDL related XML Schema language basics, WSDL language basics, SOAP language basics, Service interface design tools.

SOA Composition Guidelines: Steps to composing SOA, Considerations for choosing service layers, Considerations for positioning for choosing SOA extensions.

Service Design: Service Design overview, Entity-centric business Service Design, Application Service Design, Task-centric business Service Design, Service Design guidelines. **Total Periods: 55**

TEXT BOOK:

1. Thomas Erl, "*Service-Oriented Architecture - Concepts, Technology, and Design,*" Pearson, 2011.

REFERENCE BOOKS:

1. Eric Newcomer, *"Understanding SOA with Web Services,"* Pearson Education, 2nd Edition, 2005.
2. Shankar Kambhampaty, *"Service Oriented Architecture for Enterprise and Cloud Applications,"* Wiley-India, 2nd Edition, 2010.

MCA IV - Semester

(16MC40105) **INTERNET OF THINGS**

(Professional Elective – I)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITE: A Course on **"**Computer Networks".

COURSE DESCRIPTION: Internet of Things(IoT) Components; Communication models; Prototyping; Hardware; Design models; Development platforms; Analytics for IoT.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on Protocols, Functional blocks and communication models of Internet of things.

CO2. Identify appropriate sensors and communication modes used in IoT based systems.

CO3. Design appropriate solutions for IoT applications using Raspberry Pi and Arduino kits.

CO4. Appropriately synthesize the models and applications for usage in Home automation and cities.

CO5. Apply evolutionary techniques to perform analytics on the data integrated from IoT based systems.

CO6. Use Professional engineering principles to design and develop applications using IoT.

DETAILED SYLLABUS:

UNIT- I: INTRODUCTION AND DOMAIN APPLICATIONS (10 periods)

Introduction to Internet of Things: Definition of Internet of Things, Characteristics, Things, Protocols, Logical Design, Functional Blocks, Communication models, APIs, Enabling Technologies, Levels and Deployment templates, Introduction to M2M, Difference between IoT and M2M, Software Defined Networking, Network Function Virtualization.

UNIT- II: DEVICES AND END POINTS (12 periods)

IoT Device, Examples - Arduino, Raspberry PI; Programming Raspberry PI with Python, Other IoT devices, Domain Specific IoTs.

UNIT-III: SENSORS AND CONNECTIVITY (12 periods)

Sensors-Types of Sensor Nodes; Internet Communications, IP Addresses, MAC Address, TCP and UDP ports, Application Layer Protocols, Need for IoT Systems Management, SNMP, Network Operator Requirements, NETCONF, YANG, IoT Systems Management with NETCONF-YANG.

UNIT-IV: DESIGN METHODOLOGY AND CASE STUDIES (10 periods)

Design Methodology: Purpose and Requirements specifications, Process Specifications, Domain Model specifications, Information Model specifications, Service specification, IoT Level Specifications, Functional View specifications, Operational View specifications, Device and Component integration, Application development, Cloud Storage Models and Communications APIs, WAMP, Xively Cloud for IoT.

Case Studies: Weather Monitoring System.

UNIT-V: DATA ANALYTICS FOR IOT (11 periods)

Analytics, Apache Hadoop, Hadoop MapReduce for Batch Data Analysis, Apache Oozie, Apache Spark, Apache Storm.

Tools: Chef and Case studies. **Total Periods: 55**

TEXT BOOK:

1. Arshdeep Bahga, Vijay Madisetti, "*Internet of Things – A hands-on approach*," University Press, 2015.

REFERENCE BOOKS:

1. Adrian McEwen and Hakim Cassimally, "*Designing the Internet of Things*," Wiley Publishing, 2013.
2. CharlesBell, "*Beginning Sensor Networks with Arduino and Raspberry Pi*," Apress, 2013.
3. Marco Schwartz, "*Internet of Things with the Arduino Yun*," Packt Publishing, 2014.
4. Matt Richardson, Shawn Wallace, "*Getting Started with Raspberry Pi*," Maker Media, Inc, 2012.

MCA – IV Semester

(16MC40106) COMPUTER FORENSICS

(Professional Elective-I)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A Course on "Computer Networks".

COURSE DESCRIPTION: Computer forensics technologies and cybercrime; Evidence collection and data seizure; Initial Response and Forensic Duplication; Open source tools for Forensic Process; Forensic Data Analysis and Validation; Processing crimes and incident scenes; Mobile Device Forensics; Network Forensics; E-mail Investigation; Report writing.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:

- Process Fundamentals and Technologies
- Evidence Capture and Computer Forensic Analysis
- Law Enforcement crime and incident scenes

CO2. Analyze and validate digital evidence found in digital storage device.

CO3. Design and develop solutions for a forensic process based on type of communication standards, electronic device capabilities and specifications.

CO4. Investigate and contribute in groups for the development of new forensics tools- Forensic Card Reader, Cell Seizure and MOBILedit.

CO5. Apply forensic tools- Forensic SIM, WinHex and techniques to acquire and verify the evidence.

CO6. Commit to ethics and follow Law of Enforcement standards for digital Forensics and crime investigations.

DETAILED SYLLABUS:

UNIT – I: OVERVIEW OF COMPUTER FORENSICS TECHNOLOGY AND CYBERCRIME (10 periods)

Computer Forensics Fundamentals: Introduction to computer Forensics, Use of computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources/Employment Proceedings, Computer Forensics Services, Benefits of Professional Forensics Methodology, Steps taken by Computer Forensics Specialists.

Types of Computer Forensics Technologies: Types of Military Computer Forensic Technology, Types of Law Enforcement - Computer Forensic Technology, Types of Business Computer Forensic Technology.

Introduction to Cybercrime: Cybercrime, Cybercrime and Information Security, Cybercriminals, Classification of Cybercrimes, Cyber Detectives.

UNIT – II: COMPUTER FORENSICS EVIDENCE AND CAPTURE (10 periods)

Data Recovery: Data back-up and Recovery, Role of Back-up in Recovery, Data-Recovery solution.

Evidence Collection and Data Seizure: Importance of Collecting Evidence, Collection Options, Obstacles, Types of Evidence, The Rules of Evidence, Volatile Evidence, General Procedure, Collection and Archiving, Methods of Collection, Artifacts, Collection Steps, Controlling Contamination- The Chain of Custody.

UNIT – III: INITIAL RESPONSE, FORENSIC DUPLICATION AND FORENSIC TOOLS (12 periods)

Initial Response and Volatile Data Collection from Windows system, Initial Response and Volatile Data Collection from UNIX system.

Forensic duplication: Forensic Duplicates as Admissible Evidence, Forensic Duplication Tool Requirements, Creating a Forensic Duplicate/Qualified Forensic Duplicate of a Hard Drive, Live Data Collection for Systems (Windows and UNIX).

Forensic Tools: Forensic Card Reader, Cell Seizure, MOBILedit, Forensic SIM, WinHex.

UNIT -IV: COMPUTER FORENSIC ANALYSIS (11 periods)

Data Analysis and Validation: Determining the data to collect and analyze, Validating forensic data, Addressing data, hiding techniques, performing remote acquisitions.

Processing Crime and Incident Scenes: Identifying digital evidence, collecting evidence in private-sector incident scenes, processing law enforcement crime, Preparing for a search, Seizing Digital Evidence at the Scene, Storing Digital Evidence.

UNIT – V: FORENSICS AREAS AND REPORT WRITING (12 periods)

Cell Phone and Mobile Device Forensics: Understanding Mobile Device Forensics, Acquisition Procedures for Cell Phones and Mobile Devices.

Network Forensics: Overview, Performing Live Acquisitions, Developing Standard Procedure for Network Forensics, Investigating Routers, Network Tools.

E-Mail Investigation: Exploring the role of E-Mail in investigations, Investigating E-Mail Crimes and Violations.

Report Writing: Understanding the importance of Reports, Guidelines for Writing Reports, Generating Report Findings with Forensics Software Tools.

Case Study: Perform the Forensic process on a File system or on an external storage device to ensure the integrity or loss of data using any open source Forensic Tool. **Total periods: 55**

TEXT BOOKS:

1. John R. Vacca, *"Computer Forensics, Computer Crime Scene Investigation"*, Firewall Media, 2009.
2. Bill Nelson, Amelia Phillips, Christopher Steuart, *"Guide to Computer Forensics and Investigations"*, Cengage Learning, 4th Edition, 2009.

REFERENCE BOOKS:

1. Chris Prosise, Kevin Mandia, *"Incident Response and Computer Forensics"*, McGraw-Hill Osborne Media, 2nd Edition, July 2003.
2. Nina Godbole, Sunit Belapure, "*Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives*", Wiley India Pvt Ltd, 2011.
3. EoghanCasey,*"Handbook Computer Crime Investigation's Forensic Tools and Technology"*, Academic Press, 2001.
4. Peter Stephenson, Keith Gilbert, "*Investigating Computer Related Crime*", CRC Press, 2nd Edition, 2004.

MCA – IV Semester

(16MC40107) E-COMMERCE

(Professional Elective–I)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: Courses on "Database Management Systems", "Computer Networks" and "Web Programming".

COURSE DESCRIPTION:
Electronic Commerce; E-Commerce applications and web; Process models; Electronic payment systems; EDI; Interorganizational E-Commerce; Digital document types; Online marketing process; M-Commerce; Commerce catalogues; Multimedia.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on
- E-Commerce applications.
- Mercantile Process Models
- Electronic Payment Systems
- Electronic Data Interchange (EDI)

CO2. Analyze the impact of E-commerce on business models and strategies in the new economy.
CO3. Design and develop an electronic payment system.
CO4. Solve complex security problems in the development of Electronic commerce application using SSL and S-HTTP.
CO5. Apply corporate digital library technique to make the information useful to diverse people at different stages in the work process.
CO6. Follow ethics to adapt security standards - digital signature standards in resolving the issues of E-Commerce.

DETAILED SYLLABUS:

UNIT-I: ELECTRONIC COMMERCE (11 Periods)

Electronic Commerce: Electronic Commerce Framework, anatomy of E-Commerce applications, E-Commerce Consumer applications, E-Commerce Organisation Applications.

Electronic commerce and World Wide Web: Architectural Framework for E-Commerce, WWW as the Architecture, Technology behind the Web, Security and the Web.

