ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABI
OF
ELECTRONICS AND COMMUNICATION 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 ELECTRONICS AND COMMUNICATION ENGINEERING

VISION

To be a center of excellence in Electronics and Communication Engineering through teaching and research producing high quality engineering professionals with values and ethics to meet local and global demands.

MISSION

- The Department of Electronics and Communication Engineering is established with the cause of creating competent professionals to work in multicultural and multidisciplinary environments.
- Imparting knowledge through contemporary curriculum and striving for development of students with diverse background.
- Inspiring students and faculty members for innovative research through constant interaction with research organizations and industry to meet societal needs.
- Developing skills for enhancing employability of students through comprehensive training process.
- Imbibing ethics and values in students for effective engineering practice.

PROGRAM EDUCATIONAL OBJECTIVES

After few years of completion of the Program, the graduates of B. Tech. (ECE) would have

1. Enrolled or completed higher education in the core or allied areas of electronics and communication engineering or management.
2. Successful entrepreneurial or technical career in the core or allied areas of electronics and communication engineering.
3. Continued to learn and to adapt to the world of constantly evolving technologies in the core or allied areas of electronics and communication engineering.

PROGRAM OUTCOMES

On successful completion of the Program, the graduates of B. Tech. (ECE) 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 modeling 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 of B. Tech. (ECE) will be able to:

1. Apply the knowledge of Electronics, Signal Processing, Communications, and VLSI & Embedded Systems to the solutions of real world problems.
2. Analyze, Design and Develop solutions in real time in the domains of Electronics, Signal Processing, Communications, and VLSI & Embedded Systems.
3. Conduct investigations and address complex engineering problems in the domains of Electronics, Signal Processing, Communications, and VLSI & Embedded Systems.
4. Apply appropriate techniques, resources, and modern tools to complex engineering systems and processes in the domains of Electronics, Signal Processing, Communications, and VLSI & Embedded Systems.

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 forthcoming meeting. As per the requirements of statutory bodies, Principal, Sree Vidyanikethan Engineering College shall be the Chairman, Academic Council.

3. Admission :

3.1. Admission into 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).
(c) Admissions to PIO and Foreign Nationals as per the guidelines and norms of MHRD, AICTE, APSCHE & Affiliating University.

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 shall 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 shall 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 shall not carry Credits.

i) Other student activities like NCC, NSS, Sports, Study Tour, Guest Lecture etc. shall 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 a 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
- The total credits for the Programme 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 27.
- 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 be below 21 (minimum) and should not exceed 27 (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 shall 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 the 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 shall 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 shall not be considered for the calculation of SGPA and CGPA of the student.
- The MOOC course shall be listed in the grade sheet of the student.

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

11.1 A student is permitted to go on break of study for a maximum period of 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, each of which includes Day-to-Day evaluation and Practical test, 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 semester 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 shall not be allowed to register for the courses of the semester while he is in detention. A student detained due to shortage of attendance, shall have to repeat that semester when offered next.

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

12.4. Evaluation: Following procedure governs the evaluation.

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

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

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

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

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

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

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

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

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

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

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

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

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

irrespective of whether or not the candidate appears for the semester-end examination as per the normal course of study and in case of getting detained for want of credits by sections 13.2 and 13.3 above, the student shall 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 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 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

GUIDE LINES FOR DISCIPLINARY ACTION FOR MALPRACTICES / IMPROPER CONDUCT IN EXAMINATIONS

Rule No.	Nature of Malpractices/ Improper conduct	Punishment
	If the candidate:	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the course of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the course of the examination)	Expulsion from the examination hall and cancellation of the performance in that course only.

(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that course only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the course of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the courses of that Semester. The Hall Ticket of the candidate is to be cancelled.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred for four consecutive semesters from class work and all Semester-end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the courses of the examination (including labs and project work) already appeared and shall not be allowed to appear for examinations of the remaining courses of that semester. The candidate is also debarred for four consecutive semesters from class work and all Semester-end examinations, if his involvement is established. Otherwise, The candidate is debarred for two consecutive semesters from class work and all Semester-end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.

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

7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The candidate is also debarred for two consecutive semesters from class work and all Semester-end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The candidate is also debarred and forfeits the seat.

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

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(Autonomous)

COURSE STRUCTURE

ELECTRONICS AND COMMUNICATION ENGINEERING

I B.Tech. (I Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credit (C)	Scheme of Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
I Year - I Semester										
1.	16BT1BS02	Engineering Physics	3	1	-	4	3	30	70	100
2.	16BT1BS03	Matrices and Numerical Methods	3	1	-	4	3	30	70	100
3.	16BT1BS04	Multi-variable calculus and Differential	3	1	-	4	3	30	70	100
4.	16BT10241	Network Analysis	4	1	-	5	4	30	70	100
5.	16BT10501	Programming in C	3	1	-	4	3	30	70	100
6.	16BT1BS32	Engineering Physics Lab	-	-	3	3	2	50	50	100
7.	16BT10232	Electrical and Electronics Workshop	-	-	3	3	2	50	50	100
8.	16BT10251	Network Analysis Lab	-	-	3	3	2	50	50	100
9.	16BT10531	Programming in C Lab	-	-	3	3	2	50	50	100
		Total	**16**	**5**	**12**	**33**	**24**	**350**	**550**	**900**

I B.Tech. (II Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credit (C)	Scheme of Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
I Year - II Semester										
1.	16BT1HS01	Technical English	3	1	-	4	3	30	70	100
2.	16BT1BS01	Engineering Chemistry	3	1	-	4	3	30	70	100
3.	16BT2BS01	Transformation Techniques and	3	1	-	4	3	30	70	100
4.	16BT20401	Electronic Devices and Circuits	3	1	-	4	3	30	70	100
5.	16BT20541	Foundations of Data Structures	3	1	-	4	3	30	70	100
6.	16BT1HS31	English Language Lab	-	-	3	3	2	50	50	100
7.	16BT1BS31	Engineering Chemistry Lab	-	-	3	3	2	50	50	100
8.	16BT10331	Computer Aided Engineering Drawing	-	1	6	7	3	50	50	100
9.	16BT20551	Foundations of Data structures Lab	-	-	3	3	2	50	50	100
		Total	**15**	**6**	**15**	**36**	**24**	**350**	**550**	**900**

II B.Tech. (I Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credit (C)	Scheme of Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
II Year - I Semester										
1.	16BT3HS01	Environmental Studies	3	-	-	3	3	30	70	100
2.	16BT3BS02	Special Functions and Complex Analysis	3	1	-	4	3	30	70	100
3.	16BT30401	Electronic Circuit Analysis and Design	3	1	-	4	3	30	70	100
4.	16BT30402	Signals and Systems	3	1	-	4	3	30	70	100
5.	16BT30403	Switching Theory and Logic Design	3	1	-	4	3	30	70	100
6.	16BT30241	Electrical Technology	3	1	-	4	3	30	70	100
7.	16BT30251	Electrical Technology Lab	-	-	3	3	2	50	50	100
8.	16BT30431	Basic Electronics and Digital Design Lab	-	-	3	3	2	50	50	100
9.	16BT30432	Signal and Systems Lab	-	-	3	3	2	50	50	100
		Total	**18**	**5**	**9**	**32**	**24**	**330**	**570**	**900**

II B.Tech. (II Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credit (C)	Scheme of Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
II Year - II Semester										
1.	16BT40401	Analog Communications	3	1	-	4	3	30	70	100
2.	16BT40402	Digital IC Applications	3	1	-	4	3	30	70	100
3.	16BT40403	Electromagnetic Theory and	3	1	-	4	3	30	70	100
4.	16BT40404	Linear IC Applications	3	1	-	4	3	30	70	100
5.	16BT40405	Probability and Stochastic Process	3	1	-	4	3	30	70	100
6.	16BT40406	Pulse and Digital Circuits	3	1	-	4	3	30	70	100
7.	16BT40431	Analog Communications Lab	-	-	3	3	2	50	50	100
8.	16BT40432	Electronic Circuit Analysis and Design	-	-	3	3	2	50	50	100
9.	16BT40433	Pulse and Digital Circuits Lab	-	-	3	3	2	50	50	100
		Total	**18**	**6**	**9**	**33**	**24**	**330**	**570**	**900**

III B.Tech. (I Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credit (C)	Scheme of Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
III Year - I Semester										
1.	16BT3HS02	Managerial Economics and Principles of Accountancy	3	1	-	4	3	30	70	100
2.	16BT50201	Control Systems	3	1	-	4	3	30	70	100
3.	16BT50401	Digital Communications	3	1	-	4	3	30	70	100
4.	16BT50402	Microprocessors and Microcontrollers	3	1	-	4	3	30	70	100
5.	16BT50403	VLSI Design	3	1	-	4	3	30	70	100
		Interdisciplinary Elective-1								
6.	16BT50404	Electronic Measurements and Instrumentation	3	1	-	4	3	30	70	100
	16BT50501	Computer Networks								
	16BT30501	Computer Organization								
	16BT51241	Object Oriented Programming								
7.	16BT50431	Linear and Digital IC Applications Lab	-	-	3	3	2	50	50	100
8.	16BT50432	Microprocessors and Microcontrollers Lab	-	-	3	3	2	50	50	100
9.	16BT4HS31	Soft Skills Lab	-	-	3	3	2	50	50	100
		Total	**18**	**6**	**9**	**33**	**24**	**330**	**570**	**900**

III B.Tech. (II Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
III Year - II Semester										
1.	16BT5HS01	Management Science	3	1	-	4	3	30	70	100
2.	16BT60401	Antennas and Waveguides	3	1	-	4	3	30	70	100
3.	16BT60402	Digital Signal Processing	3	1	-	4	3	30	70	100
		Interdisciplinary Elective-2								
4.	16BT40502	Database Management Systems	3	1	-	4	3	30	70	100
	16BT71205	Cryptography and Network Security								
	16BT31501	Operating Systems								
	16BT61241	Wireless Sensor Networks								
		Program Elective – 1								
5.	16BT60403	Analog IC Design	3	1	-	4	3	30	70	100
	16BT60404	Image Processing								
	16BT60405	Radar Engineering								
	16BT60406	Telecommunication Switching Systems								
		Program Elective - 2								
6.	16BT60407	Digital CMOS IC Design	3	1	-	4	3	30	70	100
	16BT60408	Information Theory and Coding								
	16BT60409	Light Wave Communications								
	16BT60410	Nanoelectronics								
7.	16BT60431	Digital Communications Lab	-	-	3	3	2	50	50	100
8.	16BT60432	Digital Signal Processing Lab	-	-	3	3	2	50	50	100
9.	16BT60433	Seminar	-	-	-	-	2	-	100	100
10.	16BT6MOOC	MOOC	-	-	-	-	-	-	-	-
		Total	**18**	**6**	**6**	**30**	**24**	**280**	**620**	**900**

IV B.Tech. (I Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credit (C)	Scheme of Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
IV Year - I Semester										
1.	16BT70401	Cellular and Mobile Communications	3	1	-	4	3	30	70	100
2.	16BT70402	Embedded Systems	3	1	-	4	3	30	70	100
3.	16BT70403	Microwave Engineering	3	1	-	4	3	30	70	100
		Program Elective – 3								
4.	16BT70404	Advanced Digital Signal Processing	3	1	-	4	3	30	70	100
	16BT70405	Mixed Signal Design								
	16BT70406	Satellite Communications								
	16BT70407	Wireless Communication and Networks								
		Program Elective – 4								
5.	16BT70408	Low Power CMOS VLSI Design	3	1	-	4	3	30	70	100
	16BT70409	RF Engineering								
	16BT70410	Speech Processing								
	16BT70411	Spread Spectrum Communication								
6.		**Open Elective**	3	1	-	4	3	30	70	100
7.	16BT70431	Antennas and Microwave Engineering Lab	-	-	3	3	2	50	50	100
8.	16BT70432	Embedded Systems Lab	-	-	3	3	2	50	50	100
9.	16BT70433	Comprehensive Assessment	-	-	-	-	2	-	100	100
		Total	**18**	**6**	**6**	**30**	**24**	**280**	**620**	**900**

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

IV B.Tech. (II Semester)

S. No.	Course Code	Course Title	Contact Periods/ Week				Credits (C)	Scheme of Examination Max. Marks		
			L	T	P	Total		Internal Marks	External Marks	Total Marks
IV Year - II Semester										
1.	16BT80431	Project Work *	-	-	-	-	12	100	100	200
Total			**-**	**-**	**-**	**-**	**12**	**100**	**100**	**200**

*Full-time project work

I B. Tech. - I Semester

(16BT1BS02) ENGINEERING PHYSICS

(Common to ECE, EEE & EIE)

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

PRE-REQUISITES: Intermediate / senior secondary Physics

COURSE DESCRIPTION:

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

COURSE OUTCOMES:

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

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

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

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

CO4: Develop problem solving skills in engineering context.

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

DETAILED SYLLABUS:

UNIT I - LASERS AND FIBER OPTICS (11periods)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Total Periods: 45

TEXT BOOK:

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

REFERENCE BOOKS:

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

I B. Tech. – I Semester
(16BT1BS03) MATRICES AND NUMERICAL METHODS

(Common to all Branches)

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

PRE-REQUISITES: Intermediate /Senior secondary mathematics

COURSE DESCRIPTION: Fundamentals of matrix theory; numerical solutions of equations, curve fitting; interpolation; numerical differentiation and integration; numerical solutions of ordinary differential equations.

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

CO1: Acquire basic **knowledge** in
- (a) Finding the rank of matrices and analyzing them.
- (b) Solving algebraic and transcendental equations by various numerical methods.
- (c) Fitting of various types of curves to the experimental data.
- (d) Estimating the missing data through interpolation methods.
- (e) Identification of errors in the experimental data
- (f) Finding the values of derivatives and integrals through various numerical methods.
- (g) Solving differential equations numerically when analytical methods fail.

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

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

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

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

DETAILED SYLLABUS:

UNIT–I : MATRICES (11 periods)

Rank of a matrix, echelon form, normal form, inverse of a matrix by elementary row operations. Solutions of linear system of equations. Eigen values, Eigen vectors and properties (without proof), Diagonalization. Quadratic form (QF), reductions to canonical form using orthogonal transformation and nature of QF.

UNIT-II NUMERICAL SOLUTIONS OF EQUATIONS AND CURVE FITTING (8 periods)

Solutions of Algebraic and Transcendental equations by bisection method, Regula-Falsi method, Newton – Raphson's method. Curve fitting by the principle of least squares, fitting of a straight line, parabola and exponential curves.

UNIT- III INTERPOLATION (8 periods)

Interpolation, difference operators and their relationships, Newton's forward and backward formulae, Lagrange's interpolation formula. Partial fractions using Lagrange's interpolation formula.

UNIT-IV NUMERICAL DIFFERENTIATION AND INTEGRATION (8 periods)

Numerical differentiation using Newton's forward and backward formulae. Numerical integration using Trapezoidal rule, Simpson's $1/3^{rd}$ rule and $3/8^{th}$ rule.

UNIT- V NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS (10 periods)

Numerical solutions of first order Initial value problems using Taylor series method, Euler's method , modified Euler's method, Runge – Kutta method (4 thorder only) and Milne's predictor – corrector method.

Total no. of periods: 45

TEXT BOOK:

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

REFERENCE BOOKS:

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

I B. Tech. - I Semester
(16BT1BS04) MULTI - VARIABLE CALCULUS AND DIFFERENTIAL EQUATIONS

(Common to all Branches)

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

PRE-REQUISITES: Intermediate /Senior secondary mathematics

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

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

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

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

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

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

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

DETAILED SYLLABUS:

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

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

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

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

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

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

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

Applications of integration to – lengths of curves, areas of surfaces of revolution, Double and Triple integrals – change of

order of integration, change of variables in integrals. Area enclosed by plane curves, volumes of solids.

UNIT-V: VECTOR CALCULUS (12 periods)

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

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

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

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

Gauss Divergence Theorem and Stoke's Theorem: Gauss Divergence theorem (without proof), Stokes's Theorem (without proof) –verifications and applications.

Total no. of periods: 45

TEXT BOOK:

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

REFERENCE BOOKS:

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

I B. Tech. - I Semester

(16BT10241) **NETWORK ANALYSIS**

(Common to ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	4	1	0	4

PRE-REQUISITES: --

COURSE DESCRIPTION: Basic concepts of electric circuits; Voltage - Current relationship of basic circuit elements; Mesh and Nodal analysis; Network theorems; AC circuits; Two-port network parameters; Transient analysis.

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

CO1: Demonstrate knowledge in
- voltage and current relationships for various electric elements.
- network reduction techniques.
- concepts of AC fundamentals and single phase circuits.
- concepts of two-port networks.
- various network theorems.
- transient behavior of the circuits.

CO2: Analyze
- a circuit using conventional, mesh and nodal concepts.
- a two-port network for various network parameters.
- various types of two-port networks.
- the transient behavior of the circuits.

CO3: Design circuits to meet the required specifications

CO4: Evaluate
- electrical circuits for voltage, current and power using conventional circuit analysis methods and network theorems.
- transient response.
- two-port networks.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO ELECTRICAL CIRCUITS **(12 Periods)**

Concepts of charge, current, voltage, power, circuit elements, Ohm's law, Kirchoff's Laws, Network reduction techniques, voltage and current division rules, Series-Parallel circuits, Star-Delta and Delta-Star transformations, Source transformation, nodal analysis, mesh analysis- Problems.

UNIT-II: SINGLE PHASE AC CIRCUITS (12 Periods)

Introduction to AC quantities and basic definitions: Cycle, Time period, Frequency, Amplitude, determination of Average value, RMS value, Form factor and Peak factor for different alternating waveforms, phasor notation, phase and phase difference, phase relation in R, L, C circuits, series and parallel circuits, impedance and power triangle, power factor. Series and Parallel resonance, Quality factor and bandwidth-Problems.

UNIT-III: NETWORK THEOREMS (10 Periods)

Superposition, Thevenin's, Norton's, Maximum power transfer, Tellegen's, Millman's, Reciprocity, Compensation theorems for D.C. and sinusoidal excitation- Problems.

UNIT-IV: TWO-PORT NETWORKS (10 Periods)

Impedance parameters, admittance parameters, transmission (ABCD) parameters, hybrid parameters, conversion of one parameter to another, conditions for reciprocity and symmetry, interconnection of two-port networks in series, parallel and cascaded configurations - Problems.

UNIT-V: TRANSIENT ANALYSIS (10 Periods)

Transient response of R-L, R-C and R-L-C for DC excitation and Sinusoidal excitation - Solution by using Differential equation and Laplace Transforms method - Problems.

Total Periods: 54

TEXT BOOKS:

1. Sudhakar, S.P.Shyam Mohan, Circuits and Network analysis and synthesis, 5th edition, Tata McGraw Hill publishing company Ltd., New Delhi, 2007.
2. W. H. Hayt, J. E. Kemmerly, S. M. Durbin, Engineering Circuit Analysis, 6th edition, Tata McGraw Hill publishing company Ltd., New Delhi, 2008.

REFERENCE BOOKS:

1. M.E. Van Valkenberg, Network Analysis, Pearson Publications, 3rd edition, New Delhi 2006.
2. A.Chakrabarthi, Circuit Theory (analysis and synthesis), 6th edition, Dhanpat Rai & Co, New Delhi, 2014.

I B. Tech. - I Semester

(16BT10501) **PROGRAMMING IN C**

(Common to all Branches)

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

PRE-REQUISITES: NIL

COURSE DESCRIPTION:

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

COURSE OUTCOMES:

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

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

CO2: Analyze complex engineering problems to develop suitable solutions

CO3: Design algorithms for specified engineering problems

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

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

DETAILED SYLLABUS:

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

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

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

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

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

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

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

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

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

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

UNIT IV – STRINGS & POINTERS (09 periods)

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

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

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

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

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

Total Periods: *45*

TEXT BOOK:

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

REFERENCE BOOKS:

1. PradipDey and Manas Ghosh, *"Programming in C",* Second Edition, Oxford University Press, NewDelhi, 2007.
2. E. Balagurusamy, "*Programming in C",* Seventh Edition, Mc Graw Hill Education (India) Pvt, Ltd, New Delhi, 2014.

I B. Tech. I-Semester
(16BT1BS32) **ENGINEERING PHYSICS LAB**
(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	0	0	3	2

PRE-REQUISITES: Intermediate / senior secondary Physics.

COURSE DESCRIPTION:

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

COURSE OUTCOMES:

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

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

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

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

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

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

ENGINEERING PHYSICS LAB

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

1. Determination of wavelength of a laser source using Diffraction Grating.
2. Determination of particle size by using a laser source.
3. Determination of Numerical aperture and acceptance angle of an optical fiber.

4. Melde’s experiment - transverse & longitudinal modes.
5. Magnetic field along the axis of a current carrying coil- Stewart and Gee’s method.
6. Calculation of A.C frequency using sonometer.
7. I-V Characteristics of a p-n Junction diode.
8. Energy gap of a material of a p-n Junction.
9. Characteristics of LED source.
10. Characteristics of Photo diode.
11. Hall Effect.
12. Determination of rigidity modulus of the material of the wire using torsional pendulum.

I B. Tech. - I Semester
(16BT10232) ELECTRICAL AND ELECTRONICS WORKSHOP PRACTICE

(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	0	0	3	2

PRE-REQUISITES: NIL

COURSE DESCRIPTION: Identification and specifications of various Electric and Electronic devices; analysis of various series, parallel and series-parallel electrical circuits; develop various electrical circuits for domestic and industrial applications.

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

CO1: Demonstrate knowledge on various Electrical and Electronic Devices.
CO2: Analyze various series and parallel electrical circuits.
CO3: Design and develop various electrical circuits for domestic and industrial applications.
CO4: Function effectively as individual and as a member in a team.
CO5: Communicate effectively both oral and written forms

DETAILED SYLLABUS:

PART A: (Demonstration)

1. Identification and Specifications of R, L, C Components (Colour Codes), Potentiometers, Switches (SPST, DPST and DPI), Gang Condensers, Relays, Bread Boards, PCBs, Fuses, MCBs, Earthing and Electrical Wiring accessories.
2. Identification and Specifications of Active Devices: Diodes, BJTs, Low-power JFETs, MOSFETs, Power Transistors, LEDs, LCDs, Optoelectronic Devices, SCR, UJT, DIACs, TRIACs, Linear and Digital ICs.
3. Study the operation of
   - Multimeter (Analog and Digital)
   - Function Generator
   - Regulated Power Supplies
   - CRO.

PART-B:

1. Measurement of Electrical Quantities (AC & DC) using: Voltmeter, Ammeter and Wattmeter.
2. Measurement of Resistivity of a conducting wire.
3. Circuit with one lamp controlled by one switch and provision of 2-pin or 3-pin socket PVC surface conduit system.
4. Circuit with two lamps controlled by two switches with PVC surface conduit system.
5. Circuit for Stair case wiring and Godown wiring.
6. Circuit connection for a Fluorescent tube
7. Solder simple electronic circuits.
8. B-H curve of a Magnetic material
9. I-V and P-V characteristics of a Solar panel
10. Design and Fabrication of a single-phase transformer
11. PCB preparation and design of a circuit on a PCB

I B. Tech. - I Semester

(16BT10251) **NETWORK ANALYSIS LAB**

(Common to ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	0	0	3	2

PRE-REQUISITES: NIL

COURSE DESCRIPTION: Verification of KVL, KCL and network theorems; analysis of AC and DC circuits; determination of resonant frequency in series and parallel RLC circuits; evaluation of transients

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

CO1: Demonstrate knowledge in
- Identification of various circuit elements and their values.
- Concepts of electric circuits and two-port networks.

CO2: Analyze and relate physical observations and measurements in electric circuits to theoretical perception.

CO3: Design circuit parameters to meet the required specifications.

CO4: Demonstrate skills in evaluating and interpret
- Various circuit parameters using conventional and network theorems
- Network parameters

CO5: Function effectively as individual and as a member in a team.

CO6: Communicate effectively in oral format and prepare laboratory reports.

LIST OF EXPERIMENTS:

Any TEN experiments are to be conducted

1. Verification of KVL and KCL.
2. Mesh and Nodal analysis.
3. Series and Parallel resonance.
4. Phasor analysis of RL, RC and RLC circuits.
5. Measurement of active and reactive power in a single phase circuit.
6. Steady state response of series RL and RC circuits.
7. Two-port network parameters.
8. Verification of Superposition and Reciprocity theorems.
9. Verification of Thevenin's and Norton's theorem.
10. Verification of Maximum Power transfer theorem for DC and AC excitations.
11. Verification of Millmann's and compensation theorem.
12. Transient response of RL, RC and RLC circuits.

I B. Tech. - I Semester

(16BT10531) **PROGRAMMING IN C LAB**

(Common to all Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	0	0	3	2

PRE-REQUISITES:-

A course on "Programming in C"

COURSE DESCRIPTION:

Hands on practice in developing and executing simple programs using C Programming constructs– Conditional statements, Loops, Arrays, Strings, Functions, Structures, Pointers and Functions.

COURSE OUTCOMES:

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

CO1: Demonstrate practical knowledge of using C language constructs:
- Selection and Repetition statements.
- Arrays, Strings and Functional statements.
- Derived data types, Files and Pointers

CO2: Analyze problems to develop suitable algorithmic solutions

CO3: Design Solutions for specified engineering problems

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

CO5: Implement and execute programs using 'C' language

CO6: Document programs and communicate effectively while conducting Professional transactions.

List of Exercises:

1. a. Let a and b are two integer variables whose values are 10 and 13 respectively. Write a program to evaluate the following arithmetic expressions.
   i) a + b ii) a–b iii) a * b iv) a/b v) a % b
   b. Write a program to evaluate the following algebraic expressions after reading necessary values from keyword.
   i) $(ax + b)/(ax - b)$
   ii) $2.5 \log x + \text{Cos } 32^0 + | x^2 + y^2|$
   iii) $x^5 + 10 x^4 + 8$ and $x^3 + 4 x + 2$
   iv) ae^{kt}

2. a. Mr. Gupta deposited Rs.1000 in a bank. The bank gives simple interest at the rate of 15% per annum. Write a program to determine the amount in Mr. Gupta's account at the end of 5 years. (Use the formula I = P T R / 100)

b. A cashier has currency notes of denominations Rs.10, Rs. 50 and Rs. 100. If the amount to be withdrawn is input in hundreds, find the total number of notes of each denomination the cashier will have to give to the withdrawer.

c. In a town, the percentage of men is 52. The percentage of total literacy is 48.If total percentage of literate men is 35 of the total population; write a program to find the total number of illiterate men and women if the population of the town is 8000.

3. a. Write a program that prints the given 3 integers in ascending order using if - else.

b. Write a program to calculate commission for the input value of sales amount.
Commission is calculated as per the following rules:
i) Commission is NIL for sales amount Rs. 5000.
ii) Commission is 2% for sales when sales amount is >Rs. 5000 and <= Rs. 10000.
iii) Commission is 5% for sales amount >Rs. 10000.

c. A character is entered through keyboard. Write a program to determine whether the character entered is a capital letter, a small case letter, a digit or a special symbol. The following table shows the range of ASCII values for various characters.

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

4. a. If cost price and selling price of an item is input through the keyboard, write program to determine whether the seller has made profit or incurred loss. Also determine how much profit or loss he incurred in percentage.

b. An insurance company calculates premium as follows:

i. If a person's health is excellent and the person is between 25 and 35 years of age and lives in a city and is a male then premium is Rs.4 per thousand and the policy amount cannot exceed Rs.2 lakhs.

ii. If a person satisfies all the above conditions and is female then the premium is Rs.3 per thousand and the policy amount cannot exceed Rs.1 lakh.

iii. If a person's health is poor and the person is between 25 and 35 years of age and lives in a village and is a male then premium is Rs.6 per thousand and the policy cannot exceed Rs. 10000.

iv. In all other cases the person is not insured.

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

5. a. Write a program, which takes two integer operands and one operator as input from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, %. Use switch statement)

b. Write a program to find the grace marks for a student using switch. The user should enter the class obtained by the student and the number of subjects he has failed in. Use the following rules:

i. If the student gets first class and the number of subjects failed is >3, then no grace marks are awarded. If the number of subjects failed is less than or equal to '3' then the grace is 5 marks per subject.

ii. If the student gets second class and the number of subjects failed in is >2, then no grace marks are awarded. If the number of subjects failed in less than or equal to '3' then the grace is 4 marks per subject.

iii. If the student gets third class and the number of subjects failed in is >1, then no grace marks are awarded. If the number of subjects failed in is equal to '1' then the grace is 5 marks per subject.

6. a. Write a program to find the sum of individual digits of a positive integer.

b. A Fibonacci sequence is defined as follows:

The first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a program to generate the first N terms of the sequence.

Write a program to generate all the prime numbers between 1 and N, where N is a value supplied by the user.

7. a. Write a program to find the largest and smallest number in a given list of integers.

b. Write a program to perform the following:

i. Addition of two matrices.

ii. Multiplication of two matrices.

