ACADEMIC REGULATIONS

COURSE STRUCTURE

AND

DETAILED SYLLABI

OF

COMPUTER SCIENCE AND SYSTEMS

ENGINEERING

FOR

B.TECH REGULAR FOUR YEAR DEGREE PROGRAM

(for the batches admitted from 2016-2017)

&

for B.TECH LATERAL ENTRY PROGRAM

(for the batches admitted from 2017-2018)

CHOICE BASED CREDIT SYSTEM

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(AUTONOMOUS)

(Affiliated to JNTUA Anantapuramu, Approved by AICTE
Accredited by NBA; NAAC with 'A' grade)

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 processes for the benefit of students and making the College a Centre of Excellence for Engineering and Technological studies.

DEPARTMENT OF
COMPUTER SCIENCE AND SYSTEMS ENGINEERING

VISION

To become a centre of excellence in Computer Sciences and Systems Engineering through teaching, training, research and innovation to create quality engineering professionals who can solve the growing complex problems of the society.

MISSION

➢ Established with the cause of development of technical education in advanced computer sciences and engineering with applications to systems there by serving the society and nation.

➢ Transfer of Knowledge through contemporary curriculum and fostering faculty and student development.

➢ Create keen interest for research and innovation among students and faculty by understanding the needs of the society and industry.

➢ Skill development among diversity of students in technical domains and profession for development of systems and processes to meet the demands of the industry and research.

➢ Imbibing values and ethics in students for prospective and promising engineering profession and develop a sense of respect for all.

PROGRAM EDUCATIONAL OBJECTIVES

Within few years of graduation:

1. Graduate will pursue advanced studies in expanses of Computer Science domain and Management.
2. Graduates will evolve as entrepreneurs or be employed in reputed Software Industries and develop Quality Software Systems.
3. Graduates will have career progression through professional skill development and continuing education with ethical attitude.

PROGRAM OUTCOMES

On successful completion of the Program, the graduates will be able to

1. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. 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.
5. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

On successful completion of the Program, the graduates will be able to

1. Acquire knowledge of mathematics, Computer Science and Systems Engineering to solve complex engineering problems.
2. Identify, Analyze, Design among alternatives and Develop software for applications and systems in the domain of Computers and its based Systems to meet the societal needs.
3. Use the research-based knowledge and methods to solve real-world problems in the fields of Computer Science and Systems Engineering.
4. Apply appropriate techniques, use modern programing languages, and packages to simulate and develop software by thoroughly understanding the requirements of the system and its constraints in Computer Science and Engineering.

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, 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 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 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.

Sl. No.	Course	Marks	Examination and Evaluation		Scheme of examination
1.	Theory	70	Semester-end examination of 3 hours duration (External evaluation)		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.
		30	Mid-term Examination of 2 hours duration (Internal evaluation).		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.
					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).
2	Laboratory	50	Semester-end Lab Examination for 3 hours duration (External evaluation)		50 marks are allotted for laboratory/drawing examination during semester-end.
		50	30	Day-to-Day evaluation for Performance in laboratory experiments and Record. (Internal evaluation).	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.
			20	Practical test (Internal evaluation).	
3	a) Seminar	100	Semester-end Examination		100 marks are allotted for Seminar during semester-end evaluation by the Seminar Evaluation Committees (**SECs**) as given in 12.2.1.
	b)Comprehensive Assessment	100	Semester-end Examination		Comprehensive Assessment shall be conducted as given in 12.2.2 as semester-end evaluation for 100 marks.
4	Project Work	200	100	External evaluation	Semester-end Project Viva-Voce Examination by Committee as detailed in 12.2.3 for 100 marks.
			100	Internal evaluation	Continuous evaluation by the Project Evaluation Committees (**PECs)** as detailed in 12.2.3 for 100 marks.

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. O ne 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**: 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 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 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)
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				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								
6	16BT30503	Python Programming								
7	16BT71203	Information Retrieval Systems	3	1	-	4	3	30	70	100
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								
4	16BT50341	Optimization Techniques	3	1	-	4	3	30	70	100
5	16BT60404	Image processing								
6	16BT61201	Cloud Computing								
7	16BT71204	Mobile Computing								
		Program Elective – 1								
8	16BT70505	Human Computer Interaction	3	1	-	4	3	30	70	100
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								
4	16BT71503	Data Analytics								
5	16BT71504	Performance Evaluation of Computer Systems	3	1	-	4	3	30	70	100
6	16BT71505	Network programming								
7	16BT71506	Software Architecture and Design Patterns								
		Program Elective – 3								
8	16BT71507	Business Analytics								
9	16BT71202	Mobile Application Development	3	1	-	4	3	30	70	100
10	16BT60502	Soft Computing								
11	16BT60501	Software Testing								
		Program Elective – 4								
12	16BT71210	High Performance Computing								
13	16BT71508	Internet of Things	3	1	-	4	3	30	70	100
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, 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:
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.
   $$i) (ax + b)/(ax - b)$$
   $$ii) 2.5 \log x + \text{Cos } 32^0 + | x^2 + y^2 |$$
   $$iii) x^5 + 10 x^4 + 8 \text{ and } x^3 + 4 x + 2$$
   $$iv) ae^{kt}$$
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 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 (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 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
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, $\overline{X}$, 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			
P1	2	0	0	3	2	2			
P2	3	0	2	9	0	2	3	3	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 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 (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.
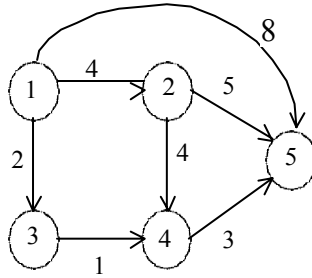
5. Develop a program to obtain routing table for each node using Distance Vector Routing Algorithm by considering the given subnet with weights indicating delay between Nodes.
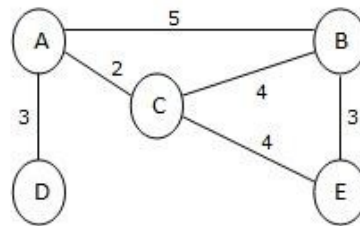
6. Write a program to simulate flow based routing.
7. Write a program to simulate random early detection congestion control algorithm.
8. Using TCP/IP sockets, write a client-server program to open a file available in the   server.
9. Write a program for congestion control using leaky bucket algorithm.
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 server must 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.

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:
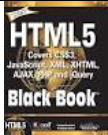1. Design the following static web pages of an online book store web application.
a. Home Page:

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.

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.
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 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   (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 (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 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 $2^k r$ 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**

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)

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.**