UNIT-II: CONSUMER ORIENTED ELECTRONIC COMMERCE (12 Periods)

Consumer Oriented Electronic commerce: Mercantile Process models, Mercantile Models from Consumer's Perspective, Mercantile Models from Merchant's Perceptive.

Electronic payment systems: Types of Electronic Payment Systems: Digital Token-Based, Smart Cards, Credit Cards, and Risks in Electronic Payment systems, Designing Electronic payment System.

UNIT-III: INTERORGANIZATIONAL COMMERCE AND ELECTRONIC DATA INTERCHANGE (EDI) (11 Periods)

Interorganizational Commerce and Electronic Data Interchange (EDI): EDI, EDI Applications in Business, EDI: Legal, Security and Privacy Issues, EDI and Electronic Commerce.

Intraorganizational Electronic Commerce: Macro forces and internal commerce, Work-Flow Automation and Coordination, Supply Chain Management.

UNIT-IV: CORPORATE DIGITAL LIBRARY (11 Periods)

Corporate Digital Library: Document Library, digital Document types, corporate Data Warehouses.

Advertising and Marketing: Information based marketing, advertising on Internet, on-line marketing process, market research.

M-Commerce: Characteristics of M-Commerce, advantages and disadvantages of M-Commerce.

UNIT-V: CONSUMER SEARCH AND RESOURCE DISCOVERY (10 Periods)

Consumer Search and Resource Discovery: Information search and Retrieval, Commerce Catalogues, Information Filtering.

Multimedia and Digital Video: Key Multimedia concepts, Digital Video and electronic Commerce, Desktop video conferencing. **Total Periods: 55**

TEXT BOOK:

1. Ravi Kalakota and Andrew B. Whinston, "*Frontiers of electronic commerce*," Pearson Education, 2008.

REFERENCE BOOKS:

1. Marilyn Greenstein and Todd M Feinman, "*Electronic Commerce*," Tata McGraw-Hill, 2000.
2. Brenda Kienan, "*Managing E-Commerce Business*," PHI, 2001.

MCA IV-Semester

(16MC40108) SOFTWARE PROJECT MANAGEMENT

(Professional Elective – II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Software Engineering".

COURSE DESCRIPTION: Software Models and process improvement ; Principles of software management system and life cycle phases; Workflows and checkpoints of the process; scheduling and work break down structure ; Process automation ; Software metrics ; Future generation software economics.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on
- Software Economics
- Engineering and Production stages
- Artifacts of the process
- Check points of the process
- Process Automation and Tailoring of the process

CO2. Analyze the resources required for a project and to produce a work plan and resource schedule.

CO3. Design and develop project plans to address real-world management Challenges.

CO4. Synthesize the development of project by assessing quality of project using metrics.

CO5. Apply process methods to manage the software projects at each stage of software development life cycle.

CO6. Commit to ethics to adapt conventional and modern software project management principles for developing the software projects.

DETAILED SYLLABUS:

UNIT- I: INTRODUCTION TO CONVENTIONAL SOFTWARE MANAGEMENT AND IMPROVING SOFTWARE ECONOMICS (11 Periods)

Conventional Software Management: The waterfall model, conventional software management performance.

Evolution of Software Economics: Software Economics, pragmatic software cost estimation.

Improving Software Economics: Reducing Software product size, improving software processes, improving team effectiveness, improving automation through software environments, Achieving required quality, peer inspections: A Pragmatic view.

UNIT- II: PRINCIPLES, LIFE CYCLE PHASES AND ARTIFACTS OF THE PROCESS (12 Periods)

The old way and the new: The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process

Life cycle phases: Engineering and production stages, inception phase, Elaboration phase, construction phase, transition phase.

Artifacts of the process: The artifact sets, Management artifacts, Engineering artifacts, pragmatic artifacts.

UNIT –III: SOFTWARE ARCHITECTURE, WORKFLOWS AND CHECKPOINTS OF THE PROCESS (12 Periods)

Model based software architectures: A Management perspective and technical perspective.

Work Flows of the process: Software process workflows, Iteration workflows.

Checkpoints of the process: Major mile stones, Minor Milestones, Periodic status assessments.

Iterative Process Planning: Work breakdown structures, Planning guidelines, Cost and schedule estimating process, Iteration planning process, Pragmatic planning.

UNIT-IV: PROJECT ORGANIZATIONS AND RESPONSIBILITIES, PROCESS AUTOMATION (10 Periods)

Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, Evolution of Organizations.

Process Automation: Tools: Automation Building blocks, The Project Environment: Roundtrip Engineering, Change management, Infrastructures, Stakeholder Environments.

UNIT-V: PROJECT CONTROL AND PROCESS INSTRUMENTATION, TAILORING THE PROCESS AND FUTURE SPM (10 Periods)

Project Control and Process instrumentation: The seven core Metrics, Management indicators, Quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation.

Tailoring the Process: Process discriminants.

Future Software Project Management: Modern Project Profiles, Next generation Software economics, modern process transitions.

Total Periods: 55

TEXT BOOK:

1. Walker Royce, "*Software Project Management*," Pearson Education, 6th Edition, 2007.

REFERENCE BOOKS:

1. Bob Hughes and Mike Cotterell, "*Software Project Management*," Tata McGraw-Hill, 4th Edition, 2006.
2. Joel Henry, "*Software Project Management*", Pearson Education, 2004.
3. Pankaj Jalote, "*Software Project Management in practice*," Pearson Education, 2002.

IV-Semester

(16MC40109) INFORMATION RETRIEVAL SYSTEMS

(Professional Elective-II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Data Warehousing and Data Mining".

COURSE DESCRIPTION: Functional overview; Information Retrieval System capabilities; automatic Indexing; stemming algorithms; automatic term clustering; user search techniques; Information visualization technologies; software text search algorithms; Information system evaluation.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on
- Theoretical and practical aspects of information retrieval Systems.
- Automatic indexing
- Hardware/ Software text search algorithms and Information visualization

CO2. Analyze the functionality of several searches and browse algorithms.

CO3. Design and develop the probabilistic retrieval methods, algorithms and ranking principles.

CO4. Apply porter stemming and successor stemming algorithms to extract meaningful and relevant patterns.

CO5. Use various search engines effectively by applying optimum searching techniques.

DETAILED SYLLABUS:

UNIT – I: INTRODUCTION AND INFORMATION RETRIEVAL SYSTEM CAPABILITIES (12 Periods)

Introduction to IRS: Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses.

Information Retrieval System Capabilities: **Search Capabilities**- Boolean logic, Proximity, contiguous word phrases, fuzzy searches, Term masking, **Browse Capabilities**-Ranking, Zoning, Highlighting, **Miscellaneous Capabilities**- vocabulary Browse, canned query.

UNIT – II: CATALOGING AND INDEXING AND DATA STRUCTURE (10 Periods)

Cataloging and Indexing: Objectives, Indexing Process, Automatic Indexing, Information Extraction.

Data Structure: Introduction to data structure, Stemming Algorithms: Introduction to stemming process, Porter stemming algorithm, Successor stemmers, Inverted file Structure, N-Gram Data Structures PAT Data Structure.

UNIT -III: AUTOMATIC INDEXING (10 Periods)

Automatic Indexing: Classes of Automatic Indexing, Statistical Indexing-probabilistic weighting, Vector weighting, Natural Language, Concept Indexing, Hypertext Linkages.

Document and Term Clustering: Introduction to clustering, Thesaurus Generation, Automatic term clustering- complete term relation method, clustering using existing clusters, one pass assignments**.**

UNIT – IV: USER SEARCH TECHNIQUES AND INFORMATION VISUALIZATION (11 Periods)

User Search Techniques: Search Statements and Binding, Similarity Measures and Ranking, Relevance Feedback, Selective Dissemination of Information Search, Weighted Searches of Boolean Systems, Searching the Internet and Hypertext.

Information Visualization: Introduction, Cognition and Perception, Information Visualization Technologies.

UNIT – V: TEXT SEARCH ALGORITHMS AND INFORMATION SYSTEM EVALUATION (12 Periods)

Text Search Algorithms: Introduction to text search techniques, Software Text Search Algorithms, Hardware Text Search Systems

Information System Evaluation: Introduction to information system evaluation, Measures Used in System Evaluations, Measurement Example – TREC Results. **Total periods: 55**

TEXT BOOK:

1. Gerald J. Kowalski and Mark T. Maybury, "*Information Storage and Retrieval Systems,*" Springer International Edition, 2nd Edition, 2009.

REFERENCE BOOKS:

1. Ricardo Baeza – Yates, Berthier Ribeiro-Neto, "*Modern Information Retrieval,*" Pearson Education, 2004.
2. Robert R. Korfhage, "*Information Storage and Retrieval*," John Wiley and Sons, 1997.

MCA IV-Semester

(16MC40110) **WIRELESS NETWORKS**

(Professional Elective – II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A Course on "Computer Networks".

COURSE DESCRIPTION: Concepts of Medium access alternatives; Generations of Wireless WANS; Adhoc and Wireless Sensor Networks; Wireless MANS and PANS.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate Knowledge on
- Wireless WANS
- Wireless LANS
- Adhoc and Sensor Networks and
- Wireless MANS and PANS

CO2. Analyze the sensor and Adhoc network models and its classifications.

CO3. Design and develop Network applications for Wireless devices like smart phones and tablets.

CO4. Solve complex connectivity problems - Security, Quality of service and routing optimization at in wireless Networks.

CO5. Select and apply the latest wireless network protocols - LTE, Wi-Fi and Bluetooth in developing and operating wireless networks.

CO6. Provide innovative privacy and security measures for accessing of Wireless Network devices adapting standards-IEEE 802.11, IEEE 802.11b and IEEE 802.11.

DETAILED SYLLABUS:

UNIT- I : MULTIPLE RADIO ACCESS (11 Periods)

Medium Access Alternatives: Fixed-Assignment for Voice Oriented Networks, Random Access for Data Oriented Networks, Handoff and Roaming Support, Security and Privacy.

UNIT -II : WIRELESS WANS (11 Periods)

First Generation Analog, Second Generation TDMA – GSM, Short Messaging Service in GSM, Second Generation CDMA – IS-95, GPRS - Third Generation Systems (WCDMA/CDMA 2000).