8. a. Write a program that uses functions to perform the following operations:
   i. To insert a sub-string in main string at a specified position.
   ii. To delete N characters from a given string from a specified position.
   b. Write a program to determine whether the given string is palindrome or not.
   c. Write a program to display the position or index in the main string S where the sub string T begins. Display -1 if S does not contain T.
   d. Write a program to count the number of lines, words and characters in a given text.
9. a. Write a program to read list of student names and perform the following operations using functions.
   i. to print list of names
   ii. to sort them in ascending order
   iii. to print the list after sorting.
   b. Write a menu driven program to read list of student names and perform the following operations using array of character pointers.
   i. to insert a student name
   ii. to delete a name
   iii. to print the name
10. Write a program that uses functions to perform the following operations:
   i. Reading a complex number
   ii. Writing a complex number
   iii. Addition of two complex numbers
   iv. Multiplication of two complex numbers
   (**Note:** Represent complex number using a structure.)
11. a. Write a program to accept the elements of the structure as:
   Employee-name,Basic pay
   Display the same structure along with the DA, CCA and Gross salary for 5 employees.
   Note: DA=51% of Basic pay, CCA=Rs.100.consolidated.
   b. Define a structure to store employee's data with the following specifications:
   Employee-Number, Employee-Name, Basic pay, Date of Joining
   i. Write a function to store 10 employee details.
   ii. Write a function to implement the following rules while revising the basic pay.

If Basic pay<=Rs.5000 then increase it by 15%.
If Basic pay> Rs.5000 and <=Rs.25000 then it increase by 10%.
If Basic pay>Rs.25000 then there is no change in basic pay.
Write a function to print the details of employees who have completed 20 years of service from the date of joining.

12. a. Write a program which copies one 'text file' to another 'text file'.
    b. Write a program to reverse the first N characters of a given text file.

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

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

REFERENCE BOOKS:

1. Byron Gottfried and Jitender Kumar C, "Programming with C," Third Edition, McGraw Hill Education(India) Pvt. ltd, New Delhi, 2016.
2. Pradip Dey and Manas Ghosh, "Programming in C," Second Edition, Oxford University Press, New Delhi, 2007.

I B. Tech. - II Semester

(16BT1HS01) **Technical English**

(Common to ECE, EEE & EIE)

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

PRE-REQUISITES: English at Intermediate level

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

COURSE OUTCOMES:

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

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

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

CO3: Design and develop functional skills for professional practice.

CO4: Apply writing skills in preparing and presenting documents

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

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

DETAILED SYLLABUS:

UNIT I - INTRODUCTION TO COMMUNICATION: (9 periods)

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

UNIT II - ACTIVE LISTENING: (9 periods)

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

UNIT III - EFFECTIVE SPEAKING: (9 periods)

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

UNIT IV - READING: (9 periods)

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

UNIT V - WRITING: (9 periods)

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

Total Periods: 45

TEXT BOOKS:

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

REFERENCE BOOKS:

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

I B. Tech. - II Semester

(16BT1BS01): **ENGINEERING CHEMISTRY**

(Common to ECE, EEE & EIE)

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

PRE REQUISITE: Intermediate/Senior Secondary Chemistry

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

COURSE OUTCOMES:

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

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

CO2: Develop analytical skills in:
- a. Determination of hardness of water.
- b. Determination of viscosity, flame and fire points, cloud and pour points.

CO3: Develop designing skills in:
- a. Synthesis of engineering plastics.
- b. Chemical methods for the synthesis of Nano materials.

CO4: Develop skills for providing solutions through:
- a. Mitigation of hardness of water.
- b. Newer Nanomaterials and engineering plastics for specific applications

CO5: Acquire awareness to practice engineering in compliance to modern techniques such as:
- a. Nalgonda technique for defluoridation of water
- b. Electroplating technique for control of corrosion.

CO6: Acquire awareness to societal issues on:
- a. Quality of water.
- b. Bio-diesel
- c. Chemical materials utility and their impact.

DETAILED SYLLABUS:

UNIT–I: WATER TECHNOLOGY (9 periods)

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

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

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

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

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

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

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

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

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

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

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

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

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

Electrochemical cell: Introduction, EMF of an electrochemical cell.

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

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

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

UNIT–V: CORROSION AND LUBRICANTS (9 periods)

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

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

Total periods: 45 periods

TEXT BOOKS:

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

REFERENCE BOOKS:

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

I B. Tech. - II Semester

(16BT2BS01) TRANSFORMATION TECHNIQUES AND PARTIAL DIFFERENTIAL EQUATIONS

(Common to all Branches)

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

PRE REQUISITE: Intermediate /Senior secondary mathematics

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

COURSE OUTCOMES:

After completion of the course a successful student is able to

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

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

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

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

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

DETAILED SYLLABUS

UNIT- I : FOURIER SERIES (7 periods)

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

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

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

UNIT-III: LAPLACE TRANSFORMS (12 periods)

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

UNIT-IV: Z- TRANSFORMS (9 periods)

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

UNIT – V: PARTIAL DIFFERENTIAL EQUATIONS (9 periods)

Formation of Partial differential equations – Solutions of first order linear equations by method of grouping. First and second order equations by method of separation of variables – Solutions of one dimensional Wave equation, Heat equation.

Total no. of periods: 45

TEXT BOOKS:

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

REFERENCE BOOKS:

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

I B. Tech. - II Semester

(16BT20401) ELECTRONIC DEVICES AND CIRCUITS

(Common to ECE, EEE & EIE)

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

PRE-REQUISITES: A Course on Engineering Physics.

COURSE DESCRIPTION:

Characteristics of general and special purpose electronic devices; Rectifiers; filters and regulators; Biasing and small signal analysis of BJT and FET.

COURSE OUTCOMES:

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

CO1: Demonstrate knowledge in
- p-n junction diode and its characteristics
- Zener diode and its characteristics
- Rectifiers, Filters and Regulators
- Characteristics of BJT, FET, MOSFET and special purpose electronic devices.

CO2: Analyze numerical and analytical problems in
- Rectifiers using Filters
- Regulated Power Supplies
- Transistor biasing circuits and stabilization
- Transistor amplifiers
- FET biasing circuits and amplifiers

CO3: Design electronic circuits such as
- Rectifiers with and without filters
- Voltage regulators
- BJT and FET biasing circuits
- BJT and FET amplifiers

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

CO5: Select appropriate technique for transistor modeling.

DETAILED SYLLABUS:

UNIT-I: P-N JUNCTION DIODE, RECTIFIERS AND REGULATORS (11 Periods)

P-N Junction Diode:

p-n Junction as a diode, *p-n* Junction diode equation, Volt-Ampere (V-I) characteristics, temperature dependence of *p-n* characteristics, diode resistance-static and dynamic resistances, transition and diffusion capacitances, break down mechanisms in semiconductor diodes, Zener diode characteristics.

Rectifiers and Regulators:

Half-Wave rectifier and Full-Wave rectifiers (Qualitative and quantitative analysis), Harmonic components in a rectifier circuit, Inductor filter, Capacitor filter, L - section filter, ð- section filter, comparison of various filter circuits in terms of ripple factors. Simple circuit of a regulator using Zener diode. Problems on rectifier circuits.

UNIT-II- *BIPOLAR JUNCTION TRANSISTOR, BIASING AND STABILIZATION*: (10 Periods)

Transistor construction, BJT Operation, Transistor currents and their relations, Input and Output Characteristics of a Transistor in Common Emitter, Common Base and Common Collector Configurations, BJT specifications, Transistor Operating Point, DC and AC Load Lines, Importance of Biasing, Fixed Bias, Emitter Feedback Bias, Collector to Base Feedback Bias, Voltage Divider Bias, Bias Stability, Transistor as an amplifier, Thermal Runaway, Problems on biasing circuits.

UNIT-III- *SMALL SIGNAL ANALYSIS OF BJT AMPLIFIERS*: (08 Periods)

BJT Modeling, Hybrid Modeling, Determination of h-Parameters from Transistor Characteristics, Measurement of h-Parameters, Miller's Theorem, Analysis of CE, CB and CC configurations using simplified Hybrid Model, Comparison of CB, CE and CC configurations.

UNIT-IV- *FIELD EFFECT TRANSISTORS*: (10 Periods)

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

UNIT-V- *SPECIAL PURPOSE ELECTRONIC DEVICES*:

(06 Periods)

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

Total Periods: *45*

TEXT BOOK:

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

REFERENCE BOOKS:

1. R.L. Boylestad and Louis Nashelsky, *Electronic Devices and Circuits,* PHI, 10thEdition, 2009.
2. David A. Bell, *Electronic Devices and Circuits,* Oxford University press, 5thEdition, 2014.
3. S. Salivahanan, N. Suresh Kumar, *Electronic Devices and Circuits*, Mc-Graw Hill, 3rd Edition 2013.
4. Ben G. Streetman, Sanjay Banerjee , Solid State Electronic Devices, Pearson Prentice Hall, 2006.

I B. Tech. - II Semester

(16BT20541) **Foundations of Data Structures**

(Common to ECE, EEE & EIE)

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

PRE-REQUISITES:

A course on "Programming in C"

COURSE DESCRIPTION:

Concepts of sorting: sorting by exchange, sorting by distribution, sorting by merging and data structures: stacks, queues, linked lists, trees, graphs, and hash table.

COURSE OUTCOMES:

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

CO1: Gain knowledge in Sorting techniques, Linear and Non-linear Data Structures.

CO2: Analyze the performance of sorting techniques and their relationship to Data Structures.

CO3: Design appropriate hashing function for a given application and develop programs to implement Linear and Non-Linear data structures

CO4: Apply appropriate data structure to provide solutions for real time problems using C Language.

DETAILED SYLLABUS:

UNIT I – SORTING (9 periods)

SORTING - Sorting by Exchange-Shell Sort, Quick sort. Sorting By Distribution-Counting Sort, Bucket Sort, Radix Sort. Sorting By Merging-Merge Sort.

UNIT II– STACKS AND QUEUES (9 periods)

STACKS -Introduction, Stack Operations, Applications.

QUEUES - Introduction, Operations on Queues, Circular Queues and Applications.

UNIT III –LINKED LISTS (9 periods)

LINKED LISTS –Introduction, Single Linked List, Circular Linked List, Doubly Linked List, Multiply Linked List and Applications.

LINKED STACKS AND LINKED QUEUES - Introduction, Operations on Linked Stack and Linked Queues, Dynamic Memory Management and Linked Stacks.

UNIT IV – TREES AND BINARY TREES (9 periods)

TREES– Introduction, Definition and Basic Terminologies, Representation of Trees.

BINARY TREES – Basic Terminologies and Types, Representation of Binary Trees, Binary Tree Traversals, Binary Search Trees: Definition and Operations and Applications.

UNIT V – Graphs and Hashing (9 periods)

Graphs – Introduction, Definitions and Basic Terminologies, Representation of Graphs, Graph Traversals, Applications.

Hashing – Introduction, Hash Table Structure, Hash Functions, Linear Open Addressing, Chaining and Applications.

Total Periods: *45*

TEXT BOOK:

1. G.A.V. Pai, *"Data Structures and Algorithms",* Tata McGraw Hill, Second Edition, 2009.

REFERENCE BOOK:

1. Debasis Samanta, "Classic Data Structures", PHI Learning, Second Edition, 2009.

I B. Tech. - II Semester

(16BT1HS31) **ENGLISH LANGUAGE LAB**

(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	0	0	3	2

PRE-REQUISITES: English at intermediate or equivalent level.

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

COURSE OUTCOMES:

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

CO1: Demonstrate knowledge in
- Phonetics
- Information Transfer

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

CO3: Design and develop functional skills for professional practice.

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

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

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

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

LIST OF EXERCISES:

1. Phonetics
2. Vocabulary Building
3. Functional Grammar
4. Just a Minute
5. Elocution/Impromptu
6. Giving Directions/Conversation Starters
7. Role Play
8. Public Speaking

9. Describing People, Places, Objects and Events.
10. Reading Comprehension
11. Listening Comprehension
12. Information Transfer

Total Lab Slots: 10

TEXT BOOK:

1. Department Lab Manual

REFERENCE BOOKS:

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

SUGGESTED SOFTWARE:

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

I B. Tech. - II Semester
(16BT1BS31): ENGINEERING CHEMISTRY LAB
(Common to ECE, EEE & EIE)

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

PRE REQUISITE: Intermediate/Senior Secondary Chemistry

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

COURSE OUTCOMES:

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

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

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

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

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

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

List of Experiments:

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

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

Total Time Slots: 12

I B. Tech. - II Semester

(16BT10331) COMPUTER AIDED ENGINEERING DRAWING

(Common to ECE, EEE & EIE)

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

PRE-REQUISITES: *None*

COURSE DESCRIPTION:

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

COURSE OUTCOMES:

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

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

DETAILED SYLLABUS:

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

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

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

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

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

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

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

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

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

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

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

Total Periods: *100*

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

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Sham Tickoo, AutoCAD 2013 for Engineers and Designers, Dreamtech Press, 2013.
2. M.H.Annaiah & Rajashekar Patil, Computer Aided Engineering Drawing, New Age International Publishers, 4th Edition, 2012.
3. T.Jeyapoovan, Engineering Drawing and Graphics Using AutoCAD, Vikas Publishing House, 3rd Edition, 2010.
4. Jolhe, Engineering Drawing, Tata McGraw Hill Education Private Limited, 1st Edition, 2007.
5. Basant Aggarwal, Engineering Drawing, Tata McGraw Hill Education Private Limited, 1st Edition, 2008.

I B. Tech. - II Semester
(16BT20551) FOUNDATIONS OF DATA STRUCTURES LAB

(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	*50*	*100*	*0*	*0*	*3*	*2*

PRE-REQUISITES:

A course on "Foundations of Data Structures"

COURSE DESCRIPTION:

Hands on programming to implement data structures - Linked lists, Stacks, Queues, Trees, Search trees, Sorting, and Hashing in C Language.

COURSE OUTCOMES:

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

CO1: Gain practical knowledge on stacks, queues, trees, graphs and Hashing Techniques

CO2: Identify suitable data structure to solve engineering problems.

CO3: Design solutions for complex engineering problems using linear and non-linear data structures.

CO4: Develop algorithms leading to multiple solutions by conducting investigations of complex problems.

CO5: Apply 'C' language as a tool for implementing linear and non linear data structures

CO6: Communicate effectively by writing Programs and document practical work.

LIST OF PRACTICAL EXERCISES:

1. Implement the following sorting techniques
   (a) Quick Sort (b) Radix Sort (c) Merge Sort
2. Implement the following data structures using arrays
   (a)Stack (b) Queue (c) Circular Queue
3. Implement the following operations on a single linked list.
   (a) Creation (b) Insertion (c) Deletion (d) Display
4. Implement the following operations on a double linked list.
   (a) Creation (b) Insertion (c) Deletion (d) Display
5. Implement the following operations on a circular linked list.
   (a) Creation (b) Insertion (c) Deletion (d) Display
6. Implement the following data structures using linked list.
   (a) Stack (b) Queue (c) Circular Queue
7. Implement the following tree traversals on a binary tree
   (a) Preorder (b) Inorder (c) Postorder
8. Implement the following operation on binary search tree
   (a) Creation (b) Insertion (c) Deletion (d) Inorder
9. Implement the following graph traversal techniques
   (a) Breadth First traversal (b) Depth First Traversal
10. Implement the following Hashing Techniques
    (a) Separate Chaining (b) Open addressing methods

REFERENCE BOOKS:

1. G.A.V. Pai, *"Data Structures and Algorithms",* Tata McGraw Hill, Second Edition, 2009.
2. Debasis Samanta, "*Classic Data Structures",* PHI Learning, Second Edition, 2009.

II B.Tech. - I semester

(16BT3HS01) **ENVIRONMENTAL STUDIES**

(Common to EEE, ECE & EIE)

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

PREREQUISITES: ACourse on Engineering Chemistry

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

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

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

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

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

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

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

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

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

CO8. Follow environmental protection laws for sustainable development.

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

DETAILED SYLLABUS:

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

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

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

UNIT - II: ECOSYSTEMS AND BIODIVERSITY (10 Periods)

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

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

UNIT - III: ENVIRONMETAL POLLUTION AND CONTROL (08 Periods)

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

UNIT - IV: SOCIAL ISSUES AND THE ENVIRONMENT

(08 Periods)

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

UNIT - V: HUMAN POPULATION AND THE ENVIRONMENT

(08 Periods)

Population growth, Population characteristics and variation among nations, Population explosion, Family welfare programme, Environment and human health, Human rights, Value education, HIV/AIDS, Women and child welfare, Role of information technology in environment and human health, Case studies, **Field Work/Assignment/Seminar:** Environmental assets – Pond/Forest/Grassland/Hill/ Mountain/Environment impact assessment procedures for local environmental issues.

Total Periods: 45

TEXT BOOKS:

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

REFERENCE BOOKS:

1. R. Rajagopalan, *Environmental Studies*, Oxford University Press, 2nd Edition, 2011.
2. Benny Joseph, *Environmental Studies*, Tata McGraw-Hill, 2nd Edition, 2009.
3. B. S. Chauhan, *Environmental Studies*, University Science Press, 2008.
4. M. Anji Reddy, *Text Book of Environmental Sciences and Technology*, BS Publications, 2007.

II B.Tech. - I semester

(16BT3BS02) SPECIAL FUNCTIONS AND COMPLEX ANALYSIS

(Common to EEE, ECE & EIE)

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

PREREQUISITES: Intermediate/senior secondary Mathematics

COURSE DESCRIPTION: Beta, Gamma functions and their properties; Limits continuity and analyticity of complex functions; Integration, power series, singularities, residues; conformal mapping.

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

CO1. Acquire knowledge in

- Beta and Gamma functions
- Expressing complex functions in power series
- Differentiation and integration of complex functions
- Conformal mappings and bilinear transformations
- Expressing complex functions in terms of graphs and power series

CO2. Develop skills in analyzing the

- The properties exhibited by complex functions in Argand plane
- Properties of real integrals through complex variable techniques
- The properties of improper integrals through residue theory
- Conformal transformations of complex valued functions for inferences
- The properties of complex functions by expressing them in power series and graphs

CO3. Develop skills in designing mathematical models involving

- Integrals of complex variable functions
- Improper integrals using beta and gamma functions
- Residue theory of complex functions
- Power series expansions of complex variable functions
- Transformations of complex variable functions
- Fluid flow patterns and flux functions.

CO4. Develop analytical skills in providing solutions for problems involving

- Fluid, Electrical and Magnetic Potential functions
- Integration of complex functions
- Improper real integrals

CO5. Use relevant Complex variable techniques for

- Residues and integrals of complex functions.
- Improper real integrals through complex functions
- Techniques of Beta and Gamma functions to improper integrals

DETAILED SYLLABUS

UNIT-I: SPECIAL FUNCTIONS (09 Periods)

Beta and Gamma functions - Properties - Relationship between Beta and Gamma functions- Evaluation of improper integrals using Beta and Gamma functions. Bessel function -Generating function (without proof) - Recurrence relations.

UNIT-II: ANALYTIC FUNCTIONS (09 Periods)

Function of a Complex Variable - Limits and Continuity of functions, uniform continuity, Differentiability and Analyticity – Cauchy Riemann equations (both Cartesian and polar) - Conjugate and harmonic conjugate functions - Milne Thomson method-Potential functions.

UNIT-III: COMPLEX INTEGRATION AND POWER SERIES (09 Periods)

Line integral - Evaluation of line integrals along curves and closed contours - Cauchy's Integral theorem - Cauchy's integral formula - Generalized integral formula- Evaluation of integrals using integral formula. Taylor's theorem (without proof) - Laurent's theorem (without proof) - Power series expansion of complex functions.

UNIT-IV: RESIDUE THEOREM (09 Periods)

Zeros, Singularities – Types of singularities- poles - Residues – Evaluation of residues at simple poles and poles of order m - Residue theorem - Evaluation of integrals using residue theorem – Evaluation of improper and real integrals of the type:

i) $\int_0^{2\pi} f(\cos\theta, \sin\theta)d\theta$ ii) $\int_{-\infty}^{\infty} f(x)dx$ iii) $\int_{-\infty}^{\infty} e^{imx} f(x)dx$

UNIT-V: CONFORMAL MAPPING (09 Periods)

Conformal mappings, Translation, Rotation, Inversion.Special transformations: $w = z^2, w = e^z, w = \log z, \quad w = \sin z, w = \cos z.$

Bilinear transformation - Properties - Fixed points - Cross ratio - Invariance of circles under bilinear transformation - Determination of bilinear transformation using three given points.

Total Periods: 45

TEXT BOOK:

1. T.K.V. Iyengar, B. Krishna Gandhi,S., Ranganatham and M.V.S.S.N. Prasad,*Text book of Engineering Mathematics,* Vol-III, S. Chand & Company, 9th Edition 2012.

REFERENCE BOOKS:

1. Grewal, B.S, *Higher Engineering Mathematics*, Khanna Publishers, Delhi, 42th Edition 2012.
2. Shahnaz Bathul, *Special Functions and Complex Variables*, PHI Learning,2nd Edition 2010.

II B.Tech. - I semester

(16BT30401) ELECTRONIC CIRCUIT ANALYSIS AND DESIGN

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

PREREQUISITES: A course on Electronic Devices and Circuits

COURSE DESCRIPTION:

Single Stage Amplifiers; Multi-Stage amplifiers; Frequency Response; Feedback Amplifiers; Oscillators; Large Signal Amplifiers; Tuned Amplifiers.

COURSE OUTCOMES:

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

CO1. Demonstrate knowledge in
- Single Stage Amplifiers
- Multi Stage Amplifiers.
- BJT Frequency Response.
- Feedback Amplifiers.
- Power Amplifiers.
- Tuned Amplifiers.

CO2. Perform analysis of electronic circuits for meeting defined specifications.

CO3. Design and develop electronic circuits such as Feedback Amplifiers, Oscillators and Power amplifiers with given specifications.

CO4. Solve problems pertaining to electronic circuit design.

CO5. Select an Amplifier circuit for a specific electronic sub-system.

CO6. Apply course knowledge to assess societal issues and understand the consequent responsibilities relevant to the professional engineering practice using electronic circuits.

DETAILED SYLLABUS:

UNIT-I: BJT AMPLIFIERS (10 Periods)

Single Stage Amplifiers: Introduction, Classification of Amplifiers, Analysis of CE amplifier with an Emitter Resistance.

Multistage Amplifiers: Distortion in amplifiers, Cascading Transistor amplifiers, Methods of inter-stage coupling, RC Coupled Amplifier, Direct and Transformer Coupled Amplifier, Multistage Frequency Effects, Darlington Pair, Bootstrapped Darlington circuit, Cascode amplifier.

UNIT- II: HIGH FREQUENCY RESPONSE (09 Periods)

BJT: Frequency response of BJT amplifier, Analysis at low and high frequencies, Effect of coupling and bypass capacitors,

Hybrid-ð Common Emitter transistor model, Hybrid-ð conductance, Hybrid-ð capacitances, validity of Hybrid-ð model, CE short circuit current gain, CE current gain with resistive load, Gain-Bandwidth Product.
FET: Analysis of Common Source and Common Drain Amplifier circuits at High
frequencies.

UNIT-III: FEEDBACK AMPLIFIERS (10 Periods)
Negative feedback amplifiers: Feedback Concept, Classification, General characteristics, Effect of feedback on amplifier characteristics, Voltage series, Current series, Current shunt and Voltage shunt feedback configurations.
Oscillators: Conditions for oscillations, types of oscillators, RC-phase shift oscillators with BJT and FET with the relevant analysis, Wein bridge oscillator, Hartley oscillator, Colpitts oscillator, Piezoelectric crystal oscillator, Frequency Stability.

UNIT-IV: POWER AMPLIFIERS (08 Periods)
Classification, Class A large-signal amplifiers- Series Fed and Transformer-coupled Audio power amplifier, Efficiency**;** Second harmonic Distortions, Higher order harmonic Distortion, Class B amplifier-Transformer coupled Push-pull amplifier, Complementary symmetry Push-pull amplifier, Efficiency**;** MOSFET power amplifier, Thermal stability and Heat sinks.

UNIT-V: BJT TUNED AMPLIFIERS (08 Periods)
Introduction, Q-Factor, Small Signal Tuned Amplifiers, Effect of Cascading Single Tuned Amplifiers on Bandwidth, Double-tuned amplifier, Effect of Cascading Double Tuned Amplifiers on Bandwidth, Stagger Tuned Amplifiers, Stability of Tuned Amplifiers, Class-C Tuned amplifier.

Total Periods: 45

TEXT BOOKS:

1. Jacob Millman and Christos C. Halkias, *Integrated Electronics*, Tata McGrawHill, 2nd Edition, 2010.
2. S Salivahanan, N.Suressh Kumar, A. Vallavaraj, *Electronic Devices and Circuits,* TataMcGraw Hill, 3rd Edition, 2008.

REFERENCE BOOKS:

1. Robert L. Boylestad and Louis Nashelsky, *Electronic Devices and Circuits Theory*, Pearson Education, 10th Edition, 2009.
2. David A. Bell, *Electronic Devices and Circuits*, Oxford University press, 5th Edition, 2014.
3. Donald A. Neamen, *Electronic Circuit Analysis and Design*, Tata McGraw-Hill, 3rd Edition, 2007.

II B.Tech. - I semester

(16BT30402) **SIGNALS AND SYSTEMS**

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

PREREQUISITES: A course on transformation techniques and partial differential equations.

COURSE DESCRIPTION:
Analysis of signals and systems; Representation of signals using Fourier series and Fourier transforms; Time-Domain and Frequency-Domain aspects of signals and systems; concept of convolution and correlation; Sampling and types of sampling; Laplace transform of signals; Z-Transform of sequences.

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

CO1. Demonstrate knowledge in
- Representation of signals and systems.
- Fourier series representation of periodic signals
- Fourier transform of signals
- Convolution and correlation of functions
- Laplace transform
- Sampling Process
- Z-Transform

CO2. Analyze various continuous and discrete time signals and systems in time andfrequency domains.

CO3. Develop solutions to stable and causal systems.

CO4. Solve problems pertaining to transforms and signal processing.

CO5. Select and apply appropriate transformation techniques for understanding of the frequency content of signals at the input and output of the systems.

DETAILED SYLLABUS:

UNIT I: SIGNALS AND SYSTEMS (10 Periods)

Elementary signals- Unit Impulse and Unit Step Functions, Exponential and Sinusoidal Signals. Classification of Continuous-Time and Discrete-Time Signals, Basic operations on signals, Classification of Continuous-Time and Discrete-Time Systems, Basic System Properties, Linear Time-Invariant Systems - Discrete-Time LTI Systems- The Convolution Sum, Continuous-Time LTI Systems - The Convolution Integral, Properties of Linear Time-Invariant Systems.

UNIT II: FOURIER SERIES AND FOURIER TRANSFORM (12 Periods)

Fourier series: Representation of Fourier series, Continuous time periodic signals, Dirichlet's conditions, Properties of CT

Fourier Series, Trigonometric Fourier Series and Exponential Fourier Series with examples. Complex Fourier spectrum. Fourier series representation of a periodic signals.
Fourier Transforms: Deriving Fourier Transform from Fourier series, Fourier Transform of standard signals, Fourier Transform of Periodic Signals, Properties of CT Fourier Transform, Systems characterized by Linear constant coefficient differential equations. The Magnitude-Phase Representation of the Fourier Transform, The Magnitude-Phase Representation of the Frequency Response of LTI Systems.

UNIT III: CORRELATION OF SIGNALS (07 Periods)
Cross correlation and auto correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function. Relation between convolution and correlation, Detection of periodic signals in the presence of noise bycorrelation, Extraction of signal from noise by filtering.

UNIT IV: LAPLACE TRANSFORMS (07 Periods)
The Laplace Transform, The Region of Convergence for Laplace Transforms, The Inverse Laplace Transform, Relationship between Fourier and Laplace Transforms, Properties of the Laplace Transform, Some Laplace Transform Pairs, Analysis and Characterization of LTI Systems Using the Laplace Transform.

UNIT V: SAMPLING AND Z-TRANSFORMS (09 Periods)
Sampling: Representation of a Continuous-Time Signal by its Samples - Sampling Theorem, Reconstruction of a Signal from Its Samples Using Interpolation. Effect of under sampling - Aliasing, Discrete-Time Processing of Continuous-Time Signals.
Z-Transforms: Region of Convergence for the z-Transform, The Inverse z-Transform, Relation between Fourier and Z-Transforms, Properties of the z-Transform, Some Common z-Transform Pairs, Analysis and Characterization of LTI Systems Using z-Transforms.

Total Periods: 45

TEXT BOOK:
1. Alan V. Oppenheim, Alan S. Willsky, & S. Hamid, *Signals and Systems*, Pearson Higher Education, 2nd Edition, 2008.