UNIT- III: WIRELESS LANS (11 Periods)

Introduction to wireless LANs - IEEE 802.11 WLAN – Architecture and Services, Physical Layer- MAC sublayer- MAC Management Sublayer, Other IEEE 802.11 standards, HIPERLAN, WiMax standard.

UNIT- IV: ADHOC AND SENSOR NETWORKS (11 Periods)

Characteristics of MANETs, Table-driven and Source-initiated On Demand routing protocols, Hybrid protocols, Wireless Sensor networks- Classification, MAC and Routing protocols.

UNIT- V: WIRELESS MANS AND PANS (11 Periods)

Wireless MANs – Physical and MAC layer details, Wireless PANs – Architecture of Bluetooth Systems, Physical and MAC layer details, Standards.

Total Periods: 55

TEXT BOOKS:

1. William Stallings, "*Wireless Communications and networks*," Pearson Education, 2nd Edition, 2007.
2. Dharma Prakash Agrawal and Qing-An Zeng, "*Introduction to Wireless and Mobile Systems*," Thomson India Edition, 2nd Edition, 2007.

REFERENCE BOOKS:

1. Vijay. K. Garg, "*Wireless Communication and Networking*," Morgan Kaufmann Publishers, 2007.
2. Kaveth Pahlavan, Prashant Krishnamurthy, "*Principles of Wireless Networks*," Pearson Education Asia, 2002.
3. Gary. S. Rogers and John Edwards, "*An Introduction to Wireless Technology*," Pearson Education, 2007.

MCA – IV Semester

(16MC40111) BUSINESS INTELLIGENCE

(Professional Elective – II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Data Warehousing and Data Mining".

COURSE DESCRIPTION: Decision support and business intelligence**;** Framework of computerized decision support and business intelligence; DSS classifications; DSS components; Mathematical models for decision support; BPM methodologies; BPM technologies; BPM applications; Artificial intelligence; Fuzzy logic; Fuzzy inference systems; Natural Language Processing and Artificial Intelligence.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:
- Big data technologies, Data Mining (DM), Knowledge Management, Expert Systems, Natural Language Processing and Artificial Intelligence, banking, finance and insurance.
- Data mining techniques.
- Frameworks of computerized decision support system and Business Intelligence.

CO2. Analyze the scenarios like customer choices and preferences for an organization using predictive analytics.

CO3. Design and develop a DSS with the dimensions like Communications-driven and group, Data-driven, Document-driven, Knowledge-driven, Model-driven.

CO4. Develop solutions for the problems in data warehouse by analyzing a BI maturity model to identify critical attributes and mapping operational data to data warehouse.

CO5. Apply modern techniques like variable identification, predictive analytics of Mathematical models for identification and environmental analysis of the problem.

DETAILED SYLLABUS:

UNIT – I: DECISION SUPPORT AND BUSINESS INTELLIGENCE (12 Periods)

Decision support systems and Business Intelligence: Introduction, Changing business environments and computerized decision support, Managerial Decision making, Computerized support for decision making, An early framework for computerized decision support, the concept of decision support systems, A framework for business intelligence.

Computerized Decision Support: Introduction and definitions, Models, Phases of decision-making process, Decision-making Phases.

UNIT–II: DECISION SUPPORT SYSTEMS CONCEPTS, METHODOLOGIES, AND TECHNOLOGIES (10 Periods)

Decision support system configurations, Decision support system description, Decision support system characteristics and capabilities, Decision support system classifications, components of Decision support system.

Modeling and Analysis: Management support systems modeling, Structure of mathematical models for decision support, Certainty, uncertainty and risk.

UNIT -III: DATA MINING FOR BUSINESS INTELLIGENCE (11 Periods)

Data mining concepts and applications, Data mining applications, Data mining process, data mining methods, Data mining software tools.

Text and web mining: Text mining concepts and definitions, Natural language processing, Text mining applications, text mining process, Text mining tools, web mining overview.

UNIT–IV:BUSINESS PERFORMANCE MANAGEMENT AND KNOWLEDGE MANAGEMENT (10 Periods)

Business performance management: Business Performance Management (BPM) overview**,** Performance measurement, BPM methodologies, BPM Technologies and Applications, Performance dashboards and scorecards.

Knowledge Management: Introduction to Knowledge Management, Organizational learning and transformation, Knowledge management activities, Approaches to knowledge Management, Information technology in knowledge management.

UNIT – V: INTELLIGENT SYSTEMS (12 Periods)

Concepts and definitions of artificial intelligence, expert systems, Applications of Expert systems, Structure of Expert systems, Knowledge Engineering**,** Machine Learning techniques, case-based reasoning, Genetic algorithms and Developing GA applications, Fuzzy logic and Fuzzy inference systems, Support vector machines.

Total periods: 55

TEXT BOOK:

1. Efraim Turban, E. Aronson, Teng - Peng Liang, and Ramesh Sharda, "*Decision Support and Business Intelligence Systems*," Pearson Education, 9th Edition, 2009.

REFERENCE BOOK:

1. David Loshin, "*Business Intelligence*," Morgan Kaufmann Publishers, 2003.

MCA – IV Semester

(16MC4HS31) SOFT SKILLS LABORATORY

(Professional Elective – II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: A Course on "English Language Lab".

COURSE DESCRIPTION: Body Language; Assertiveness; Goal Setting; Creative Thinking; Interpersonal Skills; Team Work; Conflict Management; Etiquette; Report Writing; Group Discussions; Interviewing Skills.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Acquire knowledge on:
- Goal Setting
- Creative Thinking
- Leadership Skills and
- Team Work

CO2. Analyse the functional knowledge on
- Body Language
- Interpersonal Skills and
- Stress Management

CO3. Apply the techniques of soft skills in a problem situation enhanced through multimedia software.

CO4. Function effectively as an individual and as a member in diverse teams.

CO5. Communicate effectively in public speaking in formal and informal situations.

LIST OF EXERCISES:
1. Body Language
2. Assertiveness
3. Goal Setting
4. Creative Thinking
5. Interpersonal Skills
6. Team Work
7. Conflict Management
8. Etiquette
9. Report Writing
10. Resume Writing
11. Group Discussions
12. Interviewing Skills

Total Lab Slots: 10

REFERENCE BOOKS:

1. R. C. Sharma & Krishna Mohan, "*Business Correspondence and Report Writing*," Tata McGraw-Hill Publishing Company Limited, Third Edition, New Delhi, 2012.
2. Gopalswamy Ramesh and Mahadevan Ramesh, "*The Ace of Soft Skills*," Pearson, Noida, 2010.
3. Jeff Butterfeild, "*Soft Skills for Everyone*," Cengage learning, Delhi, 2011.
4. Barun K. Mitra, "*Personality Development and Soft Skills*," Oxford University Press, Noida, 2012.

SUGGESTED SOFTWARE:
1. ETNL Language Lab Software Version 4.0
2. GEMS – Globarena E- Mentoring System
3. Speech Solutions.
4. English Pronunciation Dictionary by Daniel Jones.
5. Learning to Speak English 8.1, The Learning Company – 4 CDs.
6. Mastering English: Grammar, Punctuation and Composition.
7. English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
8. Dorling Kindersley Series of Grammar, Punctuation, Composition etc.
9. Language in Use 1, 2 and 3.
10. Cambridge Advanced Learner's Dictionary - 3rd Edition.
11. Centronix – Phonetics.
12. Let's Talk English, Regional Institute of English South India.
13. Ultimate English Tutor.

MCA IV-SEMESTER
(16MC40131) **BIG DATA ANALYTICS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A Course on "Big Data Analytics".

COURSE DESCRIPTION: Installation of Hadoop; Perform analytics on Weather sensors application; Analysis of reports in R and HIVE Tool.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:
- Map Reduce Framework
- R programming

CO2. Analyze Structured, unstructured and semi-structured types of data to perform data analytics.

CO3. Design and develop Map Reduce programs on Hadoop platform for weather sensor data.

CO4. Solve complex problems in Big Data by adopting appropriate techniques to provide insights to facebook datasets.

CO5. Apply modern tools such as HIVE and R to perform analytics in a user friendly environment.

CO6. Communicate effectively in implementing social network data sets for analysis using R tool with respect to visualization of hidden patterns.

CO7. Asses the Weather sensors applications with respect to local or global climatic conditions.

CO8. Demonstrate knowledge as an individual to manage OLA dataset on R and HIVE to handle diverse data.

LIST OF EXERCISES:

1. Setting up and Installing Hadoop to handle Big data.
2. Set up a pseudo-distributed, single-node Hadoop cluster backed by the Hadoop Distributed File System, running on Ubuntu Linux.

   After successful installation on one node, configuration of a multi-node Hadoop cluster (one master and multiple slaves).
3. Implement the following file management tasks in Hadoop:
   a) Adding files and directories
   b) Retrieving files
   c) Deleting files
   - Hint: A typical Hadoop workflow creates data files (such as log files) elsewhere and copies them into HDFS using one of the above command line utilities.
4. Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.
5. Write a Map Reduce program that mines weather data. Weather sensors collecting data every hour at many locations across the globe gather a large volume of log data, which is a good candidate for analysis with MapReduce, since it is semi structured and record-oriented.
6. Implement Matrix Multiplication with Hadoop Map Reduce
7. Perform setting up and Installing R studio.
8. Implement R scripts to perform sorting and grouping of data.
9. Implement R scripts to perform joining, projection, and filtering of data.
10. Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes.
11. Unstructured data into NoSQL data and do all operations such as NoSQL query with API.

REFERENCE BOOKS:

1. Tom White, "*Hadoop: The Definitive Guide,*" Oreilly and Yahoo press, 3rd Edition, 2012.
2. Judith Hurwitz, Alan Nugent, Dr. Fern Halper, and Marcia Kaufman, "*Big Data for Dummies*," John Wiley & Sons, Inc., 2013.
3. Frank J. Ohlhorst, "*Big Data Analytics: Turning Big Data into Big Money*", Wiley Publication, December 2012.

MCA IV-Semester

(16MC40132) LINUX AND WEB PROGRAMMING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Courses on "Linux Programming" and "Web Programming".

COURSE DESCRIPTION: HTML, Java Script, XML and Shell Script; Web Application Development using Servlets, Java Server Pages, PHP and JDBC; Tomcat Server and XAMP Server for Deploying Web Applications.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate Knowledge on:
- Client side scripting
- AJAX programming and Application Servers
- HTML, DHTML, Java Script and XML

CO2. Analyze 2-tier, 3-tier and MVC architectures for web application development.

CO3. Design and develop web Applications using Dynamic HTML with Java Script, XML technology.

CO4. Investigate and solve complex problems using Server-side technologies like servlets, JDBC technologies and adapt Tomcat Server and XAMPP Server for deployment.

CO5. Use JSP and PHP to implement E-Commerce applications that has potential insights.

CO6. Communicate effectively in implementing web application programs using HTML, JAVA script and AJAX.

CO7. Develop societal, environmental and health related applications using Servlets, JSP and PHP.

CO8. Work with diverse teams using web technology frame-works towards developing quality software applications.

LIST OF EXERCISES:

1. a. Develop static pages of an online Book Store using HTML (the pages should resemble: www.amazon.com). The website should consist of the following pages.
   i. Home Page
   ii. Registration and User Login
   iii. Books Catalog

   b. Validate the Registration and User Login pages using JavaScript.
2. a. Programs using XML Schema, XSLT/XSL

   b. Program using DOM / SAX.
3. a. Filtering utilities

   b. Networking utilities
4. Write a basic servlet program that must display information like

   a. Request method used by the client and

   b. Current system date
5. a. Write a shell script that copies multiple files to a directory.

   b. Write a shell script (small calculator) that adds, subtracts, multiplies and divides the given two integers. There are two division options: one returns the quotient and the other returns reminder. The script requires 3 arguments: The operation to be used and two integer numbers. The options are add (-a), subtract (-s), multiply (-m), quotient (-c) and reminder (-r)

6. a. Write a JSP program for finding total number of visitors in a site to keep track of active users at a given instance of time, and also display the user session starting time.
   b. Write a JSP program that creates a cookie on username which is send from html file and display the cookie value as a response. The cookie must be active based on the maximum active interval time.
7. a. Write a shell script that counts the number of lines and words present in a given file.
   b. Write a shell script that displays the list of all files in the given directory.
8. Develop java program for following SQL operations using JDBC.
   i. Create
   ii. Insert
   iii. Update and
   iv. Delete

Consider the following schema:

Employee (EmpName, EmpNo Primary Key, Department, Salary)

9. a. Write a shell script to generate a multiplication table.
   b. Write a shell script to reverse the rows and columns of a matrix.
10. Generate a JSP page that will retrieve the Employee information from the database. The page should display the employee records in a tabular format.
11. Implement in C the following UNIX commands using system calls.
    i) cat ii) ls iii) mv
12. a. Write a PHP program to demonstrate GET and POST method of passing the data between pages.
    b. Write a PHP program to demonstrate Array, Key-pair values.
    c. Write a PHP program to read and write the Data from the Database.
13. **Minor Project:** Design and develop an online library management system using Model View Controller (MVC) architecture.

REFERENCE BOOKS:

1. Kogent Learning Solutions Inc., "*Web Technologies Black Book",* Dreamtech Press, 2011.
2. Steven Holzner, *"The Complete Reference PHP"*, Tata McGraw-Hill Education Pvt. Ltd., 2007.

MCA – V Semester

(16MC50101) CLOUD COMPUTING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: Courses on "Computer Networks" and "Operating Systems".

COURSE DESCRIPTION: Virtualization, Cloud Computing Fundamentals, Deployment Models; Cloud Computing Architecture; Cloud Computing Mechanisms; Cloud Security; Cloud Disaster Recovery; Working with Clouds; and Case Studies.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on services, architecture, types of infrastructural models, disaster recovery and Virtualization.
CO2. Analyze the issues in cloud computing Data, Network and Host security.
CO3. Apply API development skills in web applications for Cloud deployment.
CO4. Use research based knowledge to build cloud applications.
CO5. Use advanced programming languages to access cloud services.
CO6. Build cloud environment suitable for societal requirements.

DETAILED SYLLABUS:

UNIT-I: FUNDAMENTAL CLOUD COMPUTING (10 Periods)

Understanding Cloud Computing: Origins and Influences, Basic Concepts and Terminology, Goals and Benefits, Risks and Challenges.

Fundamental Concepts and Models: Roles and Boundaries, Cloud Characteristics, Cloud Delivery Models, Cloud Deployment Models.

UNIT-II: CLOUD COMPUTING MECHANISMS AND ARCHITECTURE (11 Periods)

Cloud-Enabling Technology: Broadband Networks and Internet Architecture, Data Center Technology, Virtualization Technology, Web Technology, Multitenant Technology, Service Technology.

Fundamental Cloud Architectures: Architecture - Workload Distribution, Resource Pooling, Dynamic Scalability, Elastic Resource Capacity, Service Load Balancing, Cloud Bursting, Elastic Disk Provisioning, Redundant Storage.

UNIT-III: CLOUD COMPUTING ADVANCED ARCHITECTURES (12 Periods)

Advanced Cloud Architectures: Architecture-Hypervisor Clustering, Load Balanced Virtual Server Instances, Non-Disruptive Service Relocation, Zero Downtime, Cloud Balancing, Resource Reservation, Dynamic Failure Detection and Recovery, Bare-Metal Provisioning, Rapid Provisioning, Storage Workload Management.

Specialized Cloud Architectures: Architecture - Direct I/O Access, Direct LUN Access, Dynamic Data Normalization, Elastic Network Capacity, Cross-Storage Device Vertical Tiering, Intra-Storage Device Vertical Data Tiering, Load Balanced Virtual Switches, Multipath Resource Access, Persistent Virtual Network Configuration, Redundant Physical Connection for Virtual Servers, Storage Maintenance Window.

UNIT-IV: CLOUD SECURITY AND DISASTER RECOVERY (11 Periods)

Cloud Security: Data security, Network security, Host security, Cloud Security Services and Cloud Security Possible Solutions.

Cloud Disaster Recovery: Disaster Recovery Planning, Disasters in the Cloud, Disaster Management, Capacity Planning and Cloud Scale.

UNIT-V: CLOUD SERVICE MODELS AND CASE STUDIES (11 Periods)

Cloud Service Models: Software as a Service (SaaS)- Characteristics, Examples and Applications. Platform as a Service (PaaS)- Characteristics, Examples and Applications. Infrastructure as a Service (IaaS)- Characteristics, Examples and Applications.

Case Studies: SaaS: Salesforce.com, Facebook.com; PaaS: Google App Engine, MS-Azure and IBM Bluemix; IaaS: Amazon EC2, Amazon S3 and Netflix. **Total Periods: 55**

TEXT BOOKS:

1. Thomas Erl and RicardoPuttini "*Cloud Computing- Concepts, Technology & Architecture,"* Pearson Publication, 2013.
2. George Reese "Cloud Application Architectures", O'Reilly Publications, 2009.

REFERENCE BOOKS:

1. Barrie Sosinsky, *"Cloud Computing Bible",* Wiley India Pvt. Ltd, 2011.
2. Rajkumar Buyya, James Broberg and Andrzej Goscinski, *"Cloud computing principles and paradigms*", John Wiley and Sons, 2011.
3. John W. Rittinghouse, James F. Ransome, *"Cloud Computing implementation, Management and Security*", CRC Press, Taylor and Francis group, 2010.

MCA V-Semester

(16MC50102) **MOBILE APPLICATION DEVELOPMENT**

Int. Marks	**Ext. Marks**	**Total Marks**	**L**	**T**	**P**	**C**
40	60	100	4	-	-	4

PREREQUISITES: Courses on "Computer Networks", "Web Programming" and "Database Management systems"

COURSE DESCRIPTION:
J2ME concepts; J2ME Architecture and Development Environment; Commands, Items and Event Processing; Low level and High Level Displays; e Applications by using Wireless Tool Kit and Connecting with SQL Data Bases.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on J2ME and Wireless Technology.
CO2. Analyze the commands, items and event processing in MIDlet Programming.
CO3. Design and develop the applications for Mobile Devices.
CO4. Solve the High level and Low level Display problems in Mobiles Screens and Canvas.
CO5. Select appropriate tool like wireless tool kit-MIDlet programming to develop Mobile Applications.
CO6. Create security alerts in mobiles for betterment of individual and society.

DETAILED SYLLABUS:

UNIT -I: J2ME OVERVIEW (11 periods)

Introduction to J2ME: Java 2 Micro Edition and the World of Java, Inside J2ME, J2ME and Wireless Devices.

Small Computing Technology: Wireless Technology, Radio Data Networks, Microwave Technology, Mobile Radio Networks, Messaging, Personal Digital Assistants.

J2ME Architecture and Development Environment: J2ME Architecture, Small Computing Device Requirements, Run-Time Environment, MIDlet Programming, Java Language for J2ME, J2ME Software Development Kits, Hello World J2ME Style, Multiple MIDlets in a MIDlet Suite, J2ME Wireless Toolkit.

UNIT II: J2ME PRACTICES, PATTERNS, EVENTS AND SCREENS (11 periods)

J2ME Practices and Patterns: The Reality of Working in a J2ME World, Best Practices. **Commands, Items, and Event Processing:** J2ME User Interfaces, Display Class, the Palm OS Emulator, Command Class, Item Class, Exception Handling.

High-Level Display-Screens*:* Screen Class, Alert Class, Form Class, Item Class, List Class, Text Box Class, Ticker Class.

UNIT III: CANVAS AND RECORD MANAGEMENT SYSTEM (11 periods)

Low-Level Display-Canvas: The Canvas, User Interactions, Graphics, Clipping Regions, Animation.

Record Management System : Record Storage, Writing and Reading Records, Record Enumeration, Sorting Records, Searching Records, Record Listener.

UNIT IV: J2ME DATABASE CONCEPTS AND JDBC OBJECTS (11 periods)

J2ME Database Concepts: Data, Databases, database schema, the art of indexing.

JDBC Objects: Database Connection, statement Objects, Result set, Transaction Processing, Metadata, Data Types, Exceptions.