REFERENCE BOOKS:
1. Simon Haykin and B. Van Veen, *Signals & Systems*, John Wiley, 2nd Edition, 2010.
2. A. Anand Kumar, Signals & Systems, PHI, 2011.
3. B.P. Lathi, *Principles of Linear Systems and Signals,* Oxford University Press, 2nd Edition, 2013.

II B.Tech. - I Semester
(16BT30403) SWITCHING THEORY AND LOGIC DESIGN

(Common to ECE & EIE)

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

PREREQUISITES:—

COURSE DESCRIPTION:

Number system and Boolean algebra; Minimization; Analysis and synthesis of digital circuits; Asynchronous Sequential Logic & Programmable Memories.

COURSE OUTCOMES:

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

CO1. Demonstrate the knowledge in
- Conversion of number systems, Binary Codes.
- Basic theorems, properties and postulates of Boolean algebra.
- Minimization of switching functions using Map method and Tabular method.
- Combinational and sequential circuits.
- Realization of Boolean functions using PLDs.

CO2. Analyse combinational and sequential circuits.

CO3. Design and develop various combinational, sequential circuits and PLDs.

CO4. Solve problems and arrive at solutions pertaining to Digital Electronics.

CO5. Apply minimization techniques to asynchronous and synchronous designs and suggest appropriate design for engineering solutions.

CO6. Apply appropriate logic functions to obtain optimized designs useful for the society.

DETAILED SYLLABUS

UNIT I: NUMBER SYSTEM AND BOOLEAN ALGEBRA **(10 Periods)**

Introduction, Binary Numbers, Number base conversions, Complements of numbers, Signed binary numbers, Binary codes, Error detection and correction codes. Boolean Algebra-Basic definition, Basic theorems and properties, Boolean Functions, Canonical & Standard forms, logic operations & Logic gates.

UNIT II: GATE LEVEL MINIMIZATION (08 Periods)

Introduction, the map method, four variable, Five variable K-map, POS & SOP Simplification, Don't care conditions, NAND & NOR Implementation, Other two level Implementation, Ex-or Function, Quine-McCluskey Technique-simplification of Boolean function using tabulation Method.

UNIT III: ANALYSIS AND SYNTHESIS OF COMBINATIONAL CIRCUITS (10 Periods)

Combinational circuits, Analysis & Design procedure, Binary Adder-subtractor, Decimal Adder, Binary Multiplier, Magnitude comparator, Decoder, Encoders, Multiplexers, Demultiplexers-1-Line to 4-Line and 1-Line to 8-Line Demultiplexers.

UNIT IV: ANALYSIS AND SYNTHESIS OF SEQUENTIAL CIRCUITS (10 Periods)

Sequential Circuits, Latches, Flip-Flops, Analysis of Clocked sequential circuits, State Reduction & Assignment, Design procedure, Registers-Shift Registers, Counters- Synchronous counters and Asynchronous counters.

UNIT V: ASYNCHRONOUS SEQUENTIAL LOGIC & PROGRAMMABLE MEMORIES (07 Periods)

Introduction, Analysis procedure, Design Procedure, Reduction of State and flow tables, Hazards,Programmable Memories-ROM, PLA, PAL.

Total Periods: 45

TEXT BOOK:

1. M. Morris Mano, *Digital Design,* Pearson, 5thEdition, 2013.

REFERENCE BOOKS:

1. Anand Kumar, *Switching Theory and Logic Design*, PHI, 2008
2. ZviKohavi and NirahK.Jha, *Switching theory and Finite Automata Theory,* Tata McGraw-Hill, 2nd Edition, 1978.
3. Charles H. Roth, *Fundamentals of Logic Design*, Thomson Publications, 5thEdition, 2004.

II B.Tech. - I semester

(16BT30241) **ELECTRICAL TECHNOLOGY**

(Common to ECE & EIE)

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

PREREQUISITES: Courses on Network Analysis andEngineering Physics.

COURSE DESCRIPTION:

Analysis of phase & line quantities and measurement of power in three phase system; Constructional details, operation,performance evaluation andapplications of DC& AC machines; Testing of DC machines and Transformers;Special machines and single phase transformers.

COURSE OUTCOMES:

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

CO1. Demonstrate knowledge on
- Constructionand operation ofvariouselectrical machines
- Measurement of powerin three-phase system
- Applications of various types of electrical machines

CO2. Analyze
- The operation and performance of various electrical machines
- The polyphase circuit for measurement of power

CO3. Design suitable accessories / controllers for various machines to meet the nominal specifications

CO4. Solve engineering problems pertaining to various machines and provide feasible solutions

CO5. Select appropriate control techniques for various electrical machines used in domestic and industrial applications

CO6. Apply the conceptual knowledge of variouselectrical machinesin relevance to industry and society

DETAILED SYLLABUS:

UNIT-I:DC MACHINES (13 Periods)

DC Generator: Construction and working principle, types, EMF equation, losses, open circuit and load characteristics, applications.

DC Motor: Working principle, types, torque equation, characteristicsand applications.Speed control of DC shunt motor.Necessity of starter, three-point starter.Swinburne's test.

UNIT-II:SINGLE PHASE TRANSFORMER (08 Periods)
Construction and working principle, EMF equation, losses, equivalent circuit,OC and SC tests on single phase transformer, predetermination of efficiency and regulation.

UNIT-III:THREE PHASE SYSTEMS (07periods)
Introduction and advantages of polyphase system,generation of three phase voltages, phase sequence,star and delta connections, relationship between phase and line quantities in three phase balanced circuits, power measurement in three phase balanced and unbalanced systems using two wattmeter method.

UNIT-IV: THREE PHASE INDUCTION MOTOR AND ALTERNATOR (09 Periods)
Induction motor: Principle of operation, constructional details, slip, rotor frequency, starting and running torques, torque-slip characteristics.
Alternators: Principle of operation, constructional details, types, interrelation between speed and number of poles andEMF equation.

UNIT-V: SPECIAL MACHINES (07 Periods)
Construction of single phase induction motor, double field revolving theory,resistance start, capacitor start and capacitor start & run split phaseinduction motors operation and applications,Constructional details, operation and applications of shaded-pole motor, universal motor andstepper motor (VRandPM type only).

Total Periods: 44

TEXT BOOKS:

1. V.K. Mehta, Rohit Mehta, *Principles of Electrical Engineering*,S.Chand& Company Pvt. Ltd, New Delhi, 2016.
2. B.L. Theraja and A.K. Theraja, *AText Book of Electrical Technology in S. I. Units,* Vol.2, S.Chand & Company Ltd, Multicolour illustrative Edition, New Delhi, 2014.

REFERENCE BOOKS:

1. A.Sudhakar and Shyammohan, *Principles of Electrical Engineering,* Tata McGraw Hill Education Private Limited,New Delhi. 2012.
2. M.S. Naidu and S. Kamakshaiah, *Introduction to Electrical Technology*, Tata McGrawHillpublishingcompany Ltd, New Delhi, 2007.

II B.Tech. - I semester

(16BT30251) **ELECTRICAL TECHNOLOGY LAB**

(Common to ECE & EIE)

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

PREREQUISITES: Courses onNetwork Analysis and Network Analysis lab.

COURSE DESCRIPTION:

Construction,operation,types, performance evaluation of DC& ACmachines and transformers;Necessity of starter for DC motors; Three phase power measurement.

COURSE OUTCOMES:

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

CO1. Demonstrate knowledge on
- Construction, operation of DC& ACmachines and transformers.
- Starting and speed control of DC motors.
- Testing of DC& ACmachines and transformers.
- Characteristics of DC& ACmachines and transformers.
- Measurement of three phase power.
- Applications of DC& ACmachines and transformers.

CO2. Analyzethe operation and performance of DC& ACmachines, transformers and three phase system for various operating conditions.

CO3. Design the circuit with suitable accessories / controllers for desired operation conditions of DC & AC machines.

CO4. Interpret and synthesize the data obtained from experimentation on DC& ACmachines, transformers and three phase system and provide valid conclusions.

CO5. Select and apply appropriate technique for testing and control of DC& ACmachines and transformers useful in industry.

CO6. Apply the conceptual knowledge of electrical machines in relevance to industry and society.

CO7. Commit to ethical principles and standards while exercising the practical investigations on electrical machines.

CO8. Work individually or in a group while exercising practical investigationsin the field of electrical machines.

CO9. Communicate effectively in verbal and written form in relevance to electrical machines.

DETAILED SYLLABUS:

PART -A

1. Construction of DC machines, transformers, synchronous machines, induction motorsand DC motor starters.

PART – B

Any NINE experiments are to be conducted

1. Magnetization characteristic of a DC generator.
2. Load characteristics of DC shunt generator.
3. Swinburne's test on a DC shunt machine.
4. Brake test on a DC shunt motor.
5. Speed control of DC shunt motor by
    a. Field flux control method
    b. Armature voltage control method.
6. OC and SC tests on a singlephase transformer.
7. Load test on a single phase transformer.
8. Measurement of power using two wattmeter method
9. Brake test on a threephase induction motor.
10. Regulation of a three phase alternator by synchronous impedance method.
11. Brake test on single phase induction motor.

II B.Tech. - I semester

(16BT30431) BASIC ELECTRONICS AND DIGITAL DESIGN LAB

(Common to ECE & EIE)

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

PREREQUISITES: Courses on Electronic Devices and Circuits & Switching Theory and Logic Design.

COURSE DESCRIPTION: Diode characteristics; Rectifiers; BJT and FET characteristics; UJT and SCR characteristics; BJT Amplifiers; Combinational Circuits; Realization of Flip-flops; Sequential Circuits; Demonstration on VHDL Programme.

COURSE OUTCOMES:

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

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

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

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

CO4. Solve engineering problems with better Electronic circuits.

CO5. Work individually and also in a group in the area of Analog and Digital circuits.

CO6. Communicate verbally and in written form in the area of Electronic Devices and circuits.

LIST OF EXERCISES:

PART A

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

1. PN Junction and Zener diodes characteristics
2. Ripple Factor and Load Regulations of Rectifier with and without filters (Full wave or Half wave)
3. Input and Output characteristics of Transistor in CE configuration
4. Drain and Transfer Characteristics of JFET
5. Design an Common Source Amplifier Stage and Plot its Frequency response
6. UJT Characteristics
7. SCR characteristics

PART B

DIGITAL CIRCUITS (Minimum FOUR experiments to be conducted)

Design and Realization of

1. Basic gates using universal gates
2. Half Adder and Full Adder using logic gates
3. Multiplexer and Demultiplexer using logic gates
4. Flip Flops using logic gates
5. Asynchronous Counter using ICs
6. Synchronous Counter using ICs

Demonstration of

VHDL Programme

II B.Tech. - I semester

(16BT30432) **SIGNALS AND SYSTEMS LAB**

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

PREREQUISITES:A Course on Signals and Systems.

COURSE DESCRIPTION:

Generation of various signals and sequences; convolution and correlation; verification of linearity and time invariance properties; sampling theorem verification.

COURSE OUTCOMES:

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

CO1. Demonstrate knowledge in

- Operations on Matrices.
- Generation of Various signals and Sequences.
- Convolution and Correlation of signals and Sequences
- Weiner-Khinchin relation and Sampling Theorem
- Fourier Transform , Laplace Transform and Z-Transform

CO2. Analyze the simulation results for a written program.

CO3. Design MATLAB programs for the given list of exercises.

CO4. Solve problems and obtain the required results to the given list of experiments.

CO5. Apply MATLAB tools for writing the programs.

CO6. Work individually or in group in the area of signals and systems.

CO7. Communicate orally and in written form in the area of signals and systems.

LIST OF EXERCISES:

(Minimum of twelve to be conducted)

1. Basic Operations on Matrices.
2. Generation of Various signals and Sequences Such as Unit Impulse, Unit Step, Square, Saw Tooth, Triangular, Sinusoidal, Ramp, Sinc function.
3. Operations on Signals and Sequences (Addition, Multiplication, Scaling, Shifting, Folding), Computation of Energy and Average Power.
4. Finding the Even and Odd Parts of Signal or Sequence and Real and Imaginary Parts of a Signal.
5. Verification of Linearity and Time Invariance Properties of a System.
6. Computation of Unit Sample, Unit Step and Sinusoidal Responses of the Given LTI System and Verifying its Stability.
7. Finding the Fourier Transform of a given Signal and plotting its Magnitude and Phase Spectrum.
8. Convolution of Signals and Sequences.
9. Autocorrelation and Cross correlation of Signals and Sequences.
10. Verification of Weiner-Khinchin Theorem.
11. Removal of Noise by Auto Correlation / Cross correlation in a given signal corrupted by noise.
12. Sampling Theorem Verification.
13. Laplace Transform for a given function.
14. Locating Zeros and Poles and plotting the Pole-Zero map in S-Plane and Z-Plane for the given Transfer Function
15. Impulse response of a Raised Cosine Filter.

II B.Tech. - II semester

(16BT40401) **ANALOG COMMUNICATIONS**

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

PREREQUISITES: Courses on Electronic Devices and circuits, Signals and Systems.

COURSE DESCRIPTION:
Continuous wave modulations; Modulators and De-Modulators; Transmitters; Receivers; Noise performance; Pulse modulations; Multiplexing.

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

CO1. Demonstrate knowledge in
- Elements of communication systems.
- Amplitude, Frequency, and Phase Modulations and De-Modulations.
- Noise
- Multiplexing.

CO2. Analyze Noise Performance in different modulation systems, calculation of total power and bandwidth.
CO3. Design Transmitters and Receivers with high signal to noise ratio.
CO4. Solve problems pertaining to modulation schemes, transmitters and receivers considering noise effects.
CO5. Select, and apply appropriate techniques for different modulation schemes understanding power and bandwidth limitations.
CO6. Follow standards while designing transmitters and receivers.

DETAILED SYLLABUS :

UNIT-I: AMPLITUDE MODULATION AND DEMODULATION (12 Periods)

Elements of Communication Systems, Modulation, Modulation Methods, Need for Modulation, Amplitude Modulation (AM), Generation of AM waves - Square law modulator, switching modulators; Demodulation of AM waves – Square law detector, Envelope detector; Double sideband suppressed carrier (DSBSC), Generation of DSBSC waves - Balanced modulator, Ring modulator; Coherent detection of DSBSC waves - Costas receiver, squaring loop; Single sideband modulation (SSB),

Generation of SSB waves - Frequency Discrimination Method, Phase Discrimination Method; Demodulation of SSB waves, Vestigial sideband (VSB) modulation & demodulation, Frequency division multiplexing.

UNIT-II:ANGLE MODULATION AND DEMODULATION (09 Periods)

Basic Definitions Phase modulation (PM) and frequency modulation (FM), Single-Tone FM, Bandwidth of angle modulated waves - Narrow band frequency modulation (NBFM) and Wide band frequency modulation (WBFM); Transmission Bandwidth of FM Waves, Generation of FM waves – Indirect FM, Direct FM; Demodulation of FM Waves- Frequency Discrimination, PLL Demodulator**.**

UNIT-III: NOISE (09 Periods)

Noise in Analog communication System, Signal to Noise ratio in AM, DSB & SSB System, Signal to Noise ratio in Angle Modulation System, Threshold effect in Angle Modulation System, Pre-emphasis & De-emphasis, FM Capture Effect.

UNIT-VI: TRANSMITTERS AND RECEIVERS (10 Periods)

Radio Transmitter - Classification of Transmitters, AM Transmitter, FM Transmitter; Radio Receivers - Receiver Types, Tuned radio frequency receiver, Super heterodyne receiver, Intermediate frequency, AGC, FM Receiver, Amplitude limiting; Comparison FM with AM Receiver, Radio Receiver measurements - Sensitivity, Selectivity, and fidelity.

UNIT-V: PULSE MODULATION (05 Periods)

Analog pulse modulation schemes, Pulse amplitude modulation (PAM) & demodulation, Pulse-Time Modulation – Pulse Duration and Pulse Position modulations, and demodulation schemes; Time division multiplexing.

Total Periods: 45

TEXT BOOKS:

1. Simon Haykin, *Communication Systems,* Wiley-India edition, 3rd Edition, 2010.
2. R.P. Singh, S. P. Sapre, *Communication Systems*, TMH, 2nd Edition, 2007.

REFERENCE BOOKS:

1. Herbert Taub & Donald L Schilling, *Principles of Communication Systems*, Tata McGraw-Hill, 3rd Edition, 2009.
2. B. P. Lathi, *Modern Digital and Analog Communication Systems*, Oxford Univ. press, 3rd Edition, 2006.
3. Sham Shanmugam, *Digital and Analog Communication Systems*, Wiley-India Edition, 2006.

II B.Tech. - II semester

(16BT40402) DIGITAL IC APPLICATIONS

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

PREREQUISITES:
Courses on Switching Theory and Logic Design &Electronic Devices and Circuits.

COURSE DESCRIPTION:
Logic Families – CMOS, Bipolar and its Interfacing; Verilog HDL Language Elements and Modelling; Combinational and Sequential Logic Design using ICs; Memories - ROM, SRAM, DRAM, FPGA.

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

CO1. Demonstrate knowledge in:
- Classification of Integrated Circuits.
- Characteristics of Integrated Circuits.
- MOS, TTL and ECL Logic Families.
- Interfacing Between Different Logic Families.
- Digital Integrated Circuits.
- Memories.

CO2. Perform analysis of CMOS Circuits.
CO3. Design, develop and model combinational and sequential circuits.
CO4. Solve problems using relevant ICs to synthesize digital integrated circuits.
CO5. Select appropriate source code model to optimize the design of digital ICs.
CO6. Assess and propose cost effective digital IC solutions to meet design constraints to address societal needs.

DETAILED SYLLABUS

UNIT-I: DIGITAL LOGIC FAMILIES AND INTERFACING (10 Periods)

Introduction to logic families, CMOS logic, CMOS steady state and dynamic electrical behavior, CMOS logic families.Bipolar logic, Transistor-Transistor logic, TTL families, CMOS/TTL interfacing, Low voltage CMOS logic and interfacing, Emitter Coupled Logic.

UNIT-II: HARDWARE DESCRIPTION LANGUAGE (08 Periods)

Introduction, Language Elements, Expressions, Modeling-gate level modeling, data flow modeling, behavioral modeling, structural modeling.

UNIT-III: COMBINATIONAL LOGIC DESIGN (11 Periods)
74x999 Adder and Subtractor, 74x181 Arithmetic and Logic Unit, 8x8 Combinational Multiplier, 74X138 3-to-8 Decoder, 74x148 Priority Encoder, 74x541 and 74x245 Three-State Devices, 74x151 8X1 Multiplexer, 74x155, 74x139 as 2x4 Demultiplexer, 74x86 Exclusive-OR gates,74x280 9-Bit Parity Generator, 74x85 4-bit Comparator, Barrel Shifter using 74x151 multiplexer, Simple Floating point Encoder, Dual priority Encoder, modeling of circuits by using Verilog HDL.

UNIT-IV: SEQUENTIAL LOGIC DESIGN (09 Periods)
Latches and Flip-Flops – 74LS74, 74LS109, Counters - 74x163 binary counters, 74x169 up/down counter, Ring Counters, Johnson Counters. 74x194 universal shift register.Modeling of circuits by using Verilog HDL.Synchronous Design Methodology, Impediments to Synchronous Design.

UNIT-V: MEMORIES (07 Periods)
ROM: internal structure, 2D-decoding commercial types, timing applications.
STATIC RAM: internal structure, SRAM timing, standard SRAM, synchronous RAM.
DYNAMIC RAM: internal structure, timing, synchronous DRAM.
FPGA: Architecture, Applications.

Total Periods: 45

TEXT BOOKS:

1. John F. Wakerly, *Digital Design Principles & Practices*, Pearson Education Asia, 4th Edition, 2008.
2. J. Bhaskar, *A Verilog HDL Primer*, BS Publications, 2nd Edition, 2001.

REFERENCE BOOKS:

1. Charles H. Roth Jr., *Digital System Design Using VHDL*, PWS Publications, 2nd Edition, 2008.
2. Stephen Brown and Zvonko Vranesic, *Fundamentals of Digital Logic with VHDL Design*, McGraw Hill, 2nd Edition, 2005.

II B.Tech. - II semester

(16BT40403) ELECTROMAGNETIC THEORY AND TRANSMISSION LINES

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

PREREQUISITES: Courses on Engineering Mathematics and Engineering Physics.

COURSE DESCRIPTION:
Static Fields; Maxwell's Equations; Electromagnetic Wave Characteristics; Transmission Lines.

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

CO1. Apply fundamental knowledge in characterizing
- Electrostatic Fields
- Magnetostatic Fields
- Boundary Conditions
- Electromagnetic Waves
- Transmission Lines

CO2. Analyze Problems in different medium conditions by using Maxwell's Equations.
CO3. Design and Develop various impedance transformation techniques.
CO4. Provide valid solutions to solve critical problems for Electromagnetic Wave Propagation in different media.
CO5. Understand limits of Electromagnetic Wave Propagation and apply appropriate technique to arrive at feasible solutions.
CO6. Create solutions to compensate impedance mismatch in real time applications for societal needs.

DETAILED SYLLABUS:
Review of calculus and vector algebra.

UNIT - I: STATIC FIELDS (15 Periods)
Coulomb's Law, Electric Field Intensity – Fields due to Different Charge Distributions.Electric Flux Density, Gauss Law and Applications, Electric Potential, Relations between E and V,Convection and Conduction Currents,Continuity Equation. Maxwell's Two Equations for Electrostatic Fields, Capacitance – Parallel Plate, Coaxial Capacitors. Biot-Savart's Law, Ampere's Circuital Law, Magnetic Flux Density, Maxwell's Two Equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law, illustrative Problems.

UNIT - II: MAXWELL'S EQUATIONS (06 Periods)
Faraday's Law and Transformer emf, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements. Conditions at a Boundary Surface: Dielectric-Dielectric and Dielectric-Conductor Interfaces, illustrative Problems.

UNIT - III: EM WAVE CHARACTERISTICS (12 Periods)
Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, Sinusoidal Variations, Wave Propagation in Lossless and Conducting Media.Conductors & Dielectrics – Characterization, Wave Propagation in Good Conductors and Good Dielectrics.Polarization,Reflection - Normal and Oblique Incidences for both Perfect Conductor and Perfect Dielectrics.Refraction of Plane Waves - Brewster Angle, Total Internal Reflection.Poynting Vector and Poynting Theorem, Illustrative Problems.

UNIT - IV: TRANSMISSION LINES - I (06 Periods)
Types, Parameters, Transmission Line Equations, Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line Concepts, Lossless/Low Loss Characterization, Condition for Distortionless Lines.

UNIT - V: TRANSMISSION LINES - II (06 Periods)
Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR. ë/4, ë/2, ë/8 Lines – Impedance Transformations. Smith Chart – Configuration and Applications, Single stub matching, Illustrative Problems.

Total Periods: 45

TEXT BOOKS:

1. Matthew N.O. Sadiku, *Elements of Electromagnetic*, Oxford University Press, 3rd Edition, 2001.
2. John D. Ryder, *Networks, Lines and Fields*, PHI, 2nd Edition, 1999.

REFERENCE BOOKS:

1. Nathan Ida, *Engineering Electromagnetics,* Springer (India) Pvt. Ltd., New Delhi, 2nd Edition, 2005.
2. William H. Hayt Jr. and John A. Buck, *Engineering Electromagnetics*, TMH, 7th Edition, 2006.
3. Schaum's Outlines, *Electromagnetics*, TMH, 2nd Edition, 2006.
4. E.C. Jordan and K.G. Balmain, *Electromagnetic Waves and Radiating Systems*, PHI, 2nd Edition, 2000.

II B.Tech. - II semester

(16BT40404) **LINEAR IC APPLICATIONS**

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

PREREQUISITES: Courses on Network Analysis & Pulse and digital Circuits.

COURSE DESCRIPTION:

Operational Amplifier (Op-Amp) basics and its characteristics; Op-Amp Linear and Non- Linear Applications; Voltage Regulators and Analog filter Design; study of internal functional blocks and the applications of special ICs like IC 555 Timer; PLL circuits; DAC and ADCs; DAC and ADC Specification.

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

CO1. Demonstrate the knowledge of
- operational amplifiers
- Regulators and filters
- 555 timer and PLL
- D-A and A-D convertors

CO2. Analyze Operational Amplifier circuits and evaluate parameters of Operational Amplifier circuits.

CO3. Using linear ICs, design and develop
- V to I and I to V convertors
- Integrators and Differentiators
- Multivibrators
- Triangular wave generators.

CO4. Solve engineering problems and arrive at solutions using electronic circuits designed using linear ICs.

CO5. Select appropriate technique for operating op amp and 555 timer in different modes of operation based on applications.

DETAILED SYLLABUS:

UNIT I: INTEGRATED CIRCUITS ANDOPERATIONAL AMPLIFIER (10 Periods)

Basics of IC fabrication, Differential amplifier – DC and AC analysis of Dual input balanced output configuration, Cascade differential amplifier stages, Level Translator; Basic information of OP-AMP, OP-Amp Block diagram, ideal and practical OP-Amp Specifications, DC and AC characteristics, 741 OP-Amp, input and output offset voltages and currents, slew rate, CMRR, PSRR, drift, Frequency compensation technique.

UNIT II: OPERATIONAL AMPLIFIER APPLICATIONS (11 Periods)

Introduction, Basic Op-Amp applications, Instrumentation Amplifiers, AC Amplifier, V to I and I to V Converters, Op-amp circuits using diodes, Sample and Hold Circuit, Log and Antilog Amplifiers, Differentiator & Integrator, Introduction to comparators and their applications, Multivibrators, Triangular Wave Generator.

UNIT III: VOLTAGE REGULATOR AND ANALOG FILTERS (08 Periods)

Voltage Regulator: Introduction, Series Op-amp Regulator, IC Voltage Regulators-Fixed Voltage Series Regulator, Characteristics, Line and Load Regulation, Dual Voltage Supply. 723 General Purpose Regulator.

Analog Filters: Introduction, RC Active Filters- first order and second order all pass, Low pass &High pass, Band pass and Band reject.

UNIT IV: IC 555 TIMERS AND PLL (09 Periods)

IC 555 Timer: Introduction to 555 Timer, functional diagram, Monostable Operations, Astable operations & their applications

PLL: Introduction, Basic principles, Phase Detector/Comparator, SE/NE 566 Voltage Controlled Oscillator (VCO), Low Pass Filter. Monolithic Phase-Locked Loop IC 566, Derivation of capture range and lock range of PLL, Applications of PLL- Frequency multiplication & frequency translation.

UNIT V: D-A AND A-D CONVERTERS (07 Periods)

D-A Converter: Introduction, Basic DAC techniques-Weighted resistor DAC, R-2R Ladder DAC, Inverted R-2R DAC and Monolithic DAC (IC1408).

A-D Converters: Introduction, Direct type ADCs- parallel comparator, Counter, Successive Approximation Converter & Dual slope ADC. DAC and ADC specifications.

Total Periods: 45

TEXT BOOKS:

1. D. Roy Chowdhury, *Linear Integrated Circuits*, New Age International (p) Ltd, 4thEdition, 2011.
2. Ramakanth A. Gayakwad, *Op-Amps & Linear ICs*, PHI, 3rd Edition, 1998.

REFERENCE BOOKS

1. David A. Bell,*Operational Amplifiers & Linear ICs*, Oxford University Press, 2ndEdition, 1997.
2. R.F.Coughlin & Fredrick Driscoll, *Operational Amplifiers & Linear Integrated Circuits*, PHI, 6th Edition, 2001.

II B.Tech. - II semester

(16BT40405) PROBABILITY AND STOCHASTIC PROCESS

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

PREREQUISITES: A Course on Engineering Mathematics.

COURSE DESCRIPTION:
Probability theory; The Random Variable; Operations on Single and Multiple Random Variables; Temporal Characteristics of Stochastic Processes; Noise analysis.

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

CO1. Apply knowledge of
- Concepts in Probability
- Single and multiple random variables
- Operations on Single and multiple random variables
- Random processes and their characteristics
- Noise

CO2. Analyze operations on single and multiple random variables and processes.

CO3. Formulate solutions for engineering problems involving probability and random processes.

CO4. Model random processes for the analysis of communication Systems.

DETAILED SYLLABUS :

UNIT-I: PROBABILITY (07 Periods)

Probability introduced through Sets and Relative Frequency, Experiments and Sample Spaces - Discrete and Continuous Sample Spaces; Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Probability as a Relative Frequency, Joint Probability, Conditional Probability, Total Probability, Baye's Theorem, Independent Events, Bernoulli Trials.

UNIT-II: THE RANDOM VARIABLE (11 Periods)

Introduction, Random Variable Concept - Definition of Random variable, Condition for a function to be a Random Variable, Discrete and Continuous Random Variable; Distribution Function, Density FunctionProperties, The Gaussian Random Variable, Other distribution and density examples - Binomial, Poission, Uniform, Exponential, Rayleigh; Conditional Distribution and Density Functions, Properties.