UNIT V: EMBEDDED SQL AND GENERIC CONNECTION FRAMEWORK (11 periods)

JDBC and Embedded SQL: Model Programs, Tables, Indexing, Inserting Data into Tables, Selecting Data from a Table, Metadata, Updating Tables, Deleting Data form a Table, Joining Tables, Calculating Data, Grouping and Ordering Data, Sub queries, VIEWs.

Generic Connection Framework: The Connection, Hypertext Transfer Protocol, Communication Management Using HTTP Commands, Session Management, Transmit as a Background Process.

Total Periods: *55*

TEXT BOOK:

1. James Keogh,"*J2ME: The Complete Reference*," Tata McGraw-Hill, 2003.

REFERENCE BOOKS:

1. Ray Rischpater, "*Beginning Java ME Platform*, " Apress, 2009.
2. Brian Fling, *"Mobile Design and Development: Practical concepts and techniques for creating mobile sites and web apps*," O'Reilly, 2009.

MCA V-SEMESTER

(16MC50103) SOFTWARE TESTING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Software Engineering".
COURSE DESCRIPTION:
Software Testing Basics: Goals, Defects, Terminology, Methodology, STLC in SDLC, Verification and Validation; Software Testing Techniques: White box testing, Black Box Testing, Regression testing; Test Management: Test Planning, Design and Specifications; Test Automation: Tool selection and Guidelines.
COURSE OUTCOMES: On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on:
- Software Testing Life Cycle.
- Testing Techniques.
- Test Management and Metrics.
- Regression Testing
- Test Automation

CO2. Analyze testing circumstances and their resultants in software development.
CO3. Design and develop the appropriate test cases in accordance to the software development model.
CO4. Use problem solving skills to control and monitor the testing process.
CO5. Apply testing tools for testing the software quality.
CO6. Apply contextual knowledge to perform testing on software related to societal applications.

DETAILED SYLLABUS:
UNIT-I: INTRODUCTION TO SOFTWARE TESTING (10 periods)
Evolution of Software Testing, Software Testing—Myths and Facts, Goals of software testing, Psychology for software testing, Software testing definitions, Model for software testing, Effective software testing vs. exhaustive software testing, Effective testing is hard, Software testing as a process.
Terminology and Methodology: Software testing terminology, Software Testing Life Cycle (STLC), Software testing methodology.
UNIT-II: TESTING TECHNIQUES (12 periods)
White Box Testing
Need of white-box testing, Logic coverage criteria, Basis path testing, Graph matrices, Loop testing, Data flow testing, Mutation testing.
Black Box Testing
Boundary Value Analysis (BVA), Equivalence class testing, State table-based testing, Decision table-based testing, Cause-effect graphing based testing, Error guessing.
UNIT-III: SOFTWARE TEST MANAGEMENT AND METRICS (11 periods)
Test Management: Test organization, Structure of testing group, Test planning, detailed test design, Test specifications.
Software Metrics: Definition of software metrics, Classification of software metrics, Size metrics.
Efficient Test Suit Management: Minimizing Test Suite and its Benefits, Test Suit Minimization problem, Test suite Prioritization, Types of Test case prioritization, Prioritization Techniques.
UNIT-IV: REGRESSION AND AUTOMATION (10 periods)
Static Testing: Inspections, Walkthroughs, Technical reviews.
Regression Testing: Progressive vs. regressive testing, Regression testing produces quality software, Regression testability, Objectives of regression testing, Regression testing types, Defining regression test problem, Regression testing techniques.
Automation and Testing Tools: Need for automation, Categorization of testing tools, Selection of testing tools, Costs incurred in testing tools, Guidelines for automated testing, Overview of some commercial testing tools.
UNIT -V: TESTING FOR SPECIALIZED ENVIRONMENTS AND FUNCTIONAL TEST TOOL (12 Periods)
Testing for specialized Environment: Object-oriented Testing software and web-based software, challenges in testing for web-based software, testing of web-based systems.
Functional Test Tool: Overview of Functional test tool (UFT/RFT/Selenium), Test Recording, Test Running, Synchronization of test cases, creating checkpoints, testing with parameterization.

Total Periods: 55

TEXT BOOK:
1. Naresh Chauhan, "Software Testing: Principles and Practices," Oxford University Press, 2nd Edition, 2016.

REFERENCE BOOKS:
1. Boris Beizer, "Software Testing Techniques," Dream Tech Press, 2nd Edition, 2004.
2. Dr. K. V. K. K. Prasad, "Software Testing Tools," Dreamtech, 2004.

MCA V – Semester

(16MC50104) SOFTWARE QUALITY ASSURANCE

(Professional Elective – III)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A Course on "Software Engineering".

COURSE DESCRIPTION: Software Quality; Software Quality Assurance; Project Life Cycle components; Software Quality Infrastructure; Development Methodologies; Procedures and Work Instructions; Standards, Certificates and assessments.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on quality, architecture, metrics of software development.

CO2. Analyze software quality plan for a software project to include sections on change management, configuration management, defect elimination, validation and verification and measurement.

CO3. Design software quality plans for a software project and asses their capability to adopt quality standards.

CO4. Assess the quality of software product using software quality metrics.

CO5. Adapt Procedures and work instructions, Templates, Checklists and 3S development for software quality infrastructure.

CO6. Commit to ethics to apply ISO and IEEE standards in preparing the quality plan and documents.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION TO SOFTWARE QUALITY AND ARCHITECTURE (10 Periods)

Need for Software quality, Quality challenges, Software quality assurance (SQA) - Definition and objectives; Software quality factors, McCall's quality model, SQA system - an SQA architecture, Software Project life cycle Components; Pre project quality components - Development and quality plans.

UNIT II: SQA COMPONENTS AND PROJECT LIFE CYCLE (11 Periods)

Software Development methodologies, Quality assurance activities in the development process, Verification and Validation, Reviews, Software Testing, Software Testing implementations, Quality of software maintenance - Pre Maintenance of software quality components, Quality assurance tools; CASE tools for software quality, Software maintenance quality, Project Management.

UNIT III: SOFTWARE QUALITY INFRASTRUCTURE (11 Periods)

Procedures and work instructions , Templates , Checklists, 3S development , Staff training and certification, Corrective and preventive actions, Configuration management - Software change control, Configuration management audit; Documentation control - Storage and retrieval.

UNIT IV: SOFTWARE QUALITY MANAGEMENT AND METRICS (11 Periods)

Project progress control - Computerized tools, Software quality metrics - Objectives of quality measurement, Process metrics, Product metrics, Implementation, Limitations of software metrics; Cost of software quality - Classical quality cost model, extended model, Application of Cost model.

UNIT V: STANDARDS, CERTIFICATIONS AND ASSESSMENTS (12 Periods)

Quality management standards- ISO 9001 and ISO 9000-3, capability Maturity Models, CMM and CMMI assessment methodologies , Bootstrap methodology, SPICE Project; SQA project process standards- IEEE standard 1012 and 1028; Organization of Quality Assurance - Department management responsibilities, Project management responsibilities; SQA units and other actors in SQA systems. **Total Periods: 55**

TEXT BOOK:

1. Daniel Galin, "*Software Quality Assurance: From Theory to Implementation*", Pearson Publication, 2004.

REFERENCES:

1. Alan C. Gillies, "*Software Quality: Theory and Management*", International Thomson Computer Press, 1997.
2. Mordechai Ben, Menachem "*Software Quality: Producing Practical Consistent Software*", International Thompson Computer Press, 1997.

MCA – V Semester

(16MC50105) **SEMANTIC WEB**

(Professional Elective – III)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: Courses on "Web Programming" and "Computer Networks".

COURSE DESCRIPTION: Semantic web fundamentals; Semantic web technology; Ontology web language; Swoogle; Semantic web services.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:

- Semantic web search
- RDF and SWOOGLE
- Semantic web services
- RDFS and OWL

CO2. Analyze layers of web architecture for describing web content.

CO3. Design semantic web search engine for capturing information on the current web

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO SEMANTIC WEB (10 periods)

The world of the semantic web: WWW, Internet usage, Meta data, Search Engine for traditional web and Semantic Web, Web Page Markup Problem, "Common Vocabulary"- Problem, Query-Building Problem.

UNIT-II: SEMANTIC WEB TECHNOLOGY (11 periods)

Resource Description Framework (RDF), Rules of RDF, Aggregation-Distributed information, core elements of RDFS, Ontology and Taxonomy, Inference based on RDF schema, RDF relationship with DL, XML, and RDF tools.

UNIT-III: WEB ONTOLOGY LANGUAGE –OWL (11 periods)

Web Ontology Language (OWL), Define Classes: Localize Global Properties, Set Operators and Enumeration, Define properties; Ontology Matching and Distributed Information , OWL ontology Header, Camera Ontology in OWL, Three Faces of OWL, Validating OWL ontology.

UNIT-IV: SWOOGLE (12 periods)

Swoogle Architecture, FOAF, Semantic markup, Issues, prototype system, Design of Semantic web search engine, Discovery and indexation strategy, usage of prototype system, Prototype Search Engine Performance.

UNIT-V: SEMANTIC WEB SERVICES (11 periods)

Need for Semantic Web Services Semantic web services and applications, OWL-S: Upper ontology, Building blocks, Validating OWL-S document semantics, WSDL-S, OWL-S to UDDI mapping, Matchmaking Engines, Design of the search engine and implementations. **Total Periods: 55**

TEXT BOOK:

1. Liyang Yu, *"Introduction to the Semantic Web and Semantic web services,"* Chapman and Hall/CRC, Taylor & Francis group, 2007.

REFERENCE BOOKS:

1. Johan Hjelm*, "Creating the Semantic Web with RDF,"* Wiley, 2001.
2. Grigoris Antoniou and Frank van Harmelen, *"A Semantic Web Primer",* MIT Press, 2004.

MCA – V Semester

(16MC50106) INFORMATION SECURITY

(Professional Elective – III)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Computer Networks".

COURSE DESCRIPTION: cryptographic algorithms; Classical Encryption Techniques; Public key and Private key encryption; security models; Hash Algorithms; E-mail and IP Security; analysis of security principles in internet and system security; Intrusion Detection.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on
- Symmetric and Asymmetric Encryption Algorithms
- Key distribution and message Authentication
- Hash algorithms and digital signature techniques
- IP security and Web Security
- Intrusion Detection and Firewall configurations

CO2. Analyze appropriate Symmetric, Asymmetric Encryption algorithms and Hash Algorithms to provide Confidentiality and Authentication.

CO3. Design solutions to problems related to Public-Key Encryption, Digital signatures, Secure Hash Functions.

CO4. Identify efficient ciphers such as Gauss Cipher, Vigenere cipher, Rail Fence Cipher and cryptographic algorithms such as RSA, Diffie-Hellman cryptographic algorithms, Digital Signature standard for Hashing techniques to provide novel solutions for real-time application protocols like PGP, S/MIME, SSL, TLS and SET.

CO5. Use the Cryptographic Techniques - Vigenere cipher, Rail Fence Cipher to provide confidentiality, security Algorithms and hashing techniques to enhance level of protection in area of digital communication.

CO6. Commit to ethics in authentication and access control methods to implement policies and mechanisms on business operations using Digital Signature Standards.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO SECURITY, CLASSIC ENCRYPTION TECHNIQUES (11 Periods)

Introduction: Introduction to Security - Security Trends, The OSI Security Architecture, Security Attacks, Security Services and Mechanisms. A model for Network security, Internet Standards and the Internet Society.

Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques – Caesar Cipher, Monoalphabetic Ciphers, Playfair Cipher, Hill Cipher, Polyalphabetic Ciphers and One – Time pad. Transposition Techniques.

Block Ciphers and the Data Encryption Standard: Block Cipher Principles, The Data Encryption Standard, The Strength of DES, Multiple Encryption and Triple DES.

UNIT-II: CONFIDENTIALITY USING CONVENTIONAL ENCRYPTION TECHNIQUES (11 Periods)

Advanced Encryption Standard: The AES Cipher, Block Cipher Modes of Operation, Stream Ciphers and RC4, Placement of Encryption Function, Traffic Confidentiality, Key Distribution.

Public-Key Cryptography: Principles of Public-Key Cryptosystems, Public-Key Cryptography algorithms - The RSA Public-Key Encryption Algorithm, Diffie – Hellman Key Exchange, Key Management.

UNIT-III: MESSAGE AUTHENTICATION, HASH FUNCTIONS AND DIGITAL SIGNATURE STANDARD (12 Periods)

Message Authentication: Authentication Requirements, Authentication Functions, Message Authentication Codes.

Hash Functions: Hash Functions, Secure Hash Algorithm – SHA-512 Logic and Round Function, HMAC.

Digital Signatures and Authentication Protocols: Digital Signatures, Authentication Protocols, Digital Signature Standard.

Authentication Applications: Kerberos, X.509 Authentication Service.

UNIT-IV: ELECTRONIC MAIL SECURITY AND IP SECURITY (9 Periods)

Electronic Mail Security: Pretty Good Privacy (PGP) and S/MIME.

IP Security: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

UNIT-V: WEB SECURITY AND SYSTEM SECURITY (12 Periods)

Web Security: Web Security Considerations, Secure Socket Layer and Transport Layer Security, Secure Electronic Transaction.

System Security: Intruders, Intrusion Detection systems, Viruses and Related Threats, Virus Countermeasures, Firewall Design Principles, Trusted Systems.

Case Study: To check the integrity of files in a system using any open source security algorithm.

Total Periods: 55

TEXT BOOK:

1. William Stallings, "*Cryptography and Network Security*", Pearson Education, 4th Edition, 2009.

REFERENCE BOOKS:

1. William Stallings, "*Network Security Essentials (Applications and Standards)*", Pearson Education, 3rd Edition, 2009.
2. Behrouz A. Forouzan, "*Cryptography and Network Security*", Tata McGraw-Hill, 2007.
3. Charlie Kaufman, Radia Perlman and Mike Speciner, "*Network Security - Private Communication in a Public World*", Pearson Education, 2nd Edition, 2005.
4. Michael E. Whitman, Herbert J. Mattord, "*Principles of Information Security*", Cengage Learning, 2008.

MCA V-SEMESTER

(16MC50107) **ENTERPRISE RESOURCE PLANNING**

(Professional Elective – III)

Int. Marks	**Ext. Marks**	**Total Marks**	**L**	**T**	**P**	**C**
40	60	100	4	-	-	4

PREREQUISITES: Courses on "Database Management Systems and Management Information Systems."

COURSE DESCRIPTION: Concepts of ERP; Strategies of ERP Technology; Business models; ERP market.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on systematically planning mechanisms in an enterprise and identify all components in an ERP system and the relationships among the component.

CO2. Analyze ERP Technology Implementations and Modules to develop custom ERP Applications.

CO3. Design and develop an ERP system along with customization using appropriate modeling methods-Entity Relationship Modeling (ERM) and Event-Driven Process Chains (EPC).

CO4. Solve Complex ERP Risks and SAP Business Applications problems.

CO5. Select appropriate tool like SAP AG's ERP used in implementation of ERP system.

DETAILED SYLLABUS:

UNIT – I: INTRODUCTION TO ERP (11 Periods)

Introduction, Business Functions and Business Processes, Integrated Management Information, The Role of enterprise, Business Modeling, Integrated Data Model, Definition of ERP, Common ERP Myths, History of ERP, Reasons for the growth of ERP Market, The advantages of ERP, Risks of ERP: Process Risks, Technological Risks, Implementation issues, Benefits of ERP.

UNIT – II: ERP AND TECHNOLOGY (11 Periods)

Business Process Re-engineering (BPR): Introduction, BPR- Different Phases, Product Life Cycle Management: Introduction, Product Design and Development, Product Data Management (PDM), Product Life Cycle Phases, Product Life Cycle Management (PLM), Supply chain Management (SCM): Evolution of SCM, Advantages of Supply chain Management, Customer Relationship Management (CRM):Function of CRM, Components of CRM, Uses of CRM, Features and Functions of CRM .

UNIT-III: ERP IMPLEMENTATION (11 Periods)

ERP Implementation Challenges, ERP Implementation (Transition) Strategies: Big bang, Phased, Parallel, Process Line, Hybrid, ERP Implementation Life Cycle: Objective of ERP Implementation, Different phases in ERP Implementation, Pre-implementation tasks: Importance of Preparation, before you Leap, Requirement Definition, Process Definition, ERP Post implementation Activities.

UNIT – IV: THE BUSINESS MODULES (11 Periods)

Finance (Fi), Manufacturing (Production), Human Resources (HR), Plant Maintenance (PM), Material Management (MM), Quality Management (QM), Marketing, Sales, Distribution and Services (SD).

UNIT-V: THE ERP MARKET (11 Periods)

ERP Marketplace and Marketplace Dynamics: Market Overview, Marketplace Dynamics, SAP-AG: Company Profile, SAP Business Applications and Solutions, Oracle Corporation: Company Profile, Oracle Application Lines, PeopleSoft, JD Edwards.

Total Periods: 55

TEXT BOOK:

1. Alexis Leon, "*ERP (Demystified Hrs),*" Tata McGraw-Hill, 2nd Edition, 2008.

REFERENCE BOOK:

1. Ashim Singla, "*Enterprise Resource Planning Systems*," Cengage Learning, 2008.

MCA – V Semester
(16MC50108) MANAGEMENT INFORMATION SYSTEMS
(Professional Elective – IV)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: Courses on "Database Management System" and "Organizational Behavior and Human Resource Management".

COURSE DESCRIPTION: Methodologies of systems approach to organization; types of information systems; Management issues; Strategic and project planning for MIS; Designing an information system; Implementation of a system; Evaluation and maintenance; Weaknesses in system development; Soft spots in planning.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:
- Meaning and role of MIS
- Types of information systems
- System design processes
- Decision making processes
- Techniques used in developing an information system.

CO2. Analyze the techniques of operations research, management science, mathematical tools, scientific approaches for decision rules.

CO3. Design and develop programmed decision system for Manufacturing Subsystem Inventory System Distribution Logistics System.

CO4. Solve complex problems in strategic and project planning, conceptual and detailed system design by using the techniques like breakdown structure, the network approach to defining task relationships and the integration of performance/cost/time for planning and control.

CO5. Apply tools like spreadsheets, system flowcharts to evaluate solutions for real-world business problems.

CO6. Aware of the ethical, social, and security issues of an information system.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO MIS (11 Periods)

The meaning and role of MIS: MIS, Systems approach, the systems view of business, MIS organization within the company.

Management, Organizational theory and the systems approach: Development of organizational theory, Management and organizational behavior, Management, Information, and the Systems approach.

UNIT-II: DECISION MAKING AND PROJECT PLANNING FOR MIS (11 Periods)

Information systems for decision making: Evolution of an information system, **Basic information systems-** Finance information system, Production / Operations System, Marketing information system, Personnel information system, other information systems.

IS Management Issues: Decision making and MIS, MIS as a technique for making programmed decisions, decision-assisting information systems.

Strategic and project planning for MIS: General business planning, appropriate MIS response, MIS planning: General, detail.

UNIT-III: CONCEPTUAL AND DETAILED SYSTEM DESIGN (13 Periods)

Conceptual system design: Problems, set system objectives, establish system constraints, determine information needs, determine information sources, develop alternative conceptual designs and select one, document the system concept, prepare the conceptual design report.

Detailed system design: Inform and involve the organization, aim of detailed design, project management of MIS detailed design, identify dominant and trade-off criteria, define the subsystems, sketch the detailed operating subsystems and information flows, determine the degree of automation of each operation, Inputs, outputs and processing, Early system Testing, Software, Hardware and Tools, Propose an organization to operate the system, document the detailed design, revisit the manager-user.

UNIT-IV: IMPLEMENTATION, EVALUATION AND MAINTENANCE OF THE MIS (11 Periods)

Implementation, evaluation and maintenance of the MIS: Plan the implementation, acquire floor space and plan space layouts, organize for implementation, develop procedures for implementation, train the operating personnel, computer related acquisitions, develop forms for data collection and information dissemination, develop the files, test the system, cutover, document the system, evaluate the MIS, control and maintain the system.

UNIT-V: PITFALLS IN MIS DEVELOPMENT (9 Periods)

Pitfalls in MIS development: Fundamental weaknesses, soft spots in planning, design problems, implementation: the TAR PIT.