Operations on One Random Variable: Introduction, Expectation, Moments - Moments about Origin, Central Moments, Variance and Skew; Chebychev's Inequality, Functions that give moments - Characteristic Function, Moment Generating Function; Transformations of a random Variable.

UNIT-III: MULTIPLE RANDOM VARIABLES (11 Periods)

Multiple Random Variables: Vector Random Variables, Joint Distribution and its Properties, Joint density and its Properties, Marginal Distribution and Density, Conditional Distribution and Density, Statistical Independence, Distribution and density of a sum of random variables, Central Limit Theorem.

Operations on Multiple Random Variables: Expected Value of a Function of Random Variables - Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables; Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

UNIT-IV: STOCHASTIC PROCESSES–TEMPORAL CHARACTERISTICS (10 Periods)

Concept of Stochastic process, Stationary and Statistical Independence, Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes, Correlation Functions - Auto correlation function and its properties, Cross correlation function and its properties, Covariance Functions;Gaussian Random Processes, Poisson Random Process, Linear system response of Mean and Mean-Squared Value, Autocorrelation function of Response, Cross-Correlation functions of Input and Output.

UNIT-V: NOISE ANALYSIS (06 Periods)

Noise classification - Uncorrelated Noise, External Noise, Atmospheric Noise, Extraterrestrial Noise, ManmadeNoise, Internal Noise, Shot Noise, Transit-Time Noise, Thermal noise, Noise power, Noise voltage, Correlated Noise, Impulse Noise; Interference, Signal-to-Noise Power Ratio, Noise Factor and Noise Figure, Equivalent Noise Temperature.

Total Periods: 45

TEXT BOOKS:

1. Peyton Z. Peebles, *Probability, Random Variables & Random Signal Principles,* TMH, 4th Edition, 2002
2. Wayne Tomasi, *Electronic communications systems*, Pearson Education, 5th Edition, 2004

REFERENCE BOOKS:

1. George R. Cooper and Clare D. McGillem, *Probabilistic Methods of Signal and System Analysis,* Oxford, 3rd Edition, 1999
2. Athanasios Papoulis and S. Unnikrishna Pillai, *Probability, Random Variables and Stochastic Processes,* PHI, 4th Edition, 2002.

II B.Tech. - II semester

(16BT40406) **PULSE AND DIGITAL CIRCUITS**

(Common to ECE &EIE)

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

PREREQUISITES: Courses on Electronic Devices and Circuits & Network Analysis.

COURSE DESCRIPTION:

Linear and non-linear Wave shaping circuits; Switching characteristics of Diode and Transistor; Design of multivibrators; Sweep circuits; Sampling and logic gates.

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

CO1. Apply the knowledgein
- Responses of High-pass and low-pass RC circuits for different inputs
- Clipping and clamping operations.
- Multivibrators.
- Methods of generating the Time-base waveforms
- Operating Principles of of Sampling gates
- Realization of logic gates using Diodes and Transistors

CO2. Analyze theperformance of Linear and non-linear Wave shaping Circuits.

CO3. Design and develop different Multivibrator Circuits, Sweep circuits, clipper and clamper circuits.

CO4. Solve engineering problems pertaining to pulse and Digital circuits to provide valid conclusions.

CO5. Apply appropriate techniques to obtain optimum solution in the field of pulse and digital circuits.

CO6. Apply contextual knowledge in pulse and digital circuits to assess propagation delay and power dissipation parameters to the Professional engineering practice for societal use.

DETAILED SYLLABUS :

UNIT-I: LINEAR WAVE SHAPING (09 Periods)

High-pass, Low-pass RC circuits, Their response for Sinusoidal, Step, Pulse, Square and Ramp inputs. High pass RC network as a Differentiator and Low pass RC network as an Integrator, Ringing circuit, Attenuators and its application as a CRO probe.

UNIT-II: NONLINEAR WAVE SHAPING (09 Periods)

Diode clippers, Transistor clipper, Clipping at two independent levels, Comparators, Clamping operation, Clamping circuit taking source and Diode resistances into account, Clamping circuit theorem, Practical clamping circuits, Effect of Diode characteristics on Clamping voltage, Synchronized Clamping.

UNIT-III: MULTIVIBRATOR CIRCUITS (09 Periods)

Transistor as a switch, Analysis and Design of Fixed-Bias Bistable, Monostable, Astable Multivibrators (Collector-Coupled), Symmetrical and Asymmetrical triggering, Schmitt trigger Circuit.

UNIT-IV: TIME-BASE GENERATORS (10Periods)

Voltage Time-Base Generators: General features of a Time-Base signal, Exponential Sweep Circuit, Constant Current Sweep Circuit, UJT Sweep Circuit, Miller and Bootstrap Time-Base generators - basic principles, Transistor Miller Time-Base generator, Transistor Bootstrap Time-Base generator.

Current Time-Base Generators: A Simple Current Sweep, Linearity Correction through Adjustment of Driving Waveform, Transistor Current Time-Base generator.

UNIT-V: SAMPLING GATES AND DIGITAL LOGIC CIRCUITS (08 Periods)

Sampling Gates: Basic operating principles of sampling gates, Unidirectional and Bi-directional sampling gates, Reduction of pedestal in gate circuits, Four Diode Sampling gate, Applications of sampling gates.

Digital Logic Circuits: Realization of Logic gates (OR, AND & NOT) using diodes & transistors,Introduction to DTL, TTL, ECL and CMOS Logic.

Total periods: 45

TEXT BOOKS:

1. Jacob Millman, Herbert Taub and Suryaprakash Rao Mothiki, *Pulse, Digital and Switching Waveforms*, TMH, 3rd Edition,2011.
2. David A. Bell,*Solid State Pulse Circuits*, PHI,4th Edition, 2009.

REFERENCE BOOKS:

1. A. Anand Kumar, *Pulse and Digital Circuits*, PHI, 2nd Edition, 2008.
2. R.Venkataraman, *Pulse Digital Circuits and Computer Fundamentals*, DhanapatRai Publications, 3rd Edition, 1994.

II B.Tech. - II semester

(16BT40431) **ANALOG COMMUNICATIONS LAB**

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

PREREQUISITES:ACourse on Analog Communications.

COURSE DESCRIPTION:
Simulation and study of various modulation schemes and analog Communications.

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

CO1. Demonstrate knowledge in different analog communications.
CO2. Analyze the characteristics of different communication circuits like
- Pre-emphasis & De-emphasis.
- Mixer.
- Radio Receiver.

CO3. Design and simulate various modulation systems for communication needs.
CO4. Solve problems pertaining to modulation schemes and communication systems.
CO5. Use MATLAB tools for simulation of modulation schemes.
CO6. Function effectively as an individual and as a member in a group in the area of analog communications.
CO7. Communicate in verbal and written form in the area of analog communications.

LIST OF EXERCISES:

1. Amplitude Modulation and Demodulation.
2. DSB SC Modulation and Demodulation.
3. SSB Modulation and Demodulation.
4. Spectral analysis of AM signals using spectrum analyzer.
5. Frequency modulation and Demodulation.
6. Pre-emphasis & De-emphasis.
7. Characteristics of mixer.
8. Response of squelch circuit.
9. AGC characteristics.
10. Radio receiver measurements – Sensitivity, Selectivity and Fidelity.
11. Pulse Amplitude Modulation and demodulation
12. Pulse Width Modulation and demodulation

II B.Tech. - II semester

(16BT40432) ELECTRONIC CIRCUIT ANALYSIS AND DESIGN LAB

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

PREREQUISITES:

A Course onElectronic Circuit Analysis and Design.

COURSE DESCRIPTION:

Design, Simulation and Implementation of Single stage, Multistage Amplifiers, Feedback Amplifiers and Oscillators, Power Amplifiers, Tuned BJT Amplifiers.

COURSE OUTCOMES:

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

CO1. Demonstrate knowledge in different electronic circuits and PSPICE tool.
CO2. Analyze amplifiers, Oscillator and Tuned circuits.
CO3. Design and develop single stage, multistage & Power amplifiers and Oscillator circuits.
CO4. Conduct of experiments, analysis and interpretation of data, and synthesis of the information to provide valid solutions.
CO5. Model an electronic circuit using simulation tools.
CO6. Function effectively as an individual and as a member in a group in the area of electronic circuits.
CO7. Communicate in verbal and written form in the area of electronic circuits.

LIST OF EXERCISES:

(Minimum of Twelve experiments to be conducted)

Part-A: Design and Simulation of the following circuits using simulation software

(Minimum of Six Experiments to be conducted):

1. Common Emitter (CE) amplifier
2. A Two Stage RC Coupled Amplifier
3. Cascode Amplifier
4. Current shunt and Voltage Series Feedback Amplifier
5. RC Phase Shift Oscillator
6. Class A Power Amplifier (Transformer less)
7. Class B Complementary Symmetry Amplifier

Part-B: Design and Implementation of the following circuits through hardware
(Minimum of Six Experiments to be conducted):

Any Three circuits from part-A
Any Three of the following

1. Darlington Pair
2. Hartley and Colpitt's Oscillators
3. Class A Power Amplifier (with transformer load)
4. Class-B push-pull amplifier
5. Class C Tuned Power Amplifier

II B.Tech. - II semester

(16BT40433) PULSE AND DIGITAL CIRCUITS LAB

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

PREREQUISITES:A course on Pulse and Digital Circuits

COURSE DESCRIPTION:

Linear and non-linear Wave shaping circuits; Transistor switching times; UJT relaxation oscillator; sampling and logic gates; Design of Multivibrator circuits.

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

CO1. Apply the knowledge in different Pulse and digital circuits.
CO2. Analyze the characteristics of different Circuits like
- RC Low Pass and High pass Circuits
- Clipping and Clamping Circuits
- Sampling and Logic Gates

CO3. Design the circuits like Multi-vibrators, Sampling Gates, UJT Relaxation Oscillator,Bootstrap sweep circuit, Constant Current Sweep Generator using BJT.
CO4. Provide valid conclusions through the design and conduct of experiments, analysis and synthesis.
CO5. Apply conversion techniques for design of multivibrators.
CO6. Function effectively as an individual and as a member in a group in the area of pulseand digital circuits.
CO7. Communicate effectively to write report and design documentation in the area of pulse and digital circuits.

LIST OF EXERCISES:

PART – A

1. Linear wave shaping - High Pass and Low Pass RC Circuits.
2. Nonlinear wave shaping – Clippers and Clampers.
3. Transistor as a switch.
4. Schmitt Trigger.
5. UJT Relaxation Oscillator
6. Constant Current Sweep Generator using BJT.
7. Bootstrap sweep circuit.
8. Sampling Gates.
9. Characterization of CMOS Inverter.

PART – B (Design aspects included)

1. Bistable Multivibrator.
2. Monostable Multivibrator.
3. Astable Multivibrator.

III B.Tech. - I semester

(16BT3HS02) MANAGERIAL ECONOMICS AND PRINCIPLES OF ACCOUNTANCY

(Common to CE, EEE, ECE & EIE)

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

PREREQUISITES:—

COURSE DESCRIPTION: Managerial Economics; Demand and Elasticity of Demand; Production Functions; Markets and Pricing Policies; Formation of different types of Business Organizations; Basic concepts of Accounting (Journal, Ledger and Trial balance); Trading Account, Profit and Loss Account and Balance sheet with simple adjustments; Computerized Accounting.

COURSE OUTCOMES:

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

CO1. Acquire Knowledge in
- Tools and concepts of Micro Economics.
- Basic Principles and concepts of Accountancy.
- Provides life skills for effective utilization of scarce resources.
- Financial Accounting.
- Significance of Economics and Accountancy

CO2. Develop skills in managerial decision making of an organization.

CO3. Apply the Economic theories i.e., Demand, Production, Cost, Markets and Price.

CO4. Develop effective communication in Business and Accounting transactions.

CO5. Ascertain the profitability and soundness of an organization.

CO6. Practice Financial Accounting

DETAILED SYLLABUS:

UNIT – I:INTRODUCTION TO MANAGERIAL ECONOMICS, DEMAND ANALYSIS: (09 Periods)

Definition, Nature and Scope of Managerial Economics.**Demand:** Determinants of demand – Demand function - Law of demand, assumptions and exceptions - Elasticity of demand – Types of elasticity of demand - Demand forecasting and methods of demand forecasting.

UNIT – II:THEORY OF PRODUCTION AND COST ANALYSIS: (09 Periods)

Production Function: Isoquants and Isocosts – Input-output relationship - Law of returns.

Cost Concepts: Total, Average and Marginal Cost **-** Fixed vs. Variable costs – Opportunity Costs vs. Outlay Costs– Separable Costs vs. Joint Costs, Urgent Costs vs. Postponable Costs-Avoidable Costs vs. Unavoidable Costs - **Break Even Analysis (BEA)** – Assumptions, Merits and demerits - Determination of Break Even Point (Simple problems).

UNIT – III:INTRODUCTION TO MARKETS AND PRICING: (09 Periods)

Market Structure: Types of Markets - Features of perfect competition - Monopoly and monopolistic competition - Price and Output determination in perfect competition, monopoly and monopolistic Markets.

Pricing : Objectives and policies of pricing – Sealed bid pricing - Marginal cost pricing - Cost plus pricing - Going rate pricing – penetration Pricing –skimming Pricing - Block pricing – Peak load pricing - Cross subsidization.

UNIT – IV: INTRODUCTION TO PRINCIPLES OF ACCOUNTING AND CAPITAL: (09 Periods)

Accountancy: Introduction – Concepts – Conventions – Double Entry Book Keeping – Journal – Ledger - Trial Balance (Simple problems).

Capital : Significance - Types of capital – Sources of Capital.

UNIT – V:FINAL ACCOUNTS - COMPUTERIZATION OF ACCOUNTING SYSTEM: (09 Periods)

Introduction to Final Accounts - Trading account - Profit and Loss account and Balance Sheet with simple adjustments (Simple problems).

Computerization of Accounting System: Manual Accounting *Vs* Computerized Accounting – Advantages and Disadvantages of Computerized Accounting.

Total Periods: 45

TEXT BOOKS:

1. A.R. Aryasri, *Managerial Economics and Financial Analysis*, Tata McGraw Hill, New Delhi, 3rd Edition, 2007.
2. R.Cauvery, U.K. Sudhanayak, M. Girija and R. Meenakshi, *Managerial Economics*, S.Chand and Company, New Delhi, 2nd Edition, 2010.

REFERENCE BOOKS:

1. Varshaney and Maheswari, *Managerial Economics,* Sultan Chand and Sons, New Delhi, 19th Edition, 2005.
2. Ms. Samba Lalita, *Computer Accounting Lab Work*, 1st Edition, Kalyani Publishers, Ludhiana, 2009.
3. S.P. Jain and K.L. Narang, *Financial Accounting,* Kalyani Publishers, Ludhiana, 6th Edition, 2002.

III B.Tech. - I semester

(16BT50201) **CONTROL SYSTEMS**

(Common to EEE & ECE)

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

PREREQUISITES:
Courses on Multivariable Calculus and Differential Equations, Transformation Techniques and Partial Differential Equations.

COURSE DESCRIPTION:
Concepts of control system, transfer function ofvarious physical systems, time response analysis, frequency responseanalysis, controller design, state space analysis.

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

CO1. Demonstrate knowledge on
- The concepts of open and closed loop control systems.
- Stability analysis in time and frequency domain.
- Controllers and compensators to meet the desired specifications.
- State variable techniques.

CO2. Analyze
- Timeand frequency response of second order systems.
- Stability analysis using root-locus, bode and Nyquist plots.
- Controllers and compensators to meet the desired response.
- State space representation from transfer function.

CO3. Design a compensator to meet the design specifications of control system.

CO4. Solve problems pertaining to control systems to provide feasible solutions inreal time environment.

CO5. Selectappropriate techniques to solve control system problems in relevance to industry.

CO6. Apply the conceptual knowledge of control systems in domestic and industrial applications.

DETAILED SYLLABUS:

UNIT-I: MATHEMATICAL MODELING OF SYSTEMS (11 Periods)

Introduction to control systems.Basic elements of control system – open loop and closed loop systems. Effect of feedback.Modeling of physical systems - electrical systems, mechanical systems, analogous systems, armature control and field control of DC motor, DC servomotor.Transfer function - block diagram reduction techniques, signal flow graph.

UNIT-II: TIME RESPONSE AND STABILITY ANALYSIS (13 Periods)

Various test signals and its importance. Time response of first and second order systems, Time-domain specifications, steady state response, steady state error and error constants, static and generalized error coefficients.Routh-Hurwitz stability criterion, Root locus technique- root locus diagram, rules to construct root loci, effect of pole zero additions on the root loci.

UNIT-III: FREQUENCY DOMAIN ANALYSIS (08 Periods)

Performance specifications in the frequency domain. Stability Analysis - Bode plot, Polar plot and Nyquist plot.

UNIT-IV: CONTROLLERS AND COMPENSATORS (06 Periods)

Introduction to controllers, effect of P, PI and PID controllers. Compensators - lag, lead, lead-lag compensator design using bode plot.

UNIT-V: STATE SPACE ANALYSIS (07 Periods)

Transfer function Vs. state space representation. Concepts of state, state variables and state model.Modeling of physical system in state space. Transfer function to state model and vice-versa.State transition matrix and its properties.Controllability and observability using Kalman's test.

Total Periods: 45

TEXT BOOKS:

1. A. Anand kumar, *Control Systems*, PHI learning Pvt. Ltd., 2ndEdition, 2014.
2. Katsuhiko Ogata, *Modern Control Engineering*, Pearson Education Publishers, 5th Edition, 2010.

REFERENCE BOOKS:

1. Nagrath I.J. and Gopal M, *Control Systems Engineering*, New Age International Publications, 5th Edition, 2010.
2. Richard C. Dorf and Robert H. Bishop,*Modern Control Systems,* Prentice Hall, 12th Edition, 2010.
3. Benjamin C.Kuo and FaridGolnaraghi, *Automatic Control Systems,* John Wiley & Sons Publications, 8th Edition, 2002.
4. A.Nagoorkani, *Control Systems*, RBA Publications, 2ndEdition, 2006.

III B.Tech. - I semester

(16BT50401) **DIGITAL COMMUNICATIONS**

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

PREREQUISITES: Courses on Signals and Systems, Analog Communications & Probability and Stochastic Processes.

COURSE DESCRIPTION: Digitization techniques - PCM, DPCM, Delta modulation and Adaptive Delta Modulation; Digital Baseband and Passband signal transmission; Detection of Baseband and Passband signals and error probability; Information Theory - Source and channel coding techniques.

COURSE OUTCOMES:

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

CO1. Apply knowledge in
- Elements of Digital Communication systems.
- Digitization techniques such as PCM, DPCM, DM and ADM
- Digital carrier modulation techniques
- Error Probability and detection of Baseband and Bandpass modulated signals
- Measure of information
- Source and Error Control Coding techniques.

CO2. Analyze different types of digital modulation schemes based on bit error probability.

CO3. Design methods for digital communications systems according to the required specifications like transmission power, bandwidth and SNR.

CO4. Solve problems using different coding techniques to improve error performance of Digital communication system.

CO5. Select appropriate coding techniques to improve transmission rates.

CO6. Apply the knowledge and skills to meet societal needs relevant to communication systems.

DETAILED SYLLABUS:

UNIT-I: PULSE DIGITAL MODULATION (10 Periods)

Elements of Digital Communication Systems; Advantages of Digital Communication Systems; Quantization of signals, Quantization error; Electrical representation of binary digits, Pulse Code Modulation (PCM);PCM System; Companding, Differential PCM, Delta Modulation and its drawbacks, Adaptive Delta Modulation.

UNIT-II: NOISE IN PULSE-CODE AND DELTA-MODULATION SYSTEMS (08 Periods)

PCM Transmission: Calculation of Quantization noise, Output Signal Power, Effect of thermal noise in PCM, Output Signal To Noise Ratio in PCM.

Delta Modulation: Quantization Noise in DM, Output signal power, Effect of thermal noise in DM, Output Signal To Noise Ratio in DM; Comparison of PCM and DM systems.

UNIT-III: DIGITAL MODULATION SCHEMES (12 Periods)

Base Band Data Transmission: Elements of Baseband Binary PAM Systems, Baseband Shaping, Correlative coding, Eye Pattern.

Band Pass Data Transmission: Introduction, Amplitude Shift Keying (ASK); Frequency Shift Keying (FSK); Phase Shift Keying (PSK); Quadrature PSK and M-ary PSK; Differential Phase Shift Keying (DPSK); M-ary QAM; Probability of error, Optimum filter, Matched filter, Correlator, Calculation of error Probability of ASK, PSK, FSK and QPSK.

UNIT-IV: INFORMATION THEORY (08 Periods)

Measure of Information, Source Encoding - Huffman coding, Shanon-Fano Coding; Error Free Communication over Noisy Channel, Channel Capacity of Discrete Memoryless Channel, Channel Capacity of Continuous Channel, Practical Communication Systems in light of Shannon's Equation.

UNIT-V: ERROR CORRECTION CODES (07 Periods)

Introduction, Linear Block codes, Cyclic Codes, Convolution Codes, Comparison of Coded and Uncoded Systems.

Total Periods: 45

TEXT BOOKS:

1. H. Taub and D. Schilling, *Principles of Communication Systems*, TMH, 2nd Edition, 2003.
2. B.P.Lathi, *Modern Digital and Analog Communication Systems,* Oxford reprint, 3rd Edition, 2004.

REFERENCE BOOKS:

1. Simon Haykin, *Digital communications*, John Wiley, 2005.
2. Sam Shanmugam, *Digital and Analog Communication Systems*, John Wiley, 2005.
3. R.P Singh and S.D Sapre, *Communication Systems Analog and Digital*, TMH, 2nd Edition, 2007.

III B.Tech. - I semester
(16BT50402) MICROPROCESSORS AND MICROCONTROLLERS

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

PREREQUISITES:ACourse on Switching Theory and Logic Design.

COURSE DESCRIPTION:
Architecture, Instruction set and programming of 8086; Programmable interfacing devices - architecture and programming; Interfacing Memory and I/O devices with 8086; 8051 Microcontroller - Architecture, programming, interrupts and applications.

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

CO1. Demonstrate knowledge in
- Internal hardware details of Intel 8086, 8051 and programmable devices like 8255, 8251, 8259, 8257.
- Interfacing various peripherals to build standalone systems.

CO2. Critically analyze the requirements to meet the specifications of microprocessors and microcontrollers based systems.

CO3. Design and develop suitable interfaces for real time applications.

CO4. Exhibit programming skills, choose suitable hardware and program the devices to solve Engineering problems.

CO5. Apply appropriate techniques, resources to complex engineering activities for modeling microcomputer and microcontroller based systems with understanding of limitations.

CO6. Apply concepts of microprocessors and microcontrollers for solving societal problems.

DETAILED SYLLABUS:

UNIT - I: 8086 ARCHITECTURE AND PROGRAMMING **(10 Periods)**

Microprocessor Evolution, Review of Intel 8085, 8086 internal Architecture - register organization, memory segmentation, memory organization; Introduction to programming the 8086 - Assembler directives, addressing modes, instruction set, simple programs, procedures and macros;

UNIT - II: 8086 INTERFACING AND INTERRUPTS (08 Periods)

Pin description, minimum & maximum mode operation of 8086, timing diagram. Interfacing memory (RAM and EPROM) to 8086. 8086 Interrupts - types and interrupt responses, Interrupt vector table, priority of interrupts; 8259 priority interrupt controller - architecture, system connections and cascading, initialization of 8529;

UNIT - III: PROGRAMMABLE DATA COMMUNICATION DEVICES (11 Periods)

Introduction to serial and parallel communication, methods of parallel data transfer. 8255 PPI - Internal architecture and system connections, operational modes and initialization, interfacing stepper motor, ADC, DAC, Optical Shaft Encoder; Methods of serial data transfer, 8251 USART - architecture and its initialization, sending and receiving characters; Serial communication standard - RS232C, USB; Architecture and operation of 8257 DMA controller.

UNIT - IV: MICROCONTROLLERS AND PROGRAMMING (08 Periods)

Microcontroller Vs. General purpose microprocessor, 8051/8052 Microcontroller – architecture, features, register organization, pin diagram, internal and external memories & their interfacing, instruction set, addressing modes, simple programs;

UNIT - V: 8051 INTERFACING (08 Periods)

Timer/Counters – Registers, modes and programming; Serial communication – registers, programming 8051 for serial communication; Interrupts – registers, programming; 8051 applications – Interfacing key board, LEDs and LCD;

Total Periods: 45

TEXT BOOKS:

1. Douglas V. Hall, *Microprocessors and Interfacing: Programming and Hardware,* Tata McGraw-Hill, revised 2nd Edition, 2006.
2. Muhammad Ali Mazidi and Janice Gillispie Mazidi, *The 8051 Microcontroller and Embedded Systems,* Prentice Hall of India, 2000.

REFERENCE BOOKS:

1. A.K. Ray and K.M. Bhurchandi, *Advanced Microprocessors and Peripherals- Architecture, Programming and Interfacing,* Tata McGraw Hill, 2002 reprint.
2. Kenneth J. Ayala, *The 8051 microcontroller, Thomson Delmar learning,* 3rd Edition, 2004.

III B. Tech. I Semester

(16BT50403) **VLSI DESIGN**

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

PRE-REQUISITES:
A Course on Digital IC Applications.

COURSE DESCRIPTION:
CMOS Technology; Stick Diagrams and Layouts; Subsystem design; Programmable Interconnect structures; Synthesis and Test Principles.

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

CO1. Demonstrate knowledge in
- Understanding the Fabrication Process of MOS Transistors
- Electrical properties of CMOS Circuits
- Designing Static Combinational and Sequential logic at transistor level, including Mask layout.
- Estimating and optimizing combinational RC Circuit delay using RC delay models and logical effort.
- Design methodology and tools.
- Test Principles.

CO2. Analyze characteristics and performance of CMOS Circuits.
CO3. Design solutions for subsystems to compensate tradeoff between area, speed and power requirements.
CO4. Synthesize and extract information from designs and layouts for optimum solutions.
CO5. Select and apply appropriate designs to overcome the limitations of CMOS devices for high speed applications.
CO6. Assess test strategies for design and development of Integrated Circuits for societal needs.

DETAILED SYLLABUS:

UNIT-I: FABRICATION AND ELECTRICAL PROPERTIES OF MOS (10 Periods)
Basic Electrical Properties of MOS: Ids – Vds relationships, Threshold Voltage VT, gm-, gds and ù0; Pass Transistor, NMOS inverter, Pull up to pull down ratio for an NMOS inverter, CMOS Inverter, Fabrication Process for NMOS and CMOS technology.

UNIT-II: CMOS CIRCUIT DESIGN PROCESS (10 Periods)
VLSI design flow, MOS layers, stick diagrams, NMOS design style, CMOS design style, lambda based design rules, layouts for inverters, sheet resistance, capacitances of layers, Gate delays, Delay estimation, Limitations of Scaling.

UNIT-III: SUBSYSTEM DESIGN - I (08 Periods)
Adders – Transmission based Adder, Carry look-ahead adder, Manchester carry chain adder, Carry Skip Adder, Carry Select Adder; Barrel Shifter, Multipliers – Array Multiplier, Booth Multiplier; ALUs.

UNIT-IV: SUBSYSTEM DESIGN - II (09 Periods)
Counters- Synchronous and Asynchronous Counter; High Density Memory Elements - Design Approach, FPGAs, Programmable Interconnect structures - Fusible links, Antifuse via link, UV Erasable, Electrically Erasable; CPLDs, Cell based Design Methodology.

UNIT-V: LOW POWER DESIGN AND TESTING (08 Periods)
Need for Low Power VLSI Chips, Basic Principles Of Low Power Design, Low Power Techniques for SRAM, CMOS Testing, Need for testing, Test Principles, Design Strategies for test.

Total Periods: 45

TEXT BOOKS:

1. Kamran Eshraghian, Douglas A. Pucknell and Sholeh Eshraghian, *Essentials of VLSI Circuits and Systems*, PHI, 2005.
2. Weste and Eshraghian, *Principles of CMOS VLSI Design*, Pearson Education, 1999.

REFERENCE BOOKS:

1. Gary Yeap, *Practical Low-Power Digital VLSI Design*, Springer Publication, 1998.
2. John M. Rabaey, *Digital Integrated Circuits: A Design Perspective*, PHI, 2nd Edition, 1997.
3. Stephen Brown, Zvonko Vranesic, *Fundamentals of Digital Logic with VHDL Design*, TMH, 2007.

III B.Tech. - I semester

(16BT50404) ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

(Interdisciplinary Elective-1)

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

PREREQUISITES:—

COURSE DESCRIPTION:

Measurements and Measuring Systems; Signal Analyzers and Oscilloscopes; Transducers; Display Devices and Recorders; Data Acquisition Systems and Telemetry.