Case Study on International Medical Instruments to develop a management information system for the company.

Total Periods: 55

TEXT BOOK:

1. R. G. Murdick, J. E. Ross and J. R. Claggett, "*Information systems for Modern Management*," PHI, 3rd Edition, 2004.

REFERENCE BOOKS:

1. Laudon & Laudon and V. M. Prasad, "*Management Information Systems*," Pearson Education, 9th Edition, 2005.
2. Robert Schultheis and Mary Sumner, "*Management information Systems*," Prentice-Hall of India, 4th Edition, 2004.

MCA – V Semester
(16MC50109) BIOINFORMATICS
(Professional Elective – IV)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: —

COURSE DESCRIPTION: Bioinformatics; Biology and Information; DNA and RNA; biological databases; Sequence alignment and dynamic programming; database mining tools; usages of Bioinformatics.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on
- Biological database.
- Bioinformatics.
- DNA and RNA.
- Modern molecular biology

CO2. Analyze DNA and RNA Structure, Public Databases-NCBI and global and local sequence alignments on biological DBMS.

CO3. Design and implement
- Data retrieval.
- Data annotation.
- Database Connectivity

CO4. Investigate on sequence alignment function and retrieve structure and Evolutionary information using dynamic programming.

CO5. Select and apply techniques and data mining tools on biological data to perform Sequence similarity search using tools like BLAST and FASTA.

DETAILED SYLLABUS:

UNIT- I: BIOLOGY AND INFORMATION (11 periods)

Bioinformatics - Maturing Science, Genes to Proteins, Bioinformatics in the public domain; Computers in Biology and Medicine- Computational Tools- Limitations of Computational Tools; Virtual Doctor- Mapping the human Brain; Biological Macromolecules as Information Carriers.

UNIT- II: DNA and RNA (10 periods)

DNA and RNA Structure, DNA Cloning and Sequencing, Genes, Taxonomy and Evolution

Automated Procedure: DNA Sequencing, Method of Genome Sequencing Access from Databases-ENTREZ.

UNIT-III: BIOLOGICAL DATABASES (11 periods)

Biological Databases Organization: Database content and Management, Data submission, Growth of Public Databases, Data Retrieval, Data Annotation and Database Connectivity.

Public Databases: National Center for Biotechnology Information (NCBI).

UNIT-IV: SEQUENCE ALIGNMENT AND DYNAMIC PROGRAMMING (12 periods)

Alignment of Pairs of Sequence:

Introduction to sequence alignment, Definition of Sequence alignment, Sequence alignment Reveal function, Structure and Evolutionary information.

Dynamic Programming: Principal methods of Pair wise sequence alignment- Dot matrix method, Finding sequence Repeats, Finding Repeats of a Single sequence symbols, Dynamic programming methods for sequence alignment.

UNIT-V: DATABASE MINING TOOLS (11 periods)

Database Mining Tools: Sequence similarity search tools- BLAST and FASTA; Overview of Database sequence searching, Pattern Recognition tools, Multiple Alignment and Phylogenetic Tree Analysis.

Total Periods: 55

TEXT BOOKS:

1. Hooman H. Rashidi and Lukas K. Buehler, "*Bioinformatics Basics, Applications in Biological Science and Medicine*", CRC Press, Taylor & Francis Group, 2nd Edition, 2005.
2. David W.Mount "*Bioinformatics: Sequence and Genome Analysis*", Cold Spring Harbor Laboratory (CSHL) press, 2nd Edition, 2005.

REFERENCE BOOK:

1. C S V Murthy," *Bioinformatics*", Himalaya Publishing House, 2003.

MCA – V Semester

(16MC50110) ETHICAL HACKING

(Professional Elective – IV)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A Course on "Computer networks".

COURSE DESCRIPTION: Network and Computer Attacks; Foot Printing and Social Engineering; Port Scanning; Enumeration; Desktop and Server Operating System vulnerabilities; Hacking Web Servers; Cryptography; Network Protection System; Hacking Wireless Network.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate Knowledge on:
- Network and Computer attacks
- OS Vulnerabilities
- Hacking web servers, Hacking wireless network

CO2. Analyze system and network vulnerabilities.

CO3. Design security solutions for risks that arise from hacking.

CO4. Use appropriate ethical hacking technique to solve security problems.

CO5. Apply Contextual Knowledge to assess safety and legal issues in ethical hacking.

CO6. Inculcate use of ethical hacking practices while maintaining professional ethics.

DETAILED SYLLABUS:

UNIT-I: ETHICAL HACKING OVERVIEW, NETWORK AND COMPUTER ATTACKS (11 periods)

Ethical Hacking Overview: Ethical hacking, Certification programs for network security personnel, Hacker Vs Cracker.

Network and Computer Attacks: Malicious software, Protection against malware, Intruder attacks on networks and computers, addressing physical security.

UNIT-II: FOOTPRINTING AND SOCIAL ENGINEERING, PORT SCANNING (10 periods)

Footprinting and Social Engineering: Using web tools for footprinting, Conducting competitive intelligence, Using domain name system zone transfers, Introduction to social engineering.

Case Study: Social Engineering.

Port Scanning: Port scanning, Using port scanning tools, Conducting ping sweeps, Understanding scripting.

UNIT-III: ENUMERATION, OS VULNERABILITIES (11 periods)

Enumeration: Enumeration, Enumerating windows operating systems, Netware operating system and Unix operating system.

Desktop and Server OS Vulnerabilities: Windows OS vulnerabilities, Tools for identifying vulnerabilities in windows, Best practices for hardening windows systems, Linux OS vulnerabilities.

UNIT-IV: HACKING WEB SERVERS, HACKING WIRELESS NETWORK (12 periods)

Hacking Web Servers: Understanding web applications, Web application vulnerabilities, Tools for web attackers and Security testers.

Hacking Wireless Network: Understanding wireless technology, Wireless network standards, Authentication, War driving, Wireless hacking.

UNIT-V: CRYPTOGRAPHY, NETWORK PROTECTION SYSTEM (11 periods)

Cryptography: Understanding cryptography basics, Substitution and Transposition ciphers, DES, Cryptography attacks.

Network Protection System: Understanding routers, Firewalls, Intrusion detection and prevention systems, Honeypots.

Total Periods: 55

TEXT BOOK:

1. Michael T. Simpson, Kent Backman and James E. Corley, "*Hands-On Ethical Hacking and Network Defense*," Cengage Learning, 2013.

REFERENCE BOOKS:

1. Kimberly graves, *"CEH Official Certified Ethical Hacker Review Guide,"* Wiley Publications, 2007.
2. Michael Gregg, *"Certified ethical hacker (CEH) Cert guide,"* Pearson Education, 2014.

MCA V-Semester

(16MC50111) MULTIMEDIA AND RICH INTERNET APPLICATION DEVELOPMENT

(Professional Elective – IV)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Web Programming".

COURSE DESCRIPTION: Concepts of Multimedia; Multimedia authoring tools; Data representations; Fundamental concepts in Video and digital audio; Basic video compression techniques; Multimedia communication and retrieval; Development of rich internet applications with adobe flash.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate Knowledge on multimedia, video compression techniques and adobe flash.

CO2. Analyze a variety of creative techniques like sequential, hierarchical search and MPEG in the visual design of online media.

CO3. Design and development of Multimedia Animations using Adobe Flash and Flex3

CO4. Create highly interactive, rich internet applications using multimedia technologies and authoring tools.

CO5. Evaluate the role and importance of critical experimentation and innovation in the multimedia development process as a professional practice.

DETAILED SYLLABUS:

UNIT- I: MULTIMEDIA AUTHORING AND DATA REPRESENTATIONS (10 periods)

Multimedia and hypermedia, World Wide Web, overview of multimedia software tools. Graphics and image data representation graphics/image data types, file formats, Color in image and video: color science, color models in images, color models in video.

UNIT- II: FUNDAMENTAL CONCEPTS IN VIDEO AND DIGITAL AUDIO (11 periods)

Types of video signals, analog video, digital video, digitization of sound, MIDI, quantization and transmission of audio. Multimedia Data Compression: Lossless compression algorithms, Lossy compression algorithms, Image compression standards.

UNIT-III: BASIC VIDEO COMPRESSION TECHNIQUES (11 periods)

Introduction to video compression, video compression based on motion compensation, search for motion vectors, MPEG video coding I- MPEG-1 and 2, Basic Audio Compression Techniques: ADPCM in Speech Coding, G.726 ADPCM, Vocoders.

UNIT-IV: MULTIMEDIA COMMUNICATION AND RETRIEVAL (12 periods)

Basics of Computer and Multimedia Networks, Multiplexing Technologies, LAN and WAN, Access Networks. Multimedia Network Communications and Applications: Quality of Multimedia Data Transmission, Multimedia over IP, Multimedia over ATM Networks, Transport of MPEG-4, Media-On- Demand (MOD).

UNIT-V: RICH INTERNET APPLICATIONS (RIAS) WITH ADOBE FLASH (11 periods)

Adobe Flash Introduction, Flash Movie Development, Learning Flash with Hands-on Examples, Publish your flash movie, creating special effects with Flash, Creating a website splash screen, action script. Rich Internet Applications (RIAs) with Flex3 Introduction, Flex Platform Overview, Creating a Simple user Interface.

Total Periods: 55

TEXT BOOKS:

1. Ze-Nian Li, and Mark S. Drew, "*Fundamentals of Multimedia*", Pearson Education, 2008.
2. Paul J Deitel and Harvey M Deitel, "*AJAX Rich Internet Applications, and Web Development for Programmers*", Deitel Developer Series, Pearson Education, 2009.

REFERENCE BOOKS:

1. Nigel Chapman, and jenny chapman, "*Digital Multimedia*", Wiley-*Dreamtech, 2005*
2. Russel Chun, "*Flash CS3 Professional Advanced*", Pearson Education, 2007.