COURSE OUTCOMES:

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

CO1. Demonstrate knowledge in
- Working of measuring instruments
- Operating principles of various display and recording devices
- Various measurement techniques
- Errors in measurements and their rectification
- Transmitting techniques of various electrical and non-electrical quantities
- Application of digital techniques in development of instrumentation systems

CO2. Analyse and compare the performance of various measuring systems based on the response to the given inputs.

CO3. Design of basic electronic instruments according the required specifications.

CO4. Solve engineering problems using different transducers for measurement of an electrical or non-electrical quantity and establish the drawbacks of instruments.

CO5. Create effective and suitable techniques to overcome limitations of the instruments and display devices in measuring systems.

CO6. Apply the instrumentation technology to provide wide range of solutions for the problems of Societal, Health and Safety issues in real time world.

DETAILED SYLLABUS:

UNIT-I: MEASUREMENTS AND MEASURING SYSTEMS (10 Periods)

Static characteristics – Accuracy, Precision, Resolution, Sensitivity, measurement Errors; Dynamic Characteristics - Speed of response, fidelity, Lag, Dynamic error and Statistical Analysis; Basic meter movement; Ammeters – Multirange, Universal Shunt, Extending Ranges; DC voltmeters – Multirange, Range extension, Loading, Transistorized Voltmeter; AC voltmeters – Rectifier type, Thermocouple Type; Ohmmeters - Series type and Shunt type; Calibration of DC Instrument & Ohmmeter, Multimeter for Voltage, Current & Resistance measurements.

UNIT-II: TRANSDUCERS AND BRIDGES (10 Periods)

Transducers: Classification of Transducers; Measurement of Displacement (Resistance, Capacitance, Inductance, LVDT), Force (Strain Gauges), Pressure (Piezoelectric Transducers), Temperature (Resistance Thermometers, Thermocouples, Thermistors); Measurement of Velocity, Acceleration, Vibration, Moisture and pH value.

Bridges: Wheatstone bridge, Kelvin Bridge, Practical Kelvin's double bridge, Maxwell's bridge, Hay's bridge, Schering bridge, Wien Bridge, Anderson Bridge, Errors and precautions in using bridges, Q-meter.

UNIT-III: SIGNAL ANALYZERS AND OSCILLOSCOPES (12 Periods)

Signal Analyzers: Wave analyzers - Frequency Selective Wave Analyzer, Heterodyne Wave Analyzer, Application of Wave Analyzers, Harmonic Distortion Analyzers, Total Harmonic Distortion; Spectrum Analyzers – Basic Spectrum Analyzer, Spectral Displays, Spectra of Different Spectrum Analyzers.

Oscilloscopes: Oscilloscope Block diagram, Cathode Ray Tube, Vertical Deflection System, Delay Line, Horizontal Deflection System - Triggered Sweep, Delayed sweep; CRO Probes, Dual Beam & Trace CROs, Measurement of Amplitude, Frequency and Phase (Lissajous method), Sampling Oscilloscope, Analog Storage Oscilloscope, Digital Storage Oscilloscope.

UNIT-IV: DISPLAY DEVICES AND RECORDERS (07 Periods)

Display Devices: Segment Displays – Seven Segment Display, Dot Matrix Display; LCD Display, BCD to 7 Segment Converter, BCD to Dot Matrix Converter.

Recorders: Strip Chart Recorder and X-Y Recorder.

UNIT-V: DATA ACQUISITION SYSTEMS AND TELEMETRY
(06 Periods)

Data Acquisition System: Generalized Data Acquisition System, Single and Multi-Channel DAS.

Telemetry: General Telemetry System, Types of Telemetry Systems, Land Line Telemetry Systems – Voltage, Current and Position Telemetering Systems; Introduction to Radio Frequency Telemetry.

Total Periods: 45

TEXT BOOKS:

1. A.D. Helfrick and W.D. Cooper, Modern *Electronic Instrumentation and Measurement Techniques*, PHI, 5th Edition, 2006.
2. A.K. Sawhney, *A Course in Electrical & Electronic Measurement and Instrumentation,* DhanpatRai& Company Private Limited, New Delhi, 18th Edition, 2007.

REFERENCE BOOKS:

1. David A. Bell,*Electronic Instrumentation & Measurements*, PHI, 2nd Edition, 2003.
2. H.S.Kalsi, *Electronic instrumentation,* TMH, 3rd Edition, 2015.

III B.Tech. - I semester

(16BT50501) **COMPUTER NETWORKS**

(Common to ECE, CSE, IT&CSSE)

(Interdisciplinary Elective-1)

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

PREREQUISITES:—

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

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

CO1. Demonstrate knowledge on:
- Functionalities of Various OSI and TCP/IP layers
- 3G Mobile phone networks, 802.11
- TCP,UDP and SMTP

CO2. Analyze the issues related to data link, medium access and transport layers by using channel allocation and connection management schemes.

CO3. Design and compute subnet masks and addresses for networking requirements.

CO4. Solve problems related to Flow control, Error control, congestion control and Network Routing.

CO5. Apply Network Standards - 802.3 and 802.11 for developing computer Networks.

CO6. Assess the impact of wired and wireless Networks in the context of legal, safety, health and societal issues.

DETAILED SYLLABUS:

UNIT- I: INTRODUCTION AND PHYSICAL LAYER **(09 Periods)**

Introduction: Network Hardware, Network Software, Reference Models - OSI, TCP/IP; Example Networks – Internet; Wireless LANs - 802.11.

Physical Layer: Guided Transmission Media, Wireless Transmission.

UNIT- II: DATA LINK LAYER AND MEDIUM ACCESS CONTROL SUBLAYER (10 Periods)

Data Link Layer: Data Link Layer Design Issues, Error Detection and Correction-CRC, Hamming Codes, Elementary Data Link Protocols, Sliding Window Protocols.

Medium Access Control Sublayer: ALOHA, Carrier Sense Multiple Access Protocols, Collision-Free Protocols, Ethernet, Data Link Layer Switching- Repeaters, Hubs, Switches, Routers, and Gateways.

UNIT-III: NETWORK LAYER (10 Periods)

Network Layer Design Issues, Routing Algorithms - Shortest Path, Flooding, Distance Vector, Link State Routing, Hierarchical, Broadcast, Multicast, Anycast; Congestion Control Algorithms, Network Layer in the Internet - The IP Version 4 Protocol, IP Addresses, IP Version 6, Internet Control Protocols.

UNIT-IV: TRANSPORT LAYER (09 Periods)

Internet Transport Protocols: UDP – Segment Header, Remote Procedure Call, Real-Time Transport Protocols; TCP **–** Service Model, Protocol, Segment Header, Connection Establishment, Connection Release, Connection Management Modeling, Sliding Window, Timer Management, Congestion Control.

UNIT-V: APPLICATION LAYER (07 Periods)

Domain Name System (DNS)-Name Space, Domain Resource Records, Name Servers; Electronic Mail-Architecture and Services, User Agent, Message Formats, Message Transfer, Final Delivery; The World Wide Web- Architectural Overview, HTTP.

Total Periods: 45

TEXT BOOK:

1. Andrew S. Tanenbaum and David J. Wetherall, *Computer Networks,* Pearson Education, 5th Edition, 2015.

REFERENCE BOOKS:

1. Behrouz A. Forouzan, *Data Communication and Networking*, Tata McGraw-Hill, 4th Edition, 2010.
2. James F. Kurose and Keith W. Ross, *Computer Networking: A Top-Down Approach Featuring the Internet,* Pearson Education, 2nd Edition, 2012.

III B.Tech. - I semester

(16BT30501) COMPUTER ORGANIZATION

(Interdisciplinary Elective-1)

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

PREREQUISITES:—

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

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

CO1. Demonstrate knowledge on:
- Computer Arithmetic units
- Register Transfer Language and Computer Instructions
- Design of Control Unit
- Input Output Organization and Memory system
- Pipelining and Multiprocessing.

CO2. Analyze the functional units of a digital computer.
CO3. Design the functional modules in a digital computer - Arithmetic Units, Memory and I/O.
CO4. Investigate the performance of memory, I/O, and pipelined processors.
CO5. Select appropriate techniques of I/O, Pipelining and Multiprocessing to solve computing problems.
CO6. Apply contextual knowledge of computer systems development to societal applications.

DETAILED SYLLABUS:

UNIT-I: REGISTER TRANSFER AND MICROOPERATIONS AND COMPUTER ARITHMETIC (09 Periods)

Register Transfer And Microoperations: Register transfer, Bus and memory transfers, Arithmetic microoperations, Logic microoperations, Shift microoperations, Arithmetic logic shift unit.

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

UNIT-II: BASIC COMPUTER ORGANIZATION AND DESIGN AND MICRO PROGRAMMED CONTROL (09 Periods)

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

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

UNIT-III: INPUT-OUTPUT ORGANIZATION (08 Periods)

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

UNIT-IV: THE MEMORY SYSTEM (10 Periods)

Semiconductor RAM memories – Internal organization, Static memories, Synchronous and Asynchronous DRAMs, Structure of larger memories, Memory system considerations, Rambus memory; Read-Only memories – ROM, PROM, EPROM, EEPROM, Flash memory; Cache memory – Mapping functions, Replacement algorithms; Performance considerations, Secondary storage – Magnetic disks, RAID disk arrays, Optical disks, Magnetic tape systems.

UNIT-V: PIPELINE AND VECTOR PROCESSING AND MULTIPROCESSORS (09 Periods)

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

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

Total Periods: 45

TEXT BOOKS:

1. Morris Mano, *Computer System Architecture*, 3rd Edition, Pearson Education, 2007.
2. Carl V. Hamacher, Zvonko G. Vranesic and Safwat G. Zaky, *Computer Organization*, 5th Edition, McGraw-Hill, 2002.

REFERENCE BOOKS:

1. William Stallings, *Computer Organization and Architecture: Designing For Performance*, 7th Edition, Pearson Education, 2007.
2. John P. Hayes, *Computer Architecture and Organization*, 3rd Edition, McGrawHill.

III B.Tech. - I semester

(16BT51241) OBJECT ORIENTED PROGRAMMING

(Common to ECE&EIE)

(Interdisciplinary Elective-1)

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

PREREQUISITES:—

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

COURSE OUTCOMES:

On successful completion of thecourse, students will be able to:

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

CO2. Analyze complex engineering problems using object oriented concepts.

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

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

CO5. Use advanced programming languages to develop web applications.

CO6. Build Java Applications suitable for societal requirements.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION OF JAVA LANGUAGE (12 Periods)

Data types, Variables, Arrays, Operators, Control statements.
Classes and Objects: Concepts of Classes, Objects, Constructors, Methods, this keyword, Garbage collection, Overloading Methods and Constructors, Parameter passing, Access control, Recursion, String Class.

UNIT-II: INHERITANCE, PACKAGES AND INTERFACES (07 Periods)

Inheritance: Inheritance basics, Super Keyword, Multi-level hierarchy, Abstract classes, final Keyword with inheritance.
Packages: Definition, Creating and Accessing a package, Understanding CLASSPATH, Importing packages.
Interfaces: Definition, implementing interfaces, Nested interfaces, Applying interfaces, Variables in interface and Extending interfaces.

UNIT-III: EXCEPTION HANDLING AND MULTITHREADING (09 Periods)

Exception Handling: Concepts of exception handling, Exception Types, Usage of try, catch, throw, throws and finally, Built in exceptions, Creating own exception sub classes.
Multithreading: Java thread model, Creating threads, Thread priority, Synchronizing threads,Inter-thread communication.

UNIT-IV: COLLECTION CLASSES, THE APPLET CLASS AND AWT (09 Periods)

The Collection Classes: ArrayList Class, LinkedList Class, HashSet Class, LinkedHashSet Class, TreeSet Class, PriorityQueue Class, EnumSet Class.
The Applet Class: Types of applets, Applet Basics, Applet Architecture, Applet Skeleton, Passing Parameters to Applets.

The AWT Control Fundamentals, User interface components, Layout managers.

UNIT-V: EVENT HANDLING AND SERVLETS (08 Periods)

Delegation event model: Event Classes, Event Listener Interfaces – Mouse and Key; Adapter classes.
Servlets: Life Cycle of a Servlet, Using Tomcat for Servlet Development, Create and compile the servlet source code, Servlet API, Javax.Servlet package.

Total Periods: 45

TEXT BOOK:

1. Herbert Schildt, *Java the Complete Reference*, Oracle Press, 9thEdition, 2014.

REFERENCE BOOK:

1. Sachin Malhotra, Saurab Choudhary, *Programming in Java*, Oxford University Press, 2ndEdition, 2014.

III B.Tech. - I semester

(16BT50431) LINEAR AND DIGITAL IC APPLICATIONS LAB

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

PREREQUISITES: Courses on Linear IC Applications and Digital IC Applications.

COURSE DESCRIPTION: Design and verification of Op-Amp applications; Timers; Voltage regulator; ADC and DAC; Simulation and synthesis of combinational and sequential circuits; XILINX tools.

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

CO1. Demonstrate knowledge in different Linear and Digital integrated circuits applications and XILINX tools.
CO2. Analyzedifferentcircuits built with linear and digital ICs.
CO3. Design different multivibrator circuits, filters and digital circuits.
CO4. Conduct of experiments, analysis and interpretation of data, and synthesis of the information to provide valid solutions.
CO5. Model a Linear and Digital integrated circuits using HDL tools.
CO6. Function effectively as an individual and as a member in a group in the area of IC applications.
CO7. Communicate in verbal and written form in the area of IC applications.

LIST OF EXERCISES:

PART A: Linear IC Applications: (Minimum of **six experiments** to be conducted)

1. Op-Amp Applications-Adder, Subtractor and Comparator circuits.
2. Active Filter Applications-LPF, HPF (first and second order).
3. Function Generator using Op-Amps.
4. IC 555 Timer-Monostable and Astable Multivibrators.
5. IC 566-VCO Applications.
6. Voltage Regulator using IC 723.
7. 4 Bit ADC and DAC.
8. Precision Rectifier using Op-Amp.

PART B: **Digital IC Applications:** (Minimum of **six experiments** to be conducted)

Simulate the internal structure of the following Digital IC's using HDL and verify the operations of the Digital IC's (Hardware) in the Laboratory.

1. Half Adder, Full Adder, Half Subtractor & Full Subtractor.
2. 8-3 Encoder-74x148.
3. 3-8 Decoders -74x138.
4. 8x1 Multiplexer -74x151 and 2x4 Demultiplexer - 74x155.
5. 4 Bit Comparator-74x85.
6. Decade counter-74x90.
7. Universal shift Register – 74X194/195

III B.Tech. - I semester

(16BT50432) MICROPROCESSORS AND MICROCONTROLLERS LAB

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

PREREQUISITES: A course on Microprocessors and Microcontrollers.

COURSE DESCRIPTION:
Assembly language Programming for Intel 8086 & 8051; Interfacing standard peripherals & Programming-DAC, Stepper Motor, ADC, Logic Controller, Keyboard, Seven Segment Display.

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

CO1. Demonstrate knowledge in various aspects of microprocessors, microcontrollers and interfaces.
CO2. Analyze various programming alternatives, interfacing methods & usage of various on-chip resources like Timers, Interrupts, ADC, DAC, and Stepper Motor to build standalone systems.
CO3. Design and develop microcomputer based systems to suit to market requirements.
CO4. Solve engineering problems by proposing potential solutions using microprocessors and microcontrollers.
CO5. Apply appropriate techniques, resources, and tools for modeling microcomputer based systems with understanding of limitations.
CO6. Apply concepts of microprocessors and microcontrollers to solve societal problems.
CO7. Work individually and in a group to develop microcomputer based systems.
CO8. Communicate effectively in oral and written form in the field of microprocessors and microcontrollers.

LIST OF EXERCISES:
(Minimum of **TWELVE** experiments to be conducted)

I Programs using 8086

1. Introduction to MASM/TASM
2. Arithmetic operations
3. Logic operations
4. String operations
5. Modular program: using procedure & DOS/BIOS Programming

II Interfacing with 8086

1. Stepper motor
2. Logic controller
3. A/D converter
4. D/A Converter.
5. Seven segment display
6. Keyboard interfacing

III Programs using 8051

1. Arithmetic operations using internal and external memory.
2. Logical Operations.
3. Programs using special instructions like SWAP, bit/byte, set/ reset etc.

IV Interfacing with 8051

1. Square wave generation using Timers in Mode 0 and Mode 1
2. Stepper Motor
3. Digital to Analog Converter

III B.Tech. - I semester

(16BT4HS31) **SOFT SKILLS LAB**

(Common to EEE, ECE&EIE)

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

PREREQUISITES:

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

COURSE DESCRIPTION:

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

COURSE OUTCOMES:

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

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

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

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

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

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

LIST OF EXERCISES:

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

Total Lab Slots: 10

REFERENCE BOOKS:

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

SUGGESTED SOFTWARE:

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

III B.Tech. - II semester

(16BT5HS01) **MANAGEMENT SCIENCE**

(Common to EEE, ECE & EIE)

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

PREREQUISITES:—

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

COURSE OUTCOMES:

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

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

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

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

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

CO5. Provide solution to organizations for sustainable development.

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

DETAILED SYLLABUS:

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

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

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

Organization, Functional Organization, Matrix Organization, Network organization.

UNIT- II: OPERATIONS MANAGEMENT (12 Periods)

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

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

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

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

Network analysis - Critical path method (CPM), Program evaluation and review technique (PERT); Project cost analysis - Project crashing.

Introduction to Entrepreneurship, Entrepreneurial Traits, Entrepreneur vs. Manager, Role of Entrepreneurship in Economic Development, Women as an Entrepreneur.

UNIT-V: CONTEMPORARY MANAGEMENT PRACTICES (09 Periods)

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

Total Periods: 45

TEXT BOOKS:

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

REFERENCE BOOKS:

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

III B.Tech. - II semester

(16BT60401) **ANTENNAS AND WAVEGUIDES**

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

PREREQUISITES:ACourse on Electro Magnetic Theory and Transmission Lines.

COURSE DESCRIPTION:
Waveguides, Antenna Parameters; Wire antennas; Antenna Arrays; VHF, UHF and Microwave antennas; Antenna Measurements.

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

CO1. Apply the knowledge of fundamentals in antenna theory and waveguides.
CO2. Analyze the characteristics and performance of different antennas and waveguides.
CO3. Design and develop various antennas.
CO4. Provide solutions through different antenna designs.
CO5. Apply appropriate techniques, resources to complex engineering activities in the field of antennas.
CO6. Apply contextual knowledge for design of antennas with required radiation levels for communication needs meeting the public health and safety conditions.

DETAILED SYLLABUS:

UNIT-I: WAVEGUIDES (09 Periods)
Introduction, Rectangular waveguides-Solutions of wave equations in rectangular coordinates, TE and TM modes analysis, Expressions for fields, Characteristic equation and cutoff frequencies, Filter characteristics, Dominant and degenerate modes, sketches of TE and TM mode fields in the cross section; Mode characteristics – Phase and group velocities, Wavelengths and impedance relations, Power transmission and power losses; Micro strip lines-Introduction, ZO relations, Effective dielectric constant, Losses, Q-factor, Illustrative Problems.

UNIT-II: ANTENNA BASICS AND THIN LINEAR WIRE ANTENNAS (10 Periods)
Introduction, Radiation mechanism, Antenna parameters - patterns, Beam Area, Radiation Intensity, Beam Efficiency, Directivity-Gain-Resolution, Antenna Apertures, Effective height; Antenna Field Zones, Antenna theorems, Friis transmission equation, Retarded potentials, Radiation from small

electric dipole, Quarter wave monopole and half wave dipole - Current distributions, Field components, Radiated power, Radiation resistance, Beam width, Directivity, Effective area and Effective height; Natural current distributions, far-fields and patterns of Thin linear center-fed antennas of different lengths, Illustrative problems.

UNIT-III: ANTENNA ARRAYS (10 Periods)

Point sources- Definition, Patterns, arrays of 2 isotropic sources different cases; Principle of pattern multiplication, Uniform linear arrays - Broadside arrays, End fire arrays, EFA with increased directivity, Derivation of their characteristics and comparison, BSA with non-uniform amplitude distribution - General considerations and Binomial arrays, Arrays with parasitic elements, Yagi-Uda arrays, Folded dipoles & their characteristics, Illustrative problems.

UNIT-IV: VHF, UHF AND MICROWAVE ANTENNAS (10 Periods)

Helical Antennas - Helical geometry, Helix modes, Practical design considerations for monofilar helical antenna in axial and normal modes ,Horn antenna,Microstrip antennas - Introduction, Features, Advantages and limitations; Rectangular patch antennas - Geometry and parameters, characteristics of microstrip antennas, Impact of different parameters on characteristics; Reflector antennas- Introduction, Flat sheet and corner reflectors, Paraboloidal reflectors - Geometry, Pattern characteristics, Feed methods, Reflector types, Illustrative problems.

UNIT-V: ANTENNA MEASUREMENTS (06 Periods)

Introduction, Concepts- Reciprocity, Near and far fields, Coordination system, Sources of errors, Pattern measurement arrangement, Measurement of Directivity, Gain(by comparison, Absolute and 3-Antenna Methods), Radiation pattern.

Total Periods: 45

TEXT BOOKS:

1. John D. Kraus and Ronald J. Marhefka and Ahmad S.Khan, *Antennas and wave propagation*, 4th Edition (Special Indian Edition), TMH, New Delhi, 2010.
2. Samuel Y. Liao, *Microwave devices and circuits,* Pearson Education, 3rd Edition, 2003

REFERENCE BOOKS:

1. C.A. Balanis, *Antenna Theory*, 2nd Edition, John Wiley & Sons, 2001.
2. E.C. Jordan and K.G. Balmain, *Electromagnetic Waves and Radiating Systems*, 2nd Edition, PHI, 2000.

III B.Tech. - II semester

(16BT60402) DIGITAL SIGNAL PROCESSING

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

PREREQUISITES: A course on Signals and Systems.

COURSE DESCRIPTION:
Continuous and discrete signals and sequences; systems**;** DFT and FFT algorithms for the analysis of discrete sequences; design and realization of Digital IIR and FIR filters; DSP processors and architectures.

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

CO1. Apply the knowledge of fundamentals in
- Frequency analysis of signals and systems.
- DFT and FFT transforms.
- Analog & Digital Filter Design.
- Digital Filter Realization.
- DSP Processors.

CO2. Analyze numerical and analytical problems of discrete time signals and systems in frequency domain using Transforms.

CO3. Design and develop digital filters to optimize system performance and their realization.

CO4. Interpret and synthesize the response of Digital filters to validate their characteristics.

CO5. Apply appropriate techniques and algorithms to design digital signal processing systems with an understanding of limitations.

DETAILED SYLLABUS:

UNIT I – INTRODUCTION TO DIGITAL SIGNAL PROCESSING (10 Periods)

Discrete-time signals and systems, Linear shift invariant, Stability and Causality, Linear constant coefficient difference equations, solution for difference equations using Z-transforms, Frequency analysis of signals - Fourier series and Fourier transform of Discrete time signals; Frequency domain representation of Discrete Time Systems.

UNIT II – DISCRETE AND FAST FOURIER TRANSFORMS (09 Periods)

Discrete Fourier Transform, properties of DFT, linear filtering methods based on DFT, Relationship of FT to Z Transform.

Fast Fourier transforms (FFT): Radix-2 Decimation in time (DIT) and Decimation in frequency (DIF) FFT algorithms, Inverse FFT.

UNIT III – IIR DIGITAL FILTERS (10 Periods)

Design of IIR digital filters from analog filters-IIR filter design by approximation of derivatives, impulse invariance and bilinear transformation. Characteristics of common use analog filters, Frequency transformations. Structural realization of IIR systems-direct, cascade and parallel form structures, Transposed form.

UNIT IV – FIR DIGITAL FILTERS (09 Periods)

Symmetric and anti-symmetric FIR filters, Design of linear phase FIR digital filters using windowing techniques, Frequency sampling technique, Comparison of IIR and FIR filters. Structural realization of FIR filters-direct, cascade-form structures and linear phase structures.

UNIT V – INTRODUCTION TO DSP PROCESSORS (08 Periods)

Introduction to programmable DSPs: Multiplier and Multiplier Accumulator (MAC), Modified Bus Structures and Memory Access schemes in P-DSPs, Multiple access memory, multi-ported memory, VLIW Architecture, Pipelining, Special addressing modes, On-Chip Peripherals.

Architecture of TMS 320C6X: Introduction, Features of 'C6X Processors, Internal Architecture, CPU, General-Purpose Register Files, Functional Units and Operation, Data Paths, Control Register File.

Total Periods: 46

TEXT BOOKS:

1. John G. Proakis, Dimitris G. Manolakis, *Digital Signal Processing, Principles, Algorithms and Applications*, Pearson Education/PHI, 4th Edition, 2007.
2. B.Venkataramani, M. Bhaskar, *Digital Signal Processors – Architecture, programming and Applications,* TATA McGraw Hill, 2nd Edition, 2010

REFERENCE BOOKS:

1. Alan.V. Oppenheim, Ronald.W. Schafer, John R Buck, *Discrete Time Signal Processing,* Prentice Hall, 2nd Edition, 2006.
2. Tarun Kumar Rawat, *Digital Signal Processing*, Oxford University Press, 1st Edition, 2015 .

III B.Tech. - II semester

(16BT40502) **DATABASE MANAGEMENT SYSTEMS**

(Interdisciplinary Elective-2)

(Common to CE & ECE)

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

PREREQUISITES:—

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

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

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

CO2. Analyze databases using normal forms to provide solutions for real time applications.
CO3. Design solutions for database problems using database design, views design and framing queries.
CO4. Use database techniques for designing databases, managing databases and its security.
CO5. Select SQL, Hash based Indexing and Tree based Indexing to manage data in databases.
CO6. Apply contextual knowledge to develop database applications related to societal issues.

DETAILED SYLLABUS:

UNIT- I: INTRODUCTION TO DATABASE SYSTEMS AND DATABASE DESIGN (09 Periods)

Database Systems: Database System Applications, Purpose of Database Systems, View of Data-Data Abstraction, Instances and Schemas, Data Models; Database Languages - DDL, DML; Database Architecture, Database Users and Administrators.

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

UNIT II: THE RELATIONAL MODEL AND RELATIONAL ALGEBRA AND CALCULUS (08 Periods)

Relational Model: Integrity Constraints over Relations, Enforcing Integrity constraints, Querying relational data, Logical database Design, Introduction to Views, Destroying/altering Tables and Views.

Relational Algebra and Calculus: Preliminaries, Relational Algebra Operators; Relational Calculus - Tuple and Domain Relational Calculus; Expressive Power of Algebra and calculus.

UNIT III: SQL AND SCHEMA REFINEMENT (10 Periods)

SQL: Form of Basic SQL Query- Examples of Basic SQL Queries; Nested Queries- Introduction to Nested Queries, Correlated Nested Queries, Set- Comparison Operators; Aggregate Operators, NULL values-Comparison using Null values, Logical connectives AND, OR and NOT, Impact on SQL Constructs, Outer Joins, Disallowing NULL values; Complex Integrity Constraints in SQL ,Triggers and Active Databases.

Schema Refinement: Problems Caused by redundancy, Decompositions, Problem related to decomposition, Functional Dependencies, Reasoning about FDS, Normal Forms – First, Second and Third Normal forms, BCNF; Multi valued Dependencies, Fourth Normal Form, Join Dependencies, Fifth Normal form.

UNIT IV: TRANSACTIONS AND CONCURRENCY CONTROL (09 Periods)

Transactions: Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability.

Concurrency Control: Lock Based Protocols, Timestamp Based Protocols, Validation Based Protocols, Multiple Granularity, Deadlock Handling.

UNIT V: STORAGE AND INDEXING (09 Periods)

Storage and Indexing: Data on External Storage, File Organization and Indexing – Clustered Indexes, Primary and Secondary Indexes; Index data Structures – Hash Based Indexing, Tree based Indexing; Comparison of File Organizations.

Tree Structured Indexing: Intuition for Tree Indexes, Indexed Sequential Access Method (ISAM), B+ Trees- A Dynamic Index Structure; Search, Insert, Delete;B-Tree Index files.

Total Periods: 45

TEXT BOOKS:

1. Raghu Ramakrishnan and Johannes Gehrke, *Database Management Systems*, Tata McGraw Hill, 3rd Edition, 2014.
2. A. Silberschatz, H.F.Korth and S. Sudarshan, *Database System Concepts*, Tata McGraw Hill, 5th Edition, 2006.

REFERENCE BOOKS:

1. Ramez Elmasri and Shamkant B. Navathe, *Database Systems*, 6th Edition, Pearson Education, 2013.
2. Peter Rob and Carlos Coronel, *Database Systems Design, Implementation and Management,*Cengage Learing, 7th Edition, 2009.