MCA – V Semester
(16MC50131) CLOUD COMPUTING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: A Course on "Cloud Computing".
COURSE DESCRIPTION: Hands-on experience on creating virtual machines on Windows and Linux platforms; Development of service based web applications and their deployment and Mobile app development.
COURSE OUTCOMES: On successful completion of the course, students will be able to:
CO1. Demonstrate hands-on experience on Virtualization models and Cloud Environment.
CO2. Analyze the given experiment and relate to existing architectures.
CO3. Apply API development skills in web applications for cloud deployment.
CO4. Demonstrate independent problem solving skills in developing dynamic web applications.
CO5. Use advanced programming languages to access cloud services.
CO6. Demonstrate communication skills, both oral and written for preparing and presenting reports.
CO7. Build suitable cloud environment for societal requirements.
CO8. Work effectively as an individual and as a member in team for mini-project implementation.

LIST OF EXERCISES:
1. Create VM's with given set of configuration on Hyper-V Ubuntu 14LTs files with 2GB RAM and 200GB Hard Disk through Infrastructure Services (IaaS).
2. Create Virtualization on VMware Windows 7 OS with 4GB RAM and 500GB Hard Disk" through Infrastructure as a Service (IaaS).
3. Develop a simple web application for student details and operative using Salesforce.com in Cloud Platform under Software as Service (SaaS).
4. Develop a simple web application for personal Homepage, Attributes, Controllers, GUI, Visual Page, Forms, and Templates under Software as Service (SaaS).
5. Develop a web application for performing calculator operations be selecting relevant serviced. Deploy this application on Salesforce.com Cloud Platform under Software as Service (SaaS).
6. Develop a web application on IBM Bluemix Cloud Platform for executing application using Eclipse under Platform as a Service.
7. Create virtual machine instance with given set of configuration on Amazon web Services (AWS) under Infrastructure as a Service (IaaS).
8. Create virtual machine instance with set of configuration on Amazon S3 (Simple Storage Service) in Amazon Web Service (AWS) under Infrastructure as a Service (IaaS).
9. Develop a web application on IBM Bluemix Cloud Platform for implementing IoT application.
10. Develop a calculator web based application on MS-Azure Platform i.e. Platform as a Service (PaaS).
11. Develop a student home page web based application on MS-Azure Platform i.e. Platform as a Service (PaaS) Cloud.
12. Develop a mobile app on Google App Engine for uploading a resume into a website, collaborated with Drop box. The resume should be encrypted. (PaaS)
13. Develop a service call to run on Drop box resumes for picking the resumes of given skill set. (PaaS)
    - i. 6+ years of Exp in Java Development.
    - ii. 10 years of experience in Automation Testing.
    - iii. 15+ years of Managerial experience with technical background.
    - iv. 5-7 years of on-site experience in .NET support and programming.

REFERENCE BOOKS:

1. Barrie Sosinsky, "*Cloud Computing Bible*," Wiley India Pvt Ltd, 2011.
2. Rajkumar Buyya, James Broberg and Andrzej Goscinski, "*Cloud computing principles and paradigms,*" John Wiley and Sons, 2011.
3. Thomas Erl and RicardoPuttini "*Cloud Computing- Concepts, Technology & Architecture*," Pearson, 2013.
4. John W. Rittinghouse, James F. Ransome, "*Cloud Computing implementation, Management and Security,*" CRC Press, Taylor & Francis group, 2010.

MCA – V Semester

(16MC50132) MINI PROJECT

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	-	2

PREREQUISITES: All the courses of the program from I to IV semesters.

COURSE DESCRIPTION: Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Implementation of the project work; Preparation of mini project reports and presentation.

COURSE OUTCOMES: Completion of the project work enables a successful student to demonstrate:

CO1. Knowledge on the project topic.

CO2. Analytical ability exercised in the project work.

CO3. Design skills applied on the project topic.

CO4. Ability to investigate and solve complex computing problems faced during the project work.

CO5. Ability to apply tools and techniques to complex computing activities with an understanding of limitations in the project work.

CO6. Ability to provide solutions as per societal needs with consideration to health, safety, legal and cultural issues considered in the project work.

CO7. Understanding of the impact of the professional computing practices to provide solutions in environmental context and need for sustainable development experienced during the project work.

CO8. Ability to apply ethics and norms of the professional computing practice applied in the project work.

CO9. Ability to function effectively in a team is experienced during the mini project.

CO10. Ability to present views cogently and precisely on the project work.

CO11. Project management skills as applied in the project work.

CO12. Ability to engage in life-long leaning as experience during the project work.

MCA – V Semester
(16MC50133) COMPREHENSIVE ASSESSMENT

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	100	100	-	-	-	2

PREREQUISITES: All the courses of the program.

COURSE DESCRIPTION: Assessment of student learning outcomes in the courses of the program.

COURSE OUTCOMES: Comprehensive Assessment enables a successful student to demonstrate:

CO1. Knowledge in the courses of the program.

CO2. Analytical ability in the courses of the program.

CO3. Design skills in the courses of the program.

CO4. Ability to investigate and solve complex computing problems in the courses of the program.

CO5. Ability to apply tools and techniques to complex computing activities with an understanding of limitations in the courses of the program.

CO6. Ability to provide solutions as per societal needs with consideration to health, safety, legal and cultural issues in the courses of the program.

CO7. Understanding of the impact of the professional computing solutions in environmental context and need for sustainable development in the courses of the program.

CO8. Ability to apply ethics and norms of the professional computing practices in the courses of the program.

CO9. Ability to function effectively as an individual in the courses of the program.

CO10. Ability to present views cogently and precisely in the courses of the program.

CO11. Ability to engage in life-long leaning in the courses of the program.

MCA – VI Semester
(16MC60131) **SEMINAR**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	100	100	-	-	-	2

PREREQUISITES: All the courses of the program.

COURSE DESCRIPTION: Identification of topic for the seminar; Literature survey; Performing critical study and analysis of the topic identified; Preparation of report and presentation.

COURSE OUTCOMES: Completion of the seminar work enables a successful student to demonstrate:

CO1. Knowledge on the seminar topic.

CO2. Analytical ability exercised during the seminar work.

CO3. Ability to investigate and solve complex computing problems faced during the seminar work.

CO4. Ability to apply techniques to complex computing activities with an understanding of limitations as applied in the seminar work.

CO5. Ability to function effectively as an individual as experienced during the seminar work.

CO6. Ability to present views cogently and precisely on the seminar topic.

CO7. Ability to engage in life-long leaning as experience during the seminar work.

MCA – VI Semester

(16MC60132) **PROJECT WORK**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
100	100	200	-	-	-	12

PREREQUISITES: All the courses of the program.

COURSE DESCRIPTION: Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Preparation of thesis and presentation.

COURSE OUTCOMES: Completion of the project work enables a successful student to demonstrate:

CO1. Knowledge on the project topic.

CO2. Analytical ability exercised in the project work.

CO3. Design skills applied on the project topic.

CO4. Ability to investigate and solve complex computing problems faced during the project work.

CO5. Ability to apply tools and techniques to complex computing activities with an understanding of limitations in the project work.

CO6. Ability to provide solutions as per societal needs with consideration to health, safety, legal and cultural issues considered in the project work.

CO7. Understanding of the impact of the professional computing practices to provide solutions in environmental context and need for sustainable development experienced during the project work.

CO8. Ability to apply ethics and norms of the professional computing practice applied in the project work.

CO9. Ability to function effectively as an individual as experienced during the project work.

CO10. Ability to present views cogently and precisely on the project work.

CO11. Project management skills as applied in the project work.

CO12. Ability to engage in life-long leaning as experience during the project work.

Annexure-I

GUIDE LINES FOR DISCIPLINARY ACTION FOR MALPRACTICES /IMPROPER CONDUCT IN EXAMINATIONS

Rule No.	Nature of Malpractices/Improper conduct	Punishment
	If the candidate:	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the course of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the course of the examination)	Expulsion from the examination hall and cancellation of the performance in that course only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that course only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the course of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the courses of that Semester. The Hall Ticket of the candidate is to be cancelled.
3	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred for four consecutive semesters from class work and all Semester-end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the courses of the examination (including labs and project work) already appeared and shall not be allowed to appear for examinations of the remaining courses of that semester. The candidate is also debarred for four consecutive semesters from class work and all Semester-end examinations, if his involvement is established. Otherwise, The candidate is debarred for two consecutive semesters from class work and all Semester-end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.

4	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The candidate is also debarred for two consecutive semesters from class work and all Semester-end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that course only.
6	Refuses to obey the orders of the Chief Controller of Examinations/Controller of Examinations/any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the Controller of Examinations or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the Controller of Examinations, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that course and all other courses the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the courses of that semester. If the candidate physically assaults the invigilator/ Controller of the Examinations, then the candidate is also debarred and forfeits his/her seat. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The candidate is also debarred for two consecutive semesters from class work and all Semester-end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.

8	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The candidate is also debarred and forfeits the seat.

Note: Whenever the performance of a student is cancelled in any course(s) due to Malpractice, he has to register for Semester-end Examinations in that course(s) consequently and has to fulfill all the norms required for the award of Degree.

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(AUTONOMOUS)

Sree Sainath Nagar, A.Rangampet, Near Tirupati - 517 102. A.P.

Salient Features of Prohibition of Ragging in Educational Institutions Act 26 of 1997

- Ragging within or outside the College is prohibited.
- Ragging means doing an act which causes or is likely to cause insult or annoyance or fear or apprehension or threat or intimidation or outrage of modesty or injury to a student

Nature of Ragging	Punishment
Teasing, Embarrassing and humiliating	Imprisonment up to 6 months or fine up to Rs. 1,000/- or Both
Assaulting or using criminal force or criminal intimidation	Imprisonment up to 1 year or fine up to Rs. 2,000/- or Both
Wrongfully restraining or confining or causing hurt	Imprisonment up to 2 years or fine up to Rs. 5,000/- or Both
Causing grievous hurt, Kidnapping or rape or committing unnatural offence	Imprisonment up to 5 years or fine up to Rs. 10,000/-
Causing death or abetting suicide	Imprisonment up to 10 years or fine up to Rs. 50,000/-

<u>Note:</u>

1. A student convicted of any of the above offences, will be expelled from the College.
2. A student imprisoned for more than six months for any of the above offences will not be admitted in any other College.
3. A student against whom there is prima facie evidence of ragging in any form will be suspended from the College immediately.
4. The full text of Act 26 of 1997 **and** UGC Regulations on Curbing the Menace of Ragging in Higher Educational Institutions, 2009 **(Dated 17th June, 2009) are placed in the College library for reference.**