III B.Tech. - II semester

(16BT71205) CRYPTOGRAPHY AND NETWORK SECURITY

(Interdisciplinary Elective-2)

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

PREREQUISITES:—

COURSE DESCRIPTION: Principles and Practice of Cryptography and Network Security; Classical Systems; Symmetric Block Ciphers; Public-key Cryptography; Hash Functions; Authentication; Key Management; Key Exchange; Signature Schemes; E-mail; Web Security; Malicious Software; Intrusion Detection; Phishing and Identity Theft.

COURSE OUTCOMES:

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

CO1. Demonstrate knowledge on:
- Cryptographic algorithms and their mathematical models
- Message Authentication
- Digital Signatures
- Malicious Software
- Intrusion Detection
- Phishing and Identity Theft

CO2. Analyze vulnerabilities and threats on information systems based on various security parameters

CO3. Apply security and privacy methods to protect and prevent cyber crimes

CO4. Solve information privacy issues using encryption and digital signatures

CO5. Use firewall and PGP to protect network and e-mail respectively

CO6. Follow standards in implementation of network security

DETAILED SYLLABUS:

UNIT-I: CLASSICAL ENCRYPTION TECHNIQUES (08 Periods)

Introduction: Services, Mechanisms, and Attacks Concepts, The OSI Security Architecture, Model for Network Security.

Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques- Ceaser Cipher, Hill Cipher, Poly and Mono Alphabetic Cipher, Transposition Techniques.

UNIT-II: BLOCK CIPHERS AND PUBLIC-KEY CRYPTOGRAPHY (09 Periods)

Block Ciphers and the Data Encryption Standard: Block Cipher Principles, The Data Encryption Standard (DES), The Strength of DES, Block Cipher Design Principles, Block Cipher Modes of Operation.

Public-Key Cryptography: Principles of Public-Key Cryptosystems, the RSA Algorithm, Diffie-Hellman Key Exchange.

UNIT-III: MESSAGE AUTHENTICATION CODES, HASH FUNCTIONS, AND DIGITAL SIGNATURES (09 Periods)

Message authentication codes: Message Authentication Requirements, Message Authentication Functions, Message Authentication Codes, Hash Functions, Security of Hash Functions and MACs, Hash algorithms-SHA, HMAC.

Digital Signatures: Digital Signatures and The Indian IT Act, Digital Signature Standard (DSS), Authentication applications-Kerberos.

UNIT-IV: ELECTRONIC MAIL SECURITY, IP SECURITY AND WEB SECURITY (09 Periods)

Electronic Mail Security: Pretty Good Privacy (PGP).

IP Security: IP Security Overview, Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations.

Web Security: Web security Considerations**,** Secure Sockets Layer (SSL),Transport Layer Security (TLS), Secure Electronic Transaction.

UNIT-V: MALICIOUS SOFTWARE, INTRUSION DETECTION, PHISHING AND IDENTITY THEFT (10 Periods)

Malicious Software: Spywares, Viruses and Worms, DoS and DDoS attacks and Countermeasures.

Intrusion Detection: Key loggers,Intrusion Detection, Password Management-Password Protection, Password selection; Firewall Design Principles, Trusted Systems.

Phishing and Identity Theft: Proxy Servers, Anonymizers, Phishing and Identity Theft (ID Theft).

Total Periods: 45

TEXT BOOKS:

1. William Stallings, *Cryptography and Network Security Principles and Practice,*Pearson Education, 4th Edition, 2010.
2. Nina Gobole, Sunit Belapure, *Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives*, Wiley India, 2011.

REFERENCE BOOK:

1. Behrouz A Forouzan and Debdeed Mukhopadhyay, *Cryptography and Network Security*, McGraw Hill Education, 2ndEdition, 2010.

III B.Tech. - II semester

(16BT31501) **OPERATING SYSTEMS**

(Interdisciplinary Elective-2)

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

PREREQUISITES:—

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

COURSE OUTCOMES:

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

CO1. Demonstrate knowledge on Operating system operations, services, file management, disk management, I/O management and protection.

CO2. Identify the functionality involved in process management concepts like scheduling and synchronization.

CO3. Design models for handling deadlock and perform memory management.

CO4. Synthesize and apply programming API's to perform Process management.

CO5. Use appropriate protection tools to provide access control to Operating system users.

DETAILED SYLLABUS:

UNIT I: OPERATING SYSTEMS OVERVIEW AND PROCESS MANAGEMENT (08 Periods)

Operating systems, operations, Distributed systems, Special purpose systems, Operating systems services, Systems calls, Operating system structure.

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

UNIT II: SYNCHRONIZATION AND DEADLOCKS (10 Periods)

Synchronization: The critical-section problem, Peterson's Solution, Synchronization hardware, Semaphores, Classic problems of synchronization, Monitors.

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

UNIT III: MEMORY MANAGEMENT (09 Periods)

Memory-Management Strategies: Swapping, Contiguous memory allocation, Paging, Structure of the page table, Segmentation.

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

UNIT IV: STORAGE MANAGEMENT (10 Periods)

File System: File Concept, Access methods, Directory structure, File system structure, i-node, File Descriptors, File system implementation, Directory implementation, Allocation methods.

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

UNIT V: I/O SYSTEMS AND PROTECTION (08 Periods)

I/O Systems: I/O Hardware, Application I/O interface, Kernel I/O subsystem.

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

Total Periods: 45

TEXT BOOK:

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

REFERENCE BOOKS:

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

III B.Tech. - II semester

(16BT61241) **WIRELESS SENSOR NETWORKS**

(Interdisciplinary Elective-2)

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

PREREQUISITES:—

COURSE DESCRIPTION: WSN architecture, types; Physical Layer;MAC protocols;Routing related Protocols; QoS in WSNs.

COURSE OUTCOMES:

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

CO1. Demonstrateknowledge on:
- Wireless Sensor Networks
- Physical layer
- Data link layer
- Network layer
- Transport layer

CO2. Analyze various design issues related to Data link, network and transport protocols of wireless sensor network architectures.

CO3. Solve complex engineering problems pertaining to the field of wireless sensor networks.

CO4. Design and develop feasible and optimal wireless sensor networks based solutions for societal use.

DETAILED SYLLABUS:

UNIT I– INTRODUCTION TO WIRELESS SENSOR NETWORKS (09 Periods)

Challenges for Wireless Sensor Networks, Comparison of Sensor Network with Ad Hoc Network; Single Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes; Network Architecture: Sensor Network Scenarios - Types of Sources and Sinks, Single Hop Versus Multi-Hop Networks, Multiple Sinks and Sources; Design Principles for Wireless Sensor Networks.

UNIT II – PHYSICAL LAYER (09 Periods)

Introduction, Wireless Channel and Communication Fundamentals – Frequency Allocation, Modulation and Demodulation, Wave Propagation Effects and Noise, Channels Models, Spread Spectrum Communication, Packet Transmission and

Synchronization, Quality of Wireless Channels and Measures for Improvement; Physical Layer and Transceiver Design Consideration in Wireless Sensor Networks - Energy Usage Profile, Choice of Modulation, Power Management.

UNIT III –DATA LINK LAYER (09 Periods)

MAC Protocols: Fundamentals of Wireless MAC Protocols - Requirements and Design Constraints for Wireless MAC Protocols, Important Classes of MAC Protocols, MAC Protocols for Wireless Sensor Networks; Link Layer Protocols – Fundamentals Task and Requirements; Error Control - Causes and Characteristics of Transmission Errors, ARQ Techniques, FEC Techniques, Hybrid Schemes, Power Control.

UNIT IV – NETWORK LAYER (09 Periods)

Gossiping and Agent-Based Uni-Cast Forwarding - Basic Idea, Randomized Forwarding; Energy-Efficient Unicast, Broadcast and Multicast - Source-Based Tree Protocols, Shared, Core-Based Tree Protocols, Mesh-Based Protocols. Geographic Routing - Basics of Position-Based Routing, Geocasting; Mobile Nodes - Mobile Sinks, Mobile Data Collectors, Mobile Regions; Data Centric and Content-Based Networking - Introduction, Data-Centric Routing, Data Aggregation.

UNIT V – TRANSPORT LAYER (09 Periods)

The Transport Layer and QoS in Wireless Sensor Networks - Quality of Service/Reliability Transport Protocols; Coverage and Deployment - Sensing Models, Coverage Measures; Uniform Random Deployments: Poisson Point Processes, Coverage of Random Deployments: Boolean Sensing Model, General Sensing Model, Coverage Determination, Coverage of Grid Deployments; Reliable Data Transport, Single Packet Delivery - Using A Single Path, Multiple Paths, Multiple Receivers.

Total Periods:45

TEXT BOOK:

1. Holger Karl and Andreas willing,*Protocols and Architecture for Wireless Sensor Networks,*John wiley publication, 2007.

REFERENCE BOOKS:

1. Edgar H .Callaway, *Wireless Sensor Networks: Architecture and protocol*, CRC press, 2003.
2. C.S.Raghavendra Krishna, M.Sivalingam and Taribznati, *Wireless Sensor Networks,*Springer publication, 2006.

III B.Tech. - II semester

(16BT60403) **ANALOG IC DESIGN**

(Program Elective – 1)

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

PREREQUISITES:A Course on Electronic Circuits analysis and design.

COURSE DESCRIPTION:
MOS & CMOS Devices and Modeling; Current mirrors and biasing techniques; Single stage amplifiers; Sample and Hold Circuits; Bandgap Reference Circuits and Comparators.

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

CO1. Demonstrate knowledge in
- MOS device modeling
- Current Mirrors
- Single stage amplifiers
- Bandgap Reference Circuits.
- Sample and hold circuits
- Comparators.

CO2. Analyze analog integrated circuits suitable for real time applications.

CO3. Design and Develop Analog Integrated Circuits using MOS Transistor.

CO4. Use different styles of CMOS Circuit modelling to synthesize analog ICs.

CO5. Apply appropriate biasing techniques to improve performance of analog circuits.

CO6. Assess the performance of sample and hold circuits and Bandgap reference circuits in analog ICs suitable for societal use.

DETAILED SYLLABUS:

UNIT - I: MOS DEVICE MODELING (10 Periods)
MOSFET Capacitances, Latch up in CMOS Technology, Short Channel Effects in MOS Transistors, Weak Inversion in MOS Transistors, Small Signal Modeling of MOS Transistors, Large Signal Modeling of MOS Transistors.

UNIT - II: CURRENT MIRRORS AND BIASING TECHNIQUES (10 Periods)

Current Mirrors - Simple Current Mirrors, Simple Current Mirror with Source Degeneration, Cascode Current Mirror and Wilson Current Mirror.

Biasing Techniques: CS Biasing, CG Biasing, Source Follower Biasing, Differential Pair Biasing.

UNIT - III: SINGLE STAGE AMPLIFIERS (07 Periods)

Common Source Stage with resistive load, Source follower, Common Gate Stage, Cascode Stage.

UNIT - IV: SAMPLE AND HOLD CIRCUITS, BANDGAP REFERENCE CIRCUITS (10 Periods)

Performance of Sample and Hold Circuits, MOS Sample and Hold Basics, Examples of CMOS S/H circuits, Bipolar and BICMOS Sample and Hold circuits,Band gap Voltage Reference Basics, Circuits for Band gap References.

UNIT - V: COMPARATORS (08 Periods)

Using an Opamp for a Comparator, Charge-Injection Errors, Latched Comparators, Examples of CMOS and BiCMOS Comparators.

Total Periods: 45

TEXT BOOKS:

1. David A. Johns, Ken Martin,*Analog Integrated Circuit Design*, Wiley Student Edition, 1997.
2. Behzad Razavi, *Design of Analog CMOS Integrated Circuits,* Tata McGraw Hill, 2nd Edition, 2008.

REFERENCE BOOKS:

1. Paul R. Gray, Paul J. Hurst, S. Lewis and R. G. Meyer, *Analysis and Design of Analog Integrated Circuits,* Wiley India, 5th Edition, 2013.
2. Philip E. Allen and Douglas R. Holberg, *CMOS Analog Circuit Design*, Oxford University Press, International 2nd Edition/Indian Edition, 2010.

III B.Tech. - II semester

(16BT60404) **IMAGE PROCESSING**

(Program Elective – 1)

(Common to ECE & CSSE)

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

PREREQUISITES: Courses on Digital signal processing and Digital communications.

COURSE DESCRIPTION:

Fundamentals of image processing; Image transforms; Image enhancement techniques in spatial and frequency domains; Restoration techniques; Image segmentation techniques; Image compression techniques.

COURSE OUTCOMES:

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

CO1. Demonstarte knowledge in
- Image Fundamentals
- Image Enhancement & Restoration Techniques
- Image Segmentation & Compression Techniques
- Color image processing

CO2. Analyze different images using various processing techniques.

CO3. Design and develop various image processing algorithms to process the images in Real Time Applications.

CO4. Solve problems related to images for feasible and optimal solutions in the core area of Image Processing.

CO5. Apply appropriate techniques to complex engineering problems in the field of image processing.

CO6. Understand the impact of the image processing for societal needs.

DETAILED SYLLABUS:

UNIT-I: IMAGE FUNDAMENTALS (10 Periods)

Fundamental steps in Image Processing, Image sampling & quantization, some basic relationships between pixels, Arithmetic operations, Logical operations, Spatial operations,

IMAGE TRANSFORMS: 2D-DFT and properties, Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Haar-Transform, Slant Transform, Hotelling Transform.

UNIT-II: IMAGE ENHANCEMENT (11 Periods)

Basic Intensity transformation functions, Histogram processing, Fundamentals of Spatial Filtering, Smoothing spatial filters, Sharpening spatial filters, Combining spatial Enhancement methods.

Basics of filtering in frequency domain, Correspondence between filtering in the spatial and frequency domains, Image smoothing using frequency domain filters, Image sharpening using frequency domain filters, Homomorphic filtering.

UNIT-III: IMAGE RESTORATION (07 Periods)

Image degradation/Restoration model, Noise models, Restoration in the presence of Noise only-spatial filtering - mean, order-statistic and adaptive filters. Estimating the degradation function, Inverse filtering, Weiner filtering, Constrained least squares filtering.

UNIT-IV: IMAGE COMPRESSION (08 Periods)

Classification of redundancy in Images, Image Compression models, Run length coding, Arithmetic coding, Dictionary based compression, bit-plane coding, Transform based coding, Fidelity Criteria, Image compression standards.

UNIT-V: IMAGE SEGMENTATION AND COLOR IMAGE PROCESSING (09 Periods)

Detection of discontinuities- Point, line and edge Detection.Thresholding- global thresholding, adaptive thresholding. Region based Segmentation. Color image fundamentals - RGB, HSI models, conversions, Pseudo Color Image Processing, Color transformations.

Total Periods: 45

TEXT BOOKS:

1. Rafael C. Gonzalez & Richard E. Woods, *Digital Image Processing*, Pearson Education, 3rd Edition, 2008
2. S.Sridhar, *Digital Image Processing*, Oxford University, 2nd Edition, 2016

REFERENCE BOOKS:

1. William K. Pratt, *Digital Image Processing*, John Wiley and Sons, 3rd Edition, 2002.
2. Anil K.Jain, *Fundamentals of Digital Image processing,* Prentice Hall, 2007.

III B.Tech. - II semester

(16BT60405) **RADAR ENGINEERING**

(Program Elective – 1)

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

PREREQUISITES:

Courses on Antennas and Wave propagation &Microwave Engineering.

COURSE DESCRIPTION:

Radar equation; Targets; classification of radars; MTI and pulsed radar;Tracking with radar; radar receivers; Echo signal detection in the presence of noise; Navigational Aids.

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

CO1. Demonstrate knowledge in
- Principle of working of radars
- MTI and Pulse Doppler radars
- Tracking and detection of radar signals
- Radar displays and duplexers
- Radar receivers.
- Navigational Aids.

CO2. Analyze to detect radar echo signals, range and Doppler measurement.

CO3. Design and develop optimum matched filters, radar receivers and radar system components.

CO4. Solve engineering problems to detect radar signals for range prediction anddetectable signal in the presence of noise

CO5. Apply appropriate techniques for signal detection, tracking and global positioning in the field of radar systems and navigational aids.

CO6. Provide wide range of feasible solutions for accurate echo detection and study of Navigational aids useful in real time applications.

DETAILED SYLLABUS :

UNIT I: RADAR EQUATION (10 Periods)

Introduction, Maximum Unambiguous Range, Simple form of Radar Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications, Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise, Modified Radar Range Equation, SNR, Envelope Detector, False Alarm Time and Probability, Integration of Radar Pulses, Radar Cross section of Targets (simple targets - sphere, cone-sphere), Transmitter Power, PRF and Range Ambiguities, System Losses (qualitative treatment), Illustrative Problems.

UNIT II: DOPPLER RADAR (12 Periods)

Doppler Effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW radar, Illustrative Problems. FM-CW Radar, Range and Doppler Measurement, Block Diagram and Characteristics (Approaching/ Receding Targets), FM-CW altimeter, Multiple Frequency CW Radar, MTI-Introduction, Principle, MTI Radar with - Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers – Filter Characteristics, Blind Speeds, Double Cancellation, Staggered PRFs. Range Gated Doppler Filters, MTI Radar Parameters, Limitations to MTI Performance, MTI versus Pulse Doppler radar.

UNIT III: RADAR TRACKING (06 Periods)

Tracking with Radar, Sequential Lobing, Conical Scan, Monopulse Tracking Radar – Amplitude Comparison Monopulse (one- and two- coordinates), Phase Comparison Monopulse, Tracking in Range, Acquisition and Scanning Patterns, Comparison of Trackers.

UNIT IV: RADAR TRANSMITTERS AND RECEIVERS (11 Periods)

Noise Figure and Noise Temperature, Display types. Duplexers – Branch type and Balanced type, Circulators as Duplexers. Introduction to Phased Array Antennas – Basic Concepts,

Radiation Pattern, Beam Steering and Beam Width changes, Series versus Parallel Feeds, Applications, Advantages and Limitations. Detection of Radar Signals in Noise - Introduction, Matched Filter Receiver – Response Characteristics and Derivation, Correlation Function and Cross-correlation Receiver, Efficiency of Non-matched Filters, Matched Filter with Non-white Noise.

UNIT V: FUNDAMENTALS OF NAVIGATIONAL AIDS

(06 Periods)

Introduction and Types of Navigational Aids, VHF Omni Directional Range (VOR) navigation system- salient features- principle of operation- advantages and limitations, Salient features of LORAN and DECCA navigation system.

Total Periods: 45

TEXT BOOKS:

1. Merrill I. Skolnik, *Introduction to Radar Systems*, TMH Special Indian Edition, 2nd Edition, 2007.
2. G S N Raju,*Radar Engineering and Fundamentals of Navigational Aids*, I.K. International Pvt. Ltd, 1st Edition, 2010.

REFERENCE BOOKS:

1. Merrill I. Skolnik, *Introduction to Radar Systems*, TMH, 3rd Edition, 2001.
2. Byron Edde, *Radar Principles, Technology, Applications*, Pearson Education, 2004.

III B.Tech. - II semester

(16BT60406) TELECOMMUNICATION SWITCHING SYSTEMS

(Program Elective – 1)

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

PREREQUISITES: Courses on Analog and Digital Communications.

COURSE DESCRIPTION:

Overview of telecommunication switching systems; telephone networks; signaling techniques in telephone networks; ISDN; DSL technology and SONET.

COURSE OUTCOMES:

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

CO1. Demonstrate knowledge in:
- Switching systems.
- Subscriber loop systems, numbering plan, charging plan and transmission plan.
- Signaling techniques and traffic in the context of telecommunication network.
- Integrated Services Digital Network (ISDN).
- Frame relay and ATM.
- DSL technologies and SONET networks.

CO2. Perform analysis of traffic load parameters like blocking probability and grade of service.

CO3. Solve engineering problems pertaining to implementation of communicationnetworks.

CO4. Apply appropriate Signaling techniques, networks and topologies of Telecommunications systems with understanding of limitations.

CO5. Understand the probabilistic methods and statistics to solve communication network problems related to societal issues.

CO6. Use standards to meet the responsibilities and norms of the engineering practice in the area of telecommunication switching systems.

DETAILED SYLLABUS:

UNIT-I:PRINCIPLES AND EVOLUTION OF SWITCHING SYSTEMS (13 Periods)

Evolution of telecommunications, Simple telephone communication, Basics of a switching system, Manual switching system, crossbar switching, Electronic space division switching, Time division switching, Combination switching.

UNIT-II: TELEPHONE NETWORKS (06 Periods)

Subscriber loop systems, switching hierarchy and routing, transmission plan, numbering plan, charging plan.

UNIT-III: SIGNALLING TECHNIQUES (06 Periods)

In-channel signaling, common channel signaling, Network traffic load and parameters, grade of service and blocking probability.

UNIT-IV: DATA NETWORKS (12 Periods)

Data transmission in PSTNs, Switching techniques for data transmission, Motivation for ISDN, services, network and protocol architecture, transmission channels and user network interfaces, Signaling, numbering and addressing, ISDN standards, Broadband ISDN, Introduction to the basic principles of frame relay, ATM.

UNIT-V: ADVANCED TECHNOLOGIES (08 Periods)

DSL TECHNOLOGY: ADSL, Traditional Cable Networks, HFC Networks, Sharing, CM & CMTS and DOCSIS.

SONET: Devices, Frame, Frame Transmission, Synchronous Transport Signals, STS I, Virtual Tributaries.

Total Periods: 45

TEXT BOOKS:

1. Thyagarajan Viswanath, *Telecommunication Switching Systems and Networks*, PHI, 2008.
2. B.A. Forouzan, *Data Communication & Networking*, TMH, 4th Edition, 2006.

REFERENCE BOOKS:

1. Wayne Tomasi, *Advanced Electronic Communications systems*, Pearson Education, 6th Edition, 2004.
2. Achyut. S .Godbole*, Data Communications & Networks*, TMH, 2004.

III B.Tech. - II semester

(16BT60407) **DIGITAL CMOS IC DESIGN**

(Program Elective – 2)

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

PREREQUISITES:ACourses on VLSI Design.

COURSE DESCRIPTION:
Design styles and characteristics of CMOS digital circuits; Layout design rules; Memory design; Interconnect strategies; Design Methodologies.

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

CO1. Apply knowledge in
- CMOS Circuits
- MOS Layouts
- Memories
- Interconnects
- Methodologies

CO2. Analyze Problems in Interconnect Design.
CO3. Design optimized CMOS Circuits and develop the corresponding Stick Diagrams and Layouts.
CO4. Provide valid solutions to critical problems in CMOS Design.
CO5. Understand the limitations of techniques applied in CMOS design.
CO6. Create Solutions to reduce the power dissipation in CMOS devices for societal needs.

DETAILED SYLLABUS:

UNIT - I: CMOS CIRCUIT AND LOGIC DESIGN (08 Periods)
CMOS Logic Gate Design, CMOS Logic Structures, Clocking Strategies – 2 phase clocking, 4 phase clocking.

UNIT - II:LAYOUT DESIGN RULES (10 Periods)
Need for Design Rules, Stick diagrams, Physical Design of Logic Gates, Design Capture Tools, Design Verification Tools.

UNIT - III: SEMICONDUCTOR MEMORIES (10 Periods)

Classification of Memories, RAM array organization, DRAM – Types, Operation, Leakage currents in DRAM cell and refresh operation; SRAM - operation, Leakage currents in SRAM cells; Flash Memory- NOR Flash and NAND Flash.

UNIT - IV: INTERCONNECT AND CLOCKING STRATEGIES (09 Periods)

Interconnect Parameters – Capacitance, Resistance and Inductance; Electrical Wire Models, Timing classification of Digital Systems, Synchronous Design, Self-Timed Circuit Design.

UNIT - V:CMOSDESIGN METHODS (08 Periods)

Introduction, Design Flows, Design Strategies, Design Methods, Design Options, Design Economics, Data Sheets and Documentation.

Total Periods: 45

TEXT BOOKS:

1. Kamran Eshranghian, Douglas A.Pucknell and Sholeh Eshranghian, *Essential of VLSI Circuits and Systems*, PHI, 1st Edition, 2005.
2. Jan M Rabaey, *Digital Integrated Circuits-A Design Perspective*, Prentice Hall, 1stEdition, 1997.
3. Neil H. E. Weste, David Harris, Ayan Banerjee, *CMOS VLSI Design-A Circuit and Systems Perspective,* Pearson Education India, 3rd Edition, 2005.

REFERENCE BOOK:

1. Jacob Baker, *CMOS: Circuit Design, Layout, and Simulation*, Wiley IEEE Press, 3rd Edition, 2010.

III B.Tech. - II semester

(16BT60408) INFORMATION THEORY AND CODING

(Program Elective - 2)

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

PREREQUISITES: A Course on Digital Communications.

COURSE DESCRIPTION:
Information theory; Channel capacity; Linear block codes; Cyclic codes; Convolutional codes; Read-Solomon and Turbo codes.

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

CO1. Demonstrate knowledge in Information Theory, Channel Capacity and various error control coding technique.
CO2. Analyze complex engineering problems critically in the domain of information theory, source encoding techniques, channel capacity and error control coding.
CO3. Design various types of channel encoders, syndrome circuits and channel decoders.
CO4. Solve problems pertaining to entropy, source coding and channel coding.
CO5. Use appropriate source and channel coding techniques.
CO6. Apply source and channel coding techniques for providing optimal communication systems for societal use.

DETAILED SYLLABUS

UNIT I: INTRODUCTION (09 Periods)
Entropy: Discrete stationarysources, Markov sources, Entropy of a discrete Random variable- Joint, conditional, relative entropy, Mutual Information and conditional mutual information. Chain rules for entropy, relative entropy and mutual information, Differential Entropy - Joint, relative, conditional differential entropy and Mutual information.
Loss less Source coding: Uniquely decodable codes, Instantaneous codes, Kraft's inequality, optimal codes, Huffman code, Shannon's Source Coding Theorem.

UNIT II: CHANNEL CAPACITY (08 Periods)
Capacity computation for some simple channels, Channel Coding Theorem,Fano's inequality and the converse to the Coding

Theorem, Equality in the converse to the coding theorem,The joint source Channel Coding Theorem, The Gaussian channels-Capacity calculation for Band limited Gaussian channels, Parallel Gaussian Channels, Capacity of channels with colored Gaussian noise.

UNIT III: CHANNEL CODING-1 (07 periods)

LinearBlockCodes: Introduction to Linear blockcodes, GeneratorMatrix, SystematicLinearBlockcodes, Encoder Implementation of Linear Block Codes, Parity Check Matrix, Syndrometesting, Errorcorrection, Decoder Implementation of Linear Block Codes,Error Detecting and Correcting capability of Linear Block codes.

UNITIV: CHANNEL CODING-2 (11 Periods)

CyclicCodes: Algebraic Structure of Cyclic Codes, Binary Cyclic Code Properties, Encoding in Systematic Form, Systematic Encoding with an (n - k)-Stage Shift Register, Error Detection with an (n - k)-Stage Shift Register, Well-Known Block Codes-Hamming Codes, Extended Golay Code, BCH Codes.

ConvolutionalCodes: Convolution Encoding, Convolutional Encoder Representation, Formulation of the Convolutional Decoding Problem, Properties of Convolutional Codes, Sequential Decoding, Application of Viterbi and sequential decoding.

UNIT V: CHANNEL CODING-3 (11 Periods)

Reed-Solomon Codes- Reed-Solomon Error Probability, Finite Fields, Reed-Solomon Encoding, Reed-Solomon Decoding, Interleaving and Concatenated Codes- Block Interleaving, Convolutional Interleaving, Concatenated Codes. Coding and Interleaving Applied to the Compact Disc Digital Audio System- CIRC Encoding, CIRC Decoding. Turbo Codes-Turbo Code Concepts, Encoding with Recursive Systematic Codes, Feedback Decoder, The MAP Decoding Algorithm.

Total Periods: 46

TEXT BOOKS:

1. Thomas M. Cover and Joy A. Thomas, *Elements of Information Theory*, John Wiley & Sons,1st Edition, 1999.
2. Bernard Sklar, *Digital Communications – Fundamental and Application*, PearsonEducation, 2nd Edition, 2009.

REFERENCE BOOKS:

1. John G. Proakis, *Digital Communications*, McGraw Hill Publication, 5th Edition, 2008.
2. SHU LIN and Daniel J. Costello, Jr.,*Error Control Coding – Fundamentals and Applications*, Prentice Hall, 2nd Edition, 2002.

III B.Tech. - II semester

(16BT60409) **LIGHT WAVE COMMUNICATIONS**

(Program Elective - 2)

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

PREREQUISITES:
Courses on Engineering physics, Electronic devices and Circuits, Digital communications.

COURSE DESCRIPTION:
Ray theory; Single mode fibers; Fiber materials; Fiber losses; Optical sources and detectors; Power launching in to the fiber; Optical links; WDM.

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

CO1. Apply knowledge to understand
- Mode theory of optical communication.
- Losses in optical fibers.
- Optical sources and detectors.
- Power Launching and coupling techniques.
- Optical links.
- WDM concepts.
- Optical Networks.

CO2. Analyze Problems in analog and Digital Links.
CO3. Design and Develop Optical Sources, Detectors and Links.
CO4. Provide valid solutions to overcome losses in optical fibers.
CO5. Select appropriate optical components to suit advanced optical communications and Networks.
CO6. Assess and propose cost effective solutions to minimize the radiation hazards caused by wireless links.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION TO OPTICAL FIBER WAVEGUIDES (08 Periods)

The General System, Advantages of Optical Fiber Communications, Ray Theory of Transmission, Electromagnetic Mode Theory for Optical Propagation, Cylindrical Fiber. Single Mode Fibers, Fiber Materials, Fiber Fabrication, Mechanical Properties of Fibers, Fiber Optic Cables.

UNIT II: FIBER LOSSES (07 Periods)
Attenuation, Absorption, Scattering, Bending and Core & Cladding losses. Signal Distortion in Fibers - Pulse Broadening, Intramodal Dispersion, Intermodal Dispersion, Overall Fiber Dispersion in Multi Mode and Single Mode Fibers. Polarization.

UNIT III: OPTICAL SOURCES AND DETECTORS (11 Periods)
OPTICAL SOURCES: LED Structures, Light Source Materials, Quantum Efficiency and LED Power, Modulation of LED, Laser Diode Modes and Threshold Conditions, Laser Diode Rate Equations, External Quantum Efficiencies, Resonant Frequencies.
OPTICAL DETECTORS: Physical Principles of Photo Diodes, Photo Detector Noise, Detector Response Time, Avalanche Multiplication Noise, Structures for InGaAs & APDs, Temperature Effect on Avalanche Gain, Comparisons of Photo Detectors.

UNIT IV: POWER LAUNCHING AND COUPLING (07 Periods)
Source to Fiber Power Launching, Lensing Schemes for Coupling Improvement, Fiber-to-Fiber Joints, Fiber alignment and joint loss, LED coupling to single mode fibers, Fiber Splices, Fiber Connectors.

UNIT V: OPTICAL LINKS AND COMPONENTS (12 Periods)
DIGITAL LINKS: Point-to-Point Links, Power Penalties, Error Control.
ANALOG LINKS: Overview, Carrier to Noise Ratio, Multi-channel Transmission Techniques, RF over Fiber, Radio over Fiber Links.
NETWORKS: Introduction to WDM and Optical Networks.

Total Periods: 45

TEXT BOOK:
1. Gerd keiser, *Optical Fiber Communications*, McGraw Hill International, 4th Edition, 2009.

REFERENCE BOOKS:
1. Max Ming-Kang Liu, *Principles and Applications of Optical Communications*, TMH, 2010.
2. S.C.Gupta, *Optical Fiber Communication and its Applications*, PHI, 2011.

III B.Tech. - II semester

(16BT60410) **NANOELECTRONICS**

(Program Elective - 2)

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

PREREQUISITES:
Courses on Basic Engineering Physics, Basic Engineering Chemistry and Electronic Devices.

COURSE DESCRIPTION:
Basics of Nanoelectronics; Crystal structure of materials; Fabrication techniques and measurement of nanostructures; Nanoelectronic devices.

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

CO1. Demonstrate the basic knowledge in
- Nanoelectronics,
- Crystal structure of semiconducting material
- Various techniques for fabrication and measurement of nanostructure,
- Semiconducting nano electronic devices.

CO2. Analyze
- Crystal lattices and energy band diagram of semiconducting heterostructures of nanomaterials
- Energy states in nanomaterials.

CO3. Design and develop new semiconducting nano structures with the knowledge of density of states and electron transport.

CO4. Solve the problems related to fabrication of nanoelectronic devices.

CO5. Apply techniques of fabrication and measurement to create nanostructures.

CO6. Apply the ethical standards and legal issues while using chemical substances in fabricating nano device structures.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO NANOELECTRONICS (08 Periods)

The "Top-Down" Approach, Lithography, The "Bottom-Up" Approach; Importance of Nanoelectronics Nanotechnology Potential. The Schr'odinger wave equation, Wave mechanics of particles, Atoms and atomic orbitals.

UNIT – II: MATERIALS FOR NANOELECTRONICS
(09 Periods)

Semiconductors, Crystal lattices: bonding in crystals, Electron energy bands, Semiconductor heterostructures, Lattice-matched and pseudomorphic heterostructures; Organic semiconductors, Carbon nanomaterials: nanotubes and fullerenes.

UNIT – III: FABRICATION AND MEASUREMENT TECHNIQUES FOR NANOSTRUCTURES (10 Periods)

Bulk crystal and heterostructure growth: Nanolithography, etching, physical and chemical deposition for fabrication of nanostructures and nanodevices; Techniques for characterization of nanostructures, Spontaneous formation and ordering of nanostructures; Clusters and nanocrystals, Methods of nanotube growth, Chemical and biological methods for nanoscale fabrication, Fabrication of nanoelectromechanical systems.

UNIT – IV: SEMICONDUCTING NANO STRUCTURES
(09 Periods)

Time and length scales of the electrons in solids, Statistics of the electrons in solids and nanostructures; The density of states of electrons in nanostructures, Electron transport in nanostructures, Electrons in Quantum well, Quantum wire and Quantum dots.

UNIT – V: NANOELECTRONIC DEVICES (09 Periods)

Resonant tunneling diodes, Field effect transistors, Single electron transfer devices, Potential effect transistors, Light emitting diodes and lasers; Nanoelectromechanical system devices, Quantum dot cellular automata.

Total Periods:45

TEXT BOOKS:

1. Vladimir V. Mitin, Viatcheslav A. Kochelap, Michael A. Stroscio, *Introduction to Nanoelectronics: Science, Nanotechnology, Engineering, and Applications,* Cambridge University Press, 2012.
2. George W. Hanson, *Fundamentals of Nanoelectronics*, Prentice Hall, 2007.

REFERENCE BOOKS:

1. Mitin.V, Kochelap.V and Stroscio.M, *Introduction to Nanoelectronics*, Cambridge University Press, 2008.
2. Karl Goserl, Peter Glosekotter and Jan Dienstuhl, *Nanoelectronics and Nanosystems: From Transistors to Molecular and Quantum devices*, Springer, 2005.

III B.Tech. - II semester

(16BT60431) **DIGITAL COMMUNICATIONS LAB**

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

PREREQUISITES: Courses on Signal and Systems &Digital Communications .

COURSE DESCRIPTION:

Simulation and study of various Digital modulation and Demodulation schemes.

COURSE OUTCOMES:

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

CO1. Demonstrate knowledge in different Digital Communications.
CO2. Compare the characteristics of various Digital modulation schemes and analyze their performance.
CO3. Design various digital modulation and demodulation circuits and study their characteristics.
CO4. Solve problems pertaining to development of modulation schemes.
CO5. Use MATLAB tools for simulation of modulation schemes.
CO6. Function effectively as an individual and as a member in a group in the area of digital communications.
CO7. Communicate in verbal and written form in the area of digital communications.

LIST OF EXERCISES :

1. Verification of Sampling Theorem
2. Pulse code modulation and demodulation
3. Delta modulation and demodulation
4. FSK Modulation and demodulation
5. PSK Modulation and demodulation
6. DPSK Modulation and demodulation
7. QPSK Modulation and demodulation
8. Generation and Detection of PSK & DPSK signals using MATLAB
9. Generation and Detection of QPSK signal using MATLAB
10. Generation and Detection of DM and FSK signals using MATLAB
11. Generation of PCM and DPCM signals using MATLAB
12. Generation of TDM signal using MATLAB

III B.Tech. - II semester

(16BT60432) DIGITAL SIGNAL PROCESSING LAB

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

PREREQUISITES:A Course on Digital Signal Processing.

COURSE DESCRIPTION:
Implementation of Convolution; DFT and FFT; Design of Analog, Digital FIR and IIR filters.

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

CO1. Demonstrate Knowledge in transforms, FFT algorithm, FIR and IIR filters.
CO2. Analyze the characteristics of Digital and Analog filters such as IIR, FIR and signals using various techniques.
CO3. Design the FIR and IIR filters for feasible and optimal solutions in the core area of signal processing.
CO4. Solve engineering problems using filters in communication and allied areas.
CO5. Use CCS and MATLAB tools, techniques and resource for design of analog and digital filters with understanding of limitations.
CO6. Work individually and in a group effectively in the area of digital signal processing.
CO7. Communicate effectively in oral and written form in the area of digital signal processing.

LIST OF EXERCISES:

1. Verify linear convolution of aperiodic sequences using CCS on DSP processors and also verify using MATLAB.
2. Verify the circular convolution on Periodic sequences using CCS on DSP processors and also verify using MATLAB.
3. Verify N-point DFT & IDFT using CCS on DSP processors and also verify using MATLAB.
4. Verify N-point FFT algorithm using CCS on DSP processors and also verify using MATLAB.

5. Find the frequency response of analog Butterworth prototype filters (LP/HP/BP/BR) using MATLAB.
6. Find the frequency response of analog chebyshev prototype filters (LP/HP/BP/BR) using MATLAB.
7. Design FIR filter (LP/HP/BP/BR) using following windowing techniques with MATLAB
   A) rectangular window
   B) triangular window
8. Design FIR filter (LP/HP/BP/BR) using following windowing technique with MATLAB
   A) Hamming window
   B) Hanning window
   C) Blackman window
9. Design FIR filter (LP/HP/BP/BR) using Kaiser window with MATLAB.
10. Implement IIR Butterworth filter (LP/HP/BP/BR) using bilinear transformation techniques with MATLAB.
11. Implement IIR Chebyshev filter (LP/HP/BP/BR) using impulse-invariance transformation techniques with MATLAB.
12. Design of FIR filters using frequency sampling method with MATLAB.

III B.Tech. - II semester

(16BT60433) **SEMINAR**

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

PREREQUISITES: All the courses of the program up to III B. Tech. – I Semester.

COURSE DESCRIPTION:

Identification of topic for the seminar; Literature survey; Performing critical study and analysis of the topic identified; Preparation of report and presentation.

COURSE OUTCOMES:

Completion of the seminar work enables a successful student to demonstrate:

CO1. Knowledge on the seminar topic.
CO2. Analytical ability exercised during the seminar work.
CO3. Ability to investigate and solve complex engineering problems faced during theseminar work.
CO4. Ability to apply techniques to complex engineering activities with anunderstanding of limitations as applied in the seminar work.
CO5. Ability to function effectively as an individual as experienced during the seminar work.
CO6. Ability to present views cogently and precisely on the seminar topic.
CO7. Ability to engage in life-long leaning as experience during the seminar work.

IV B.Tech. - I semester

(16BT70401) CELLULAR AND MOBILE COMMUNICATIONS

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

PREREQUISITES: Courses on Analog and Digital Communications &Antennasand waveguides.

COURSE DESCRIPTION: Concepts of cellular systems; Lee-model for cellular coverage; Desired C/I; Interference and reduction techniques; Frequency management in cellular systems; Handoff techniques; Various modulation techniques and Multiple Access techniques; 2G Systems - GSM - IS-95; 3G systems - WCDMA - CDMA 2000.

COURSE OUTCOMES:

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

CO1. Demonstrate fundamental knowledge in
- Cellular systems
- Interference and cell coverage in Cellular systems
- Handoffs and Dropped calls
- Modulation techniques for cellular systems
- 2G and 3G Wireless communication systems
- Introduction to 4G

CO2. Analyze low interference cellular systems.

CO3. Design omni-directional and directional antenna systems.

CO4. Provide appropriate solution for various scenarios to overcome interference problems.

CO5. Select appropriate antennas to suit the requirements of advanced communication systems.

CO6. Assess and propose cost effective solutions for societal use and minimize the radiation hazards caused by wireless links.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO CELLULAR MOBILE SYSTEMS (10 Periods)

A basic cellular system, performance criteria, uniqueness of mobile radio environment, operation of cellular systems, planning a cellular system, overview of generations of cellular systems.

Elements Of Cellular Radio Systems Design:

General description of the problem, concept of frequency reuse channels, co-channel interference reduction factor, desired C/I from a normal case in an omni directional antenna system, cell splitting, consideration of the components of cellular systems.

UNIT-II: COCHANNEL AND NONCOCHANNEL INTERFERENCE (10 Periods)

Introduction to co-channel interference, Exploring co-channel interference areas in a system, Real time cochannel interference measurement, Design of different antenna systems, Lowering the antenna height, antenna parameters and their effects, Diversity Receiver, Types of Noncochannel Interference.

UNIT-III: CELL COVERAGE FOR SIGNAL AND ANTENNA STRUCTURES (08 Periods)

General introduction, obtaining the mobile point to point model, propagation over water or flat open area, foliage loss, propagation near in distance, long distance propagation, point to point prediction model – characteristics; Cell site antenna heights and signal coverage cells, mobile to mobile propagation, Characteristics of basic antenna structures, antenna at cell site, mobile antennas.

UNIT- IV: FREQUENCY MANAGEMENT AND CHANNEL ASSIGNMENT, HAND OFF AND DROPPED CALLS (06 Periods)

Frequency Management, fixed channel assignment, non-fixed channel assignment, traffic & channel assignment, Why hand off, types of handoff and their characteristics, dropped call rates & their evaluation.

UNIT-V: DIGITAL CELLULAR SYSTEMS (2G AND 3G SYSTEMS) (12 Periods)

Advantages of Digital systems, GSM: , North American TDMA - Architecture, Transmission and modulation, Time alignment and Limitation of Emission, Error corrections, Interleaving and coding, Channels, Enhanced NA-TDMA; CDMA - Output power limits and control-modulation characteristics, Joint detection, call processing; Introduction to 3G, WCDMA-UMTS Physical layer, WCDMA TDD Physical Layer; Overview of CDMA 2000 - Physical layer; Introduction to 4G.

Total Periods: 46

TEXT BOOKS:

1. William C. Y. Lee*, Mobile Cellular Telecommunications*, McGraw Hill, 2nd Edition, 1990.
2. William C. Y. Lee, *Wireless & Cellular Telecommunications*, McGraw Hill, 3rd Edition, 2006.

REFERENCE BOOKS:

1. Theodore S Rappaport, *Wireless Communication Principles and Practice*, Pearson Education, 2nd Edition, 2002.
2. Lawrence Harte*, 3G Wireless Demystified*, McGraw Hill Publications, 2001.

IV B.Tech. - I semester

(16BT70402) **EMBEDDED SYSTEMS**

(Common to EEE, ECE & CSSE)

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

PREREQUISITES:
Courses on Switching Theory and Logic Design, Microprocessors and Microcontrollers.

COURSE DESCRIPTION:
Embedded system design approaches; MSP430 Architecture; Instruction Set; On-Chip Resources; Programming; Communication with peripherals; Internet of Things related Issues.

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

CO1. Apply knowledge in
- MSP430 Architecture, Pin out, Instruction set
- High level programming
- Usage of On-chip resources like ADC, DAC, Timers
- Internet of Things related issues

CO2. Analyze various design issues regarding
- Usage of on chip resources
- Low power modes
- Communication support

CO3. Design embedded systems using MSP430 series microcontrollers to suit market requirements.

CO4. Solve engineering problems and arrive at solutions in designing embedded systems to support interconnectivity.

CO5. Apply techniques, program skills, On-Chip resources to design networked embedded systems with an understanding of limitations.

CO6. Reason out and practice professional engineering to deliver efficient and costeffective embedded based products to society.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO EMBEDDED SYSTEMS **(09 Periods)**

Embedded Systems - Definition, Approaches, Applications, Anatomy of microcontroller, Memory, Software; MSP430 Introduction- Pin out, Functional Block diagram, Memory, CPU, Memory mapped input and output, Clock generator; Exceptions- Interrupts and Resets.

UNIT - II: ARCHITECTURE OF MSP430 (09 Periods)

CPU, Addressing Modes, Constant Generator and Emulated Instructions, Instruction Set, Example programs, Reflections on CPU and Instruction set, Resets, Clock System.

UNIT - III: FUNDAMENTALS FOR PROGRAMMING (09 Periods)

Development Environment, C Programming Language, Assembly Language, Programming and Debugging, Sample programs- Light LEDs in C, Read input from a switch; Automatic Control-Flashing light by delay, use of subroutines, using Timer_A; Header files and issues, Functions, Interrupts and Low power modes.

UNIT - IV: TIMERS, MIXED SIGNAL SYSTEMS AND COMMUNICATION (09 Periods)

Timers - Watchdog Timer, RTC, Measurement in capture mode; Mixed-Signal Systems- Comparator_A, ADC10 Architecture & operation, ADC12, Sigma-Delta ADC Architecture & operation, DAC; Communication- Communication Peripherals in MSP430, SPI, Inter-integrated Circuit Bus, Asynchronous communication with the USCI_A.

UNIT - V: HARDWARE SOFTWARE CO-DESIGN AND INTERNET OF THINGS (09 Periods)

CO- Design Issues: Co-design Models, Architectures, Languages, a Generic Co-design Methodology

IOT: Introduction, Origins, Drivers and Applications, IOT Communication Models - Device to Device, Device to Cloud, Device to Gateway, Back end Data Sharing Model; IPV6 and IOTs', IOT Issues, Security Issues-challenges; Privacy Considerations, Interoperability/Standards.

Total Periods: 45

TEXT BOOKS:

1. John H. Davies, *MSP430 Microcontroller Basics*, Newnes Publications, 2008.
2. Karen Rose, Scott Eldridge, Lyman Chapin, *The Internet of Things: An Overview: Understanding the Issues and Challenges of a More Connected World, Internet Society*, Oct. 2015.
3. Jorgen Staunstrup, Wayne Wolf, *Hardware/software co-design Principles and Practice*, Springer, 2009.

REFERENCE BOOK:

1. Chris Nagy, *Embedded Systems Design using the TI MSP30 Series*, Newnes Publications, 2003.

IV B.Tech. - I semester

(16BT70403) **MICROWAVE ENGINEERING**

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

PREREQUISITES: A course on Electromagnetic Theory and Transmission Lines.

COURSE DESCRIPTION: Wave Propagation; Waveguide components; Microwave tubes; Microwave solid state devices; and Microwave measurements.

COURSE OUTCOMES:

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

CO1. Demonstrate knowledge in
- Wave Propagation
- Microwave Components
- Microwave Tubes
- Microwave Measurements

CO2. Analyze the Performance of Microwave components and Microwave Tubes.

CO3. Design microwave components such as hybrid junctions, ferrite devices, and phase shifters.

CO4. Solve problems pertaining to microwave junctions and waveguide components.

CO5. Use appropriate resources to solve the problems related to microwave communication systems.

CO6. Use various microwave components like phase shifters, attenuators and tubes to model a communication system for societal needs.

DETAILED SYLLABUS:

UNIT-I: MICROWAVE COMPONENTS (10 Periods)

Introduction, Microwave spectrum and bands, applications of Microwaves, Scattering Matrix- Significance, Formulation and properties. S Matrix calculations for 2-port junction, Waveguide multiport junctions-E plane and H plane Tees, Magic Tee, Directional coupler; Ferrites- composition and characteristics, Faraday rotation, ferrite components –Isolator and Circulator. Waveguide discontinuities – waveguide Windows, tuning screws and posts, matched loads; Coupling mechanisms- probe, loop. Waveguide attenuators- resistive card, rotary vane Attenuators, waveguide phase shifters - dielectric, rotary vane phase shifters; Illustrative problems.

UNIT-II: MICROWAVE SOURCES (10 Periods)
Limitations and losses of conventional tubes at microwave frequencies.Classification of Microwave tubes.Two cavity klystron (Only Qualitative Treatment). Reflex Klystrons - structure, Velocity Modulation, Applegate diagram, mathematical theory of bunching, power output, efficiency, oscillating modes and O/P characteristics. Slow wave structures; structure of Helix TWT and amplification process. Magnetrons - different types, cylindrical travelling wave magnetron – Hull cutoff and Hartree conditions, Illustrative Problems.

UNIT-III: MICROWAVE SOLID STATE DEVICES (08 Periods)
Introduction, classification, applications, Transfer Electronic Devices, Gunn diode- principles, RWH theory, characteristics, basic modes of operation – Gunn oscillation modes, LSA Mode; Transit-Time Devices – IMPATT, TRAPATT and BARITT.

UNIT-IV: MICROWAVE MEASUREMENTS (08 Periods)
Description of Microwave bench –different blocks and their features, errors and precaution; Microwave power measurement- Bolometer method, Measurement of attenuation, frequency, low and high VSWR, Q of the cavity and impedance measurements.

UNIT-V: WAVE PROPAGATION (09 Periods)
Introduction, Modes of wave propagation, Ground wave propagation, Space wave propagation - Introduction, field strength variation with distance and height, effect of earth's curvature, absorption; Super refraction, M-curves and duct propagation, scattering phenomena, troposphere propagation, fading. Sky wave propagation-Introduction, structure of Ionosphere, refraction and reflection of sky waves by Ionosphere, Ray path, Critical frequency, MUF, LUF, OF, Virtual height and Skip distance, Relation between MUF and Skip distance, Multi-Hop propagation.

Total Periods: 45

TEXT BOOKS:

1. Samuel Y. Liao, *Microwave devices and circuits*, Pearson Education, 3rd Edition, 2003.
2. John D. Kraus and Ronald J. Marhefka and Ahmad S.Khan, *Antennas and wave propagation*, 4th Edition (special Indian Edition), TMH, New Delhi, 2010.

REFERENCE BOOKS:

1. F.E. Terman, *Electronic and Radio Engineering*, McGraw-Hill, 4th Edition, 1955.
2. Annapurna Das and Sisir K Das, *Microwave Engineering, McGraw-Hill*, 2nd Edition, 2009.
3. M.Kulkarni, *Microwave and Radar Engineering*, Umesh Publications, 3rd Edition, 2008.

IV B.Tech. - I semester

(16BT70404) ADVANCED DIGITAL SIGNAL PROCESSING

(Program Elective - 3)

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

PREREQUISITES: ACourse on Digital Signal Processing

COURSE DESCRIPTION:
Digital filter banks; Parametric and Non-Parametric Power Spectrum Estimation methods; Computationally efficient algorithms; Applications of DSP.

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

CO1. Apply knowledge in
- Filter banks and Wavelets
- Linear Prediction
- Efficient power Spectral Estimation Techniques.
- Applications of Multirate signal processing

CO2. Analyze complex engineering problems in the Power Spectrum Estimation,Sampling rate conversion and Linear Prediction.

CO3. Design optimum filters, multirate DSP systems and computationally efficient DSP algorithms.

CO4. Solve Engineering problems pertaining to Digital Signal Processing.

CO5. Apply DSP Algorithms, and algorithms related to Forward and Backward Prediction in digital system design with an understanding of the limitations.

CO6. Apply computationally efficient DSP Algorithms, Optimum Filters and perfect reconstruction filters to address societal issues in multirate signal processing andcommunications.

DETAILED SYLLABUS:

UNIT-I: MULTIRATE FILTER BANKS (10 Periods)

Decimation, Interpolation, Sampling rate conversion by a rational factor I/D, Multistage Implementation of sampling rate conversion.

Digital Filter Banks: Two-Channel Quadrature-Mirror Filter Bank, Elimination of aliasing, condition for Perfect Reconstruction, Polyphase form of QMF bank, Linear phase FIR QMF bank, IIR QMF bank, Perfect Reconstruction Two-Channel FIR QMF Bank .

UNIT-II: POWER SPECTRAL ESTIMATIONS (09 Periods)

Estimation of spectra from finite duration observation of signals. **Non-ParametricMethods**: Bartlett, Welch, Blackman &Tukey methods. Performance Characteristics of Non parametric Power Spectrum Estimators, Computational Requirements of Non parametric Power Spectrum Estimates.

Parametric Methods of Power Spectral Estimation:

Autocorrelation & Its Properties, Relationship between autocorrelation &model parameters, Yule-walker &Burg Methods, MA &ARMA models for power spectrum estimation.

UNIT-III: LINEAR PREDICTION (09 Periods)

Forward and Backward Linear Prediction – Forward Linear Prediction, Backward Linear Prediction, Optimum reflection coefficients for the Lattice Forward and Backward Predictors. Solution of the Normal Equations: Levinson Durbin Algorithm, Schur Algorithm. Properties of Linear Prediction Filters.

UNIT-IV: DSP ALGORITHMS (08 Periods)

Fast DFT algorithms based on Index mapping, Sliding Discrete Fourier Transform, DFT Computation Over a narrow Frequency Band, Split Radix FFT, Linear filtering approach to Computation of DFT using Chirp Z-Transform.

UNIT-V: APPLICATIONS OF DIGITAL SIGNAL PROCESSING (09 Periods)

Digital cellular mobile telephony, Adaptive telephone echo cancellation, High quality A/D conversion for digital Audio, Efficient D/A conversion in compact hi-fi systems, Acquisition of high quality data, Multirate narrow band digital filtering, High resolution narrowband spectral analysis.

Total Periods: 45

TEXT BOOKS:

1. John G. Proakis, Dimitris G. Manolakis, *Digital signal processing, principles, Algorithms and applications*, Prentice Hall, 4th Edition, 2007.
2. Sanjit K Mitra, *Digital signal processing, A computer base approach*, McGraw-Hill Higher Education, 4th Edition, 2011.

REFERENCE BOOKS:

1. Emmanuel C Ifeachor Barrie. W. Jervis, *DSP-A Practical Approach*, Pearson Education, 2nd Edition, 2002.
2. A.V. Oppenheim and R.W. Schaffer, *Discrete Time Signal Processing*, PHI, 2nd Edition, 2006.

IV B.Tech. - I semester

(16BT70405) **MIXED SIGNAL DESIGN**

(Program Elective - 3)

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

PREREQUISITES: A course on VLSI Design.

COURSE DESCRIPTION:
Switched Capacitor Circuits; PLLs; Nyquist Rate Data Converters.

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

CO1. Demonstrate knowledge in
- Switched Capacitor Circuits
- PLL
- Data Converters – ADC and DAC.

CO2. Analyze non-ideal effects of switched capacitor circuits and PLLs.

CO3. Design and Develop Switched Capacitor Circuits, PLLs and Data Converters.

CO4. Solve problems by using alternate data converters to compensate performance limitations.

CO5. Apply appropriate techniques to improve the performance of data converters.

CO6. Understand the impact of mixed signal design for societal needs.

DETAILED SYLLABUS:

UNIT - I: SWITCHED CAPACITOR CIRCUITS (07 Periods)
Introduction to Switched Capacitor circuits- basic building blocks, Basic Operation and Analysis - Resistor equivalance of switched capacitor, Parasitic sensitive integrator, parasitic insensitive integrator, signal flow graph analysis; Non-ideal effects in switched capacitor circuits.

UNIT - II: PHASED LOCK LOOP (08 Periods)
Simple PLL - Phase detector, Basic PLL topology, Dynamics of simple PLL; Charge pump PLLs - Problem of Lock acquisition, Phase/Frequency detector and charge pump; Non-ideal effects in PLLs.

UNIT - III: DATA CONVERTER FUNDAMENTALS (07 Periods)
Introduction to data converters, Ideal D/A converter, Ideal A/D converter, Quantization noise, Signed codes, performance limitations.

UNIT - IV: NYQUIST RATE D/A CONVERTERS (11 Periods)
Decoder based Converters - resistor string converters, folded resistor string converters, multiple R-string converters, signed outputs; Binary-Scaled converters - binary weighted resistor converters, reduced resistance ratio ladders, R-2R Based converters, charge- redistribution switched capacitor converters,current mode converters; Thermometer-code converters, Hybrid converters.

UNIT - V: NYQUIST RATE A/D CONVERTERS (12 Periods)
Successive approximation converters, Flash converter, Two-step A/D converters, Folding A/D converters, Pipelined A/D converters, Time-Interleaved Converters

Total Periods: 45

TEXT BOOKS:

1. David A. Johns, Ken Martin, *Analog Integrated Circuit Design,* Wiley Student Edition, 1997.
2. Behzad Razavi, *Design of Analog CMOS Integrated Circuits*, Tata McGraw Hill, 2008.

REFERENCE BOOKS:

1. Rudy Van De Plassche, *CMOS Integrated Analog-to-Digital and Digital-to-Analog converters*, Kluwer Academic Publishers, 2007.
2. R. Jacob Baker, *CMOS Mixed-Signal Circuit Design*, Wiley Interscience, 2014.

IV B.Tech. - I semester

(16BT70406) SATELLITE COMMUNICATIONS

(Program Elective - 3)

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

PREREQUISITES: Courses on Analog Communications and Digital Communications.

COURSE DESCRIPTION: Orbital Aspects; Satellite Subsystems; Satellite Link Design; Earth Station Technology; Multiple Access; Orbit Considerations; Global Positioning System.

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

CO1. Demonstrate knowledge in
- Basic concepts of satellite communications
- Satellite Orbits and Sub-Systems
- Satellite link design
- Earth station subsystems
- FDMA,TDMA,CDMA
- Geostationary and non-geostationary satellite systems
- Satellite navigation and global positioning system.

CO2. Identify and analyze critical engineering problems in the field of satellitesubsystem design.

CO3. Design efficient uplink and downlink satellite subsystems.

CO4. Solve engineering problems with feasible and economical solutions during satellite systems link design.

CO5. Apply appropriate and efficient techniques of multiple accessing and spread spectrum while designing satellite subsystems.

CO6. Develop solutions following IEEE, ITU and FCC standards in the field of satellite communications.

DETAILED SYLLABUS :

UNIT-I: INTRODUCTION, ORBITAL MECHANICS AND LAUNCHERS (10 Periods)

Origin of Satellite Communications, Historical Background, Basic Concepts of Satellite Communications, Frequency Allocations for Satellite Services, Applications, Future Trends of Satellite. Orbital Mechanics, Kepler's Laws of planetary motion, Look Angle Determination, Orbital Perturbations, Orbit Determination, Launches and Launch Vehicles, Orbital Effects in Communication Systems Performance.

UNIT-II: SATELLITE SUBSYSTEMS AND SATELLITE LINK DESIGN (10 Periods)

Satellite Subsystems - Attitude and Orbital Control System, Telemetry, Tracking, Command and Monitoring, Power Systems, Communication Subsystems, Satellite Antennas.Equipment Reliability and Space Qualification. Basic Transmission Theory, System Noise Temperature and G/T ratio, Design of Uplink and Down Links, Design of Satellite Links for specified C/N, System Design examples.

UNIT-III: EARTH STATION SUBSYSTEMS AND MULTIPLE ACCESS (09 Periods)

EARTH STATION: Introduction, Transmitters, Receivers, Antennas, Tracking Systems, **MULTIPLE ACCESS:** Frequency Division Multiple Access (FDMA), Intermodulation, Calculation of C/N, Time Division Multiple Access (TDMA) Frame Structure, examples. Satellite Switched TDMA Onboard Processing, DAMA, Code Division Multiple Access (CDMA), Spread Spectrum Transmission and Reception.

UNIT-IV: LOW EARTH ORBIT AND NON-GEOSTATIONARY SATELLITE SYSTEMS (08 Periods)

Orbit Consideration, Coverage and Frequency Considerations, Delay and Throughput Considerations, System Considerations, Operational NGSO Constellation Designs and comparisons.

UNIT-V: SATELLITE NAVIGATION AND THE GLOBAL POSITIONING SYSTEM (09 periods)

Radio and Satellite Navigation, GPS Position Location Principles, GPS Receivers and Codes, Satellite Signal Acquisition, GPS Navigation Message, GPS Signal Levels, Timing Accuracy, GPS Receiver Operation, GPS C/A Code Accuracy, Differential GPS.

Total Periods: 46

TEXT BOOKS:

1. Timothy Pratt, Charles W Bostian and Jeremy E Allnutt, WSE, *Satellite Communications,* Wiley publications, 2nd Edition, 2003.
2. Dennis Roddy, *Satellite communications,* McGraw Hill, 4th Edition, 2009.

REFERENCE BOOKS:

1. Wilbur L.Pritchard, Henri G.Suyderhoud and Robert A. Nelson, *Satellite CommunicationsEngineering,* Pearson Publications, 2nd Edition, 2008.
2. D.C. Agarwal, *Satellite communications,* Khanna Publications, 7th Edition, 2009.

IV B.Tech. - I semester

(16BT70407) WIRELESS COMMUNICATIONS AND NETWORKS

(Program Elective - 3)

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

PREREQUISITES: A Course on Computer Networks.

COURSE DESCRIPTION:
Multiple Access techniques; Concepts of Wired and Wireless networks; operation of Mobile IP; Wireless Application Protocol; Architecture of Wireless LAN; Layered architecture of Bluetooth; High speed data networks.

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

CO1. Apply knowledge to understand
- Routing in wireless networks.
- Various protocols for Wireless networks.
- Various wireless LAN technologies.
- Bluetooth
- Architectures of various Wireless Data Networks.

CO2. Analyze various protocols related to wireless networks.

CO3. Design and Develop innovative techniques for implementation of high performance networking.

CO4. Provide valid solutions to overcome challenges in wireless networks.

CO5. Apply appropriate techniques to solve complex engineering problems in wireless networking domain.

CO6. Apply standards in area of wireless networking.

DETAILED SYLLABUS:

UNIT-I: WIRELESS NETWORKING AND DATA SERVICES (15 Periods)

Introduction, Difference between Wireless and Fixed Telephone Networks, Development of Wireless Networks, FDMA, TDMA, Spread Spectrum Multiple Access techniques, Capture Effect in Packet Radio, Traffic Routing in Wireless Networks. CDPD, ARDIS, RMD, Common Channel Signaling, ISDN, Broadband ISDN and ATM, SS7.

UNIT-II: MOBILE IP AND WIRELESS APPLICATION PROTOCOL (11 Periods)

Operation of mobile IP, Discovery, Co-located address, Registration, Tunneling, WAP Architecture, overview, WML, WML scripts.

WAPprotocol stack: Wireless Application Environment, Wireless session Protocol, Wireless Transaction Protocol, Wireless Transport Layer Security Protocol and Wireless Datagram Protocol.

UNIT-III: WIRELESS LAN TECHNOLOGY (11 Periods)

Overview, WLAN Requirements, Infrared LANs, Spread Spectrum LANs, Narrow Band Microwave LANs, IEEE 802 Protocol Architecture, IEEE802.11 Architecture and Services, 802.11 Medium Access Control, 802.11 Physical Layer. Wi-Fi and Introduction to WiMAX.

UNIT-IV: BLUETOOTH (08 Periods)

Overview, Radio Specification, Base band Specification, Links Manager Specification, Logical Link Control and Adaptation Protocol.WLL Technology.

UNIT-V: MOBILE DATA NETWORKS (10 Periods)

Introduction, Data oriented CDPD Network, GPRS and higher Data Rates, Short Messaging Service in GSM, Mobile Application Protocol. Wireless ATM, HIPER LAN - Architecture, Physical Model, Layers and Security.

Total Periods: 45

TEXT BOOKS:

1. Theodore S. Rappaport, *Wireless Communications,* 2nd Edition, PHI, 2008.
2. William Stallings, *Wireless Communications and Networks,* 2nd Edition, Pearson Education, 2007.
3. Kaveh Pahlavan and Prashant Krishna Murthy, *Principles of Wireless Networks,* PHI, 2005.

REFERENCE BOOKS:

1. Kamilo Feher, *Wireless Digital Communications,* PHI, 2001.
2. Andreaws F. Molisch, *Wideband Wireless Digital Communications,* Pearson Education, 2002.
3. Dharma Prakash Agarwal, Qing-An Zeng, *Introduction to Wireless and Mobile Systems,* 2nd Edition, Thomson, 2006.
4. Gordon L. Stuber, *Principles of Mobile Communications,* 2nd Edition, Springer International, 2007.

IV B.Tech. - I semester

(16BT70408) **LOW POWER CMOS VLSI DESIGN**

(Program Elective - 4)

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

PREREQUISITES:A Course on VLSI Design.

COURSE DESCRIPTION:
Basic Principles; Methodologies and techniques of CMOS Circuit Designs; Need For Low Power VLSI Design; Principles Of Low Power Circuit Design; Simulation Analysis of Low Power; Logic and Circuit Analysis; Special Techniques Of Low Power Design; Performance Management in Architecture or System level.

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

CO1. Demonstrate knowledge in
- Design of logic Circuits for low power Requirements
- Power Estimation
- Low power architecture & systems
- Low Power Methodologies & Techniques.

CO2. Analyze complex problems in the domain of low power devices, CMOS Circuits, effects and related issues.

CO3. Design low power circuits to negotiate various constraints such as area, speed and power.

CO4. Solve problems using relevant methods to synthesize Low power CMOS Circuits.

CO5. Apply special techniques in evaluating the performance of low power CMOS devices.

CO6. Contribute positively towards societal issues and responsibilities in designing and developing Low Power Integrated Circuits.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO LOW POWER VLSI DESIGN **(07 Periods)**

Needs For Low Power VLSI Chips, Charging And Discharging Capacitances, Short Circuit Current in CMOS, CMOS Leakage Current, Static Current, Basic Principles Of Low Power Design, Low Power Figure Of Merits.

UNIT-II: POWER ANALYSIS AND ESTIMATION (10 Periods)
Spice Circuit Simulation, Discrete Transistor Modeling and Analysis, Gate Level Logic Simulation, Architecture Level Analysis, Data Correlation Analysis, Monte Carlo Simulation.

UNIT-III: LOW POWER CIRCUITS (11 Periods)
Circuit Analysis:
Transistor and Gate Sizing, Equivalent Pin Ordering, Network Restructuring and Reorganization, Special latches and Flip flops.
Logic Analysis:
Gate Reorganization, Signal Gating, Logic Encoding, State Machine Encoding, Pre computation Logic.

UNIT-IV: SPECIAL TECHNIQUES (08 Periods)
Power Reduction in Clock Networks, CMOS Floating Node, Low Power Bus, Delay Balancing,Low Power Techniques for SRAM.

UNIT-V: ARCHITECTURE AND SYSTEM (09 Periods)
Power and Performance Management, Switching Activity Reduction, Parallel Architecture with Voltage Reduction, Flow Graph Transformation.

Total Periods: 45

TEXT BOOK:
1. Gary Yeap, *Practical Low-Power Digital VLSI Design*, Springer Publication, 1998.

REFERENCE BOOKS:
1. A.P.Chandrakasan, R.W.Broadersen, *Low Power Digital CMOS Design*, Kluwer, 1995.
2. Kaushik Roy, Sharat Prasad, *Low-Power CMOS VLSI Circuit Design*, Wiley Student Edition, 2000.

IV B.Tech. - I semester

(16BT70409) **RF ENGINEERING**

(Program Elective - 4)

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

PREREQUISITES: Courses on Basic Electronics and Wave Theory

COURSE DESCRIPTION:
Concepts of transmission line theory; RF Electronics; high frequency circuit behavior; design of tuning and matching networks; RF Passive and active components; RF Transistor amplifier design; Oscillators and RF Mixers.

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

CO1. Understand basics of RF Electronics and transmission lines.
CO2. Analyze Transmission lines, Matching and biasing networks.
CO3. Design Matching and biasing networks, RF passive and active components, and RFtransistor amplifiers.
CO4. Solve problems in transmission lines, filters, oscillators and Mixers.
CO5. Apply appropriate Oscillators, Mixers and components to RF Circuit design.
CO6. Apply RF electronics in the field of wireless communication systems and allied areasfor societal use.

DETAILED SYLLABUS

UNIT – I: INTRODUCTION TO RF ELECTRONICS (10 Periods)

The Electromagnetic Spectrum, units and Physical Constants, Microwave bands, RF behavior of Passive components: Tuned resonant circuits, Vectors, Inductors and Capacitors. Voltage and Current in capacitor circuits, Tuned RF / IF Transformers.

UNIT – II: TRANSMISSION LINE ANALYSIS (10 Periods)

Examples of transmission lines, Transmission line equations and Biasing: Kirchoffs Voltage and current law representation, Traveling voltage and current waves, General Impedance definition, lossless transmission line model. Micro Strip Transmission Lines, Special Termination Conditions, sourced and Loaded Transmission Lines.

Single And Multiport Networks: The Smith Chart, Interconnectivity networks, Network properties and Applications, Scattering Parameters.

UNIT -III: MATCHING AND BIASING NETWORKS (10 Periods)

Impedance matching using discrete components, Micro strip line matching networks, Amplifier classes of Operation and Biasing networks.

RF Passive & Active Components: Filter Basics, Lumped filter design, Distributed Filter Design, Diplexer Filters, Crystal and Saw filters, Active Filters, Tunable filters. Power Combiners / Dividers: Directional Couplers, Hybrid Couplers, Isolators. RF Diodes: BJTs, FETs, HEMTs and Models.

UNIT – IV: RF TRANSISTOR AMPLIFIER DESIGN (09 Periods)

Characteristics of Amplifiers, Amplifier Circuit Configurations, Amplifier Matching Basics, Distortion and noise products, Stability Considerations, Small Signal amplifier design, Power amplifier design, MMIC amplifiers, Broadband High Power multistage amplifiers, Low noise amplifiers, VGA Amplifiers.

UNIT – V: OSCILLATORS and Mixers (09 Periods)

Oscillator basics, Low phase noise oscillator design, High frequency Oscillator configuration, LC Oscillators, VCOs, Crystal Oscillators, PLL Synthesizer, and Direct Digital Synthesizer.

RF Mixers: Basic characteristics of a mixer, Active mixers, Image Reject and Harmonic mixers, Frequency domain considerations.

Total Periods: 48

TEXT BOOKS:

1. Reinhold Ludwing, Pavel Bretchko, *RF Circuit design: Theory and applications*, Pearson Education Asia Publication, New Delhi 2001.
2. Joseph Carr, *Secrets of RF Design*, Tata McGraw Hill Publications, 3rd Edition, 2004.

REFERENCE BOOKS:

1. Devendra K. Misra, *Radio Frequency and Microwave Communication Circuits – Analysis and Design,* Wiley Student Edition, John Wiley & Sons, 2nd Edition, July 2004.
2. Christopher Bowick, Cheryl Aljuni and John Biyler,*RF Circuit Design*, Elsevier Science, 2008.
3. Mathew M.Radmangh, *Radio frequency and microwave electronics*, PE Asia Publication, 2001.

IV B.Tech. - I semester

(16BT70410) **SPEECH PROCESSING**

(Program Elective - 4)

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

PREREQUISITES: Courses on Signals and Systems & Digital Signal Processing

COURSE DESCRIPTION:
Acoustic Theory of speech production; model for speech signals and speech processing systems; Mathematical analysis of speech signal - Homomorphic and LPC models; Speech and Speaker recognition systems.

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

CO1. Demonstrate fundamental knowledge in
- Digital Model representation of speech signal
- STFT analysis
- LPC analysis
- Homomorphic models.

CO2. Analyze speech signal using homomorphic and linear predictive techniques.
CO3. Design efficient algorithms for feasible and optimal solutions in speech processing.
CO4. Synthesize features of speech signals to solve the problems in designing of speech and speaker recognition system.
CO5. Apply appropriate techniques and approaches to analyze and synthesis speech signals with an understanding of limitations.
CO6. Use speaker recognition system for societal needs.

DETAILED SYLLABUS:

UNIT-I: DIGITAL MODEL FOR THE SPEECH SIGNAL **(10 Periods)**

The process of speech production - the mechanism of speech production, acoustic phonetics. The Acoustic theory of speech production- sound propagation, uniform lossless tubes, Effect of losses in the vocal tract, Effect of radiation at the lips, Vocal tract transfer functions for vowels, the effect of nasal coupling, Excitation of sound in the vocal tract. Digital models for speech signals.

UNIT II: TIME DOMAIN MODELS FOR SPEECH PROCESSING
(09 Periods)

Introduction, Window considerations, Short time energy and average magnitude, Short time average zero crossing rate, Speech vs silence discrimination using Average energy and zero crossing, Pitch period estimation using parallel processing approach, The short time autocorrelation function, The short time average magnitude difference function, Pitch period estimation using the autocorrelation function.

UNIT-III: HOMOMORPHIC SPEECH PROCESSING
(09 Periods)

Short time Fourier transform: Definition, Fourier transform interpretation, linear filter interpretation, Filter Bank summation method, Overlap Addition method. Homomorphic systems for convolution – properties of the complex Cepstrum, computational considerations. The complex Cepstrum of speech, pitch detection, formant estimation, Homomorphic vocoder.

UNIT-IV: LINEAR PREDICTIVE CODING OF SPEECH
(10 Periods)

Basic principles of linear predictive analysis – Auto correlation method, The covariance method. Computation of the gain for the model, solution of LPC Equations – Cholesky Decomposition solution for the covariance method. Durbin's Recursive solution for the autocorrelation equations.Comparison between methods of solutions of LPC analysis equations.Applications of LPC parameters – Pitch detection using LPC parameters, Formant analysis using LPC parameters.

UNIT-V: SPEECH AND SPEAKER RECOGNITION SYSTEMS
(08 Periods)

Speaker Verification vs. recognition, features that distinguish speaker, Speaker recognition system-speaker verification system, speaker identification systems.
Basic pattern recognition approaches, parametric representations of Speech recognition, Speech recognition system- isolated digit recognition system, continuous digit recognition system, LPC distance measure.

Total Periods: 46

TEXT BOOK:

1. L R Rabiner and SW Schafer, *Digital processing of speech signals*, Pearson Education, 2006.

REFERENCE BOOKS:

1. Douglas O Shaughnessy, *Speech Communications*, Oxford University Press, 2nd Edition, 2000
2. L R Rabiner, BH Juang, B Yegnanarayana, *Fundamentals of Speech Recognition*, Pearson Education, 2009.

IV B.Tech. - I semester

(16BT70411) SPREAD SPECTRUM COMMUNICATIONS

(Program Elective - 4)

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

PREREQUISITES: A Course on Digital Communications.

COURSE DESCRIPTION: Fundamentals of spread spectrum systems; Analysis of spread spectrum systems; Detection of spread spectrum signals; Applications of spread spectrum to communications.

COURSE OUTCOMES:

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

CO1. Demonstrate knowledge in various types of spread spectrum techniques, generation and detection of spread spectrum signals and their applications in communications.
CO2. Analyze problems in direct sequence and avoidance-type spread spectrum systems.
CO3. Consider design and development issues in spread spectrum communication systems.
CO4. Solve engineering problems pertaining to spread spectrum communications.
CO5. Apply spread spectrum techniques to communications.
CO6. Apply engineering standards to meet the responsibilities and norms of engineering practice.

DETAILED SYLLABUS:

UNIT-I: FUNDAMENTALS OF SPREAD SPECTRUM SYSTEMS (07 Periods)

General concepts, Direct sequence (DS), Frequency Hopping (FH), Time Hopping (TH), Comparison of modulation methods, Hybrid spread spectrum systems, Chirp spread spectrum.

UNIT-II: ANALYSIS OF DIRECT SEQUENCE SPREAD SPECTRUM SYSTEMS (09 Periods)

Properties of Pseudo noise (PN) sequences, m-sequences and their properties, Partial Correlation, PN signal from PN sequences, Partial correlation of PN signals, The PN Signal, De-spreading the PN signal, Interference rejection, Output signal to noise ratio, Anti-jam characteristics, Interception, Energy bandwidth efficiency.

UNIT-III: ANALYSIS OF AVOIDANCE – TYPE SPREAD SPECTRUM SYSTEMS & GENERATION OF SPREAD SPECTRUM SIGNALS (07 Periods)

Analysis of avoidance – type spread spectrum systems: Thefrequency hopped signal, Interference rejection in a frequency hopping receiver, The time hopped signal.

Generation of Spread Spectrum Signals: Shift register sequence generators, Discrete frequency synthesizers, SAW device PN generators.

UNIT-IV: DETECTION OF SPREAD SPECTRUM SIGNALS (12 Periods)

Tracking: Coherent direct sequence receivers, other method of carrier tracking, Delay lock loop analysis, Tau – Dither loop, Coherent carrier tracking, Non-coherent frequency hop receiver.

Acquisition: Acquisition of spread spectrum signals, Acquisition by cell-by-cell searching, Reduction of acquisition time, Acquisition with matched filters, Matched filters for PN sequences, Matched filters for frequency hopped signals, Matched filters with acquisition - aiding waveform.

UNIT-V: APPLICATION OF SPREAD SPECTRUM TO COMMUNICATIONS (10 Periods)

Commercial Applications: Code Division Multiple Access, Multipath channels, The FCC part-15 rules for spread spectrum systems, Direct sequence and frequency hopping.

Cellular Systems: Direct sequence CDMA, Comparison of FDMA, TDMA and CDMA, Interference-limited versus dimension-limited systems, IS-95 CDMA digital cellular system.

Total Periods: 45

TEXT BOOKS:

1. George. R. Cooper and Clare D. McGillem, *Modern Communications and Spread Spectrum,* McGraw Hill. 1986.
2. Bernard Sklar and Pabitra Kumar Ray, *Digital Communications – Fundamentals and Applications*, Pearson Education, 2nd edition, 2009.

REFERENCE BOOKS:

1. Roger L. Peterson, Rodger E.Ziemer & David E. Borth, *Introduction to Spread Spectrum Communications,* Prentice Hall, 2013.
2. Dr. Kamilo Feher, *Wireless Digital Communications: Modulation & Spread Spectrum Applications,* Pearson Education, 2006.
3. Andrea Goldsmith, *Wireless Communications*, Cambridge University Press, 2009.
4. Upendra Dalal, *Wireless Communication*, Oxford University Press, 2009.

IV B.Tech. - I Semester

(16BT6HS01) **BANKING AND INSURANCE**

(Open Elective)

(Common to EEE, ECE & EIE)

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

PREREQUISITES:—

COURSE DESCRIPTION:

Origin of Banking; Functions of Banking; Role & Functions of RBI; Bank-Customer Relationship; Deposit and Loan Services of Banks; Banking Procedures; Electronic Payment Mechanisms; Business Models; Concepts of Risk and Uncertainty; Fundamentals of Insurance; Principles of Insurance; Essentials of Insurance Contracts; Insurance players in India.

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

CO1. Demonstrate Knowledge in
- Tools and concepts of Banking and Insurance.
- Basic Principles and concepts of Insurance and Banking.
- e-fund transfers, e-payments and e-business models.

CO2. Develop skills in providing solutions for
- Online banking and e – payments...
- Risk Management through insurance benefits the society at large.
- Money management by leveraging on technology, banking and insurance services.

CO3. Exhibit conceptual soundness about banking and insurance, this would contribute to More employment opportunities.

CO4. Provide life skills for effective utilization of Banking and Insurance facilities.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO BANKING (09 Periods)

Origin and growth of banking, meaning and functions of banking, importance of banking, Reserve Bank of India; functions, monetary policy, open market operations.

UNIT-II:BANK-CUSTOMER RELATIONSHIP (09 Periods)

Debtor-creditor relationship, anti-money laundering, deposit products or services, payment and collection of cheques. Accounts – Types of accounts, procedure for opening and closing an account. Loans and Advances- principles of lending, types of loans.

UNIT-III:BUSINESS MODELS AND ELECTRONIC PAYMENT SYSTEM (09 Periods)

Features, types of e-payment system, e-cash,NEFT, RTGS, Credit cards, Electronic purses and Debit cards.Business models-B2B, B2C, C2C, and B2G.

UNIT-IV:INTRODUCTION TO RISK AND INSURANCE (09 Periods)

Concept of risk, risk *Vs* uncertainty. Insurance definition, Insurance as risk mitigation mechanism, elements of insurance.

UNIT-V:INSURANCE OVERVIEW (09 periods)

Principles of insurance, insurance types, LIC & GIC insurance contract- nature, elements, functions, IRDA, Insurance Players in India.

Total Periods: 45

TEXT BOOKS:

1. A.V. Ranganadha Chary, R.R. Paul,*Banking and Financial system*, Kalyani Publisher, New Delhi, 2ndedition.
2. P.K.Gupta,*Insurance and Risk Management*, Himalaya Publishing House, New Delhi.

REFERENCE BOOKS:

1. Diwan, Praq and Sunil Sharma, *Electronic Commerce-A Manager's Guide to E-Business*, Vanity Books International, Delhi,2002.
2. Kalakota Ravi and Whinston Andrew B, *Frontiers of Electronic Commerce*, Pearson Education India, New Delhi, 1996.
3. Schneider, Grey P, *Electronic Commerce, Course Technology*, Cengage Learning, 8th edition, New Delhi, 2008.

IV B.Tech. - I Semester

(16BT6HS02) BUSINESS COMMUNICATION AND CAREER SKILLS

(Open Elective)

(Common to EEE, ECE & EIE)

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

PREREQUISITES: —

COURSE DESCRIPTION:

Nature and scope of communication; Corporate communication; Writing business documents; Careers and resumes; Interviews.

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

CO1. Demonstrate knowledge in
- Corporate Communication
- Main Stages of Writing Messages
- Career Building

CO2. Analyze the possibilities and limitations of language in
- Communication Networks
- Crisis Management/Communication

CO3. Design and develop the functional skills for professional practice inBusiness Presentations & Speeches

CO4. Applywritten and oral communicationtechniques in preparing and presenting various documents in technical writing.

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

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

DETAILED SYLLABUS:

UNIT-I: NATURE AND SCOPE OF COMMUNICATION (09 Periods)

Introduction: Functions of Communication – Roles of a Manager – Communication Basics –Communication Networks – Informal Communication – Interpersonal Communication –Communication Barriers.

UNIT-II: CORPORATE COMMUNICATION (09 Periods)

Introduction: What is Corporate Communication? – Corporate Citizenship and Social Responsibility – Corporate Communication Strategy – Crisis Management/Communication – Cross-Cultural Communication.

UNIT-III: WRITING BUSINESS DOCUMENTS (09 Periods)
Introduction: Importance of Written Business Communication, Types of Business Messages – Five Main Stages of Writing Business Messages – Business Letter Writing – Effective Business Correspondence – Common Components of Business Letters – Strategies for Writing the Body of a Letter.

UNIT-IV: CAREERS AND RESUMES (09 Periods)
Introduction – Career Building – Business Presentations and Speeches – Resume Formats – Traditional, Electronic and Video Resumes – Sending Resumes – Follow-up Letters – Online Recruitment Process.

UNIT-V: INTERVIEWS (09 Periods)
Introduction – Fundamental Principles of Interviewing – General Preparation for an Interview – Success in an Interview – Types of Interviewing Questions – Important Non-verbal Aspects – Types of Interviews – Styles of Interviewing.

Total Periods: 45

TEXT BOOK:
1. Meenakshi Raman and Prakash Singh, *Business Communication*, Oxford University Press, New Delhi, 2nd edition, 2012.

REFERENCE BOOKS:
1. Neera Jain and Sharma Mukherji, *Effective Business Communication*, Tata Mc Graw-Hill Education, Pvt. Ltd., New Delhi, 2012.
2. Courtland L.Bovee et al., *Business Communication Today*, Pearson, New Delhi, 2011.
3. Krizan, *Effective Business Communication*, Cengage Learning, New Delhi, 2010.
4. R.K. Madhukar, *Business Communication*, Vikas Publishing House Pvt. Ltd., New Delhi, 2005.

IV B.Tech. – ISemester

(16BT6HS03) COST ACCOUNTING AND FINANCIAL MANAGEMENT

(Open Elective)

(Common to EEE, ECE & EIE)

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

PREREQUISITES: —

COURSE DESCRIPTION:
Scope, Objectives and Elements ofcost Accounting; Cost Sheet and Tender quotations; Variance Analysis: Material variances, Labor variances; Meaning and Scope, Liquidity, Profitability Ratios: concept of Risk and Return on Investment.

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

CO1. Acquire Knowledge in
- Elements of Costing.
- Basic concepts of Financial Management.
- Risk and Return
- Significance of Cost Accountancy
- Behavioral Finance

CO2. Develop skills in
- Material, Labor, Overheads control.
- Excellence and ability to minimize the cost of the organization

CO3. Develop effective Communication in Cost control and Financial Management.

CO4. Providesolutions for effective investment decisions.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO COST AND COST ACCOUNTING (09 Periods)

Cost and Cost Accounting, Scope, Objectives, Advantages and disadvantages – Cost Accounting vs. Management Accounting – Elements of Costing – Installation of costing system – Material Control, Labour Control, Overhead Control.

UNIT-II: COST SHEET AND PREPARATION OF COST SHEET (09 Periods)

Analysis of Cost – Preparation of cost sheet, estimate, tender and quotation (Simple problems) – Importance of Costing while pricing the products.

UNIT-III: STANDARD COSTING AND VARIANCE ANALYSIS (09 Periods)

Introduction to Standard Costing & Variances – Variance Analysis: Material variances, Labour variances (Simple Problems).

UNIT-IV: INTRODUCTION TO FINANCIAL MANAGEMENT AND RATIO ANALYSIS (09 Periods)

Financial Management-Meaning and Scope, Liquidity, Profitability, Financial Statement Analysis through ratios (Simple Problems).

UNIT-V: INTRODUCTION TO INVESTMENT AND BEHAVIORAL FINANCE (09 Periods)

Investment-Meaning and Definition- concept of risk and returns-Investment Alternatives- Introduction to Behavioral Finance – Anomalies –Key Concepts –Anchoring – Mental Anchoring-Confirmation and Hindsight Bias-Gambler's Fallacy-Herd Behavior-Over Confidence-Overreaction and Availability Bias-Prospect Theory.

Total Periods: 45

TEXT BOOKS:

1. S.P. Jain and K.L. Narang,*Cost Accounting*, Kalyani Publishers, Ludhiana, 6th edition,2002.
2. James C Van Horne, *Financial Management and Policy*, Prentice-Hall of India/Pearson, 12th edition, 2001.

REFERENCE BOOKS:

1. The Institute of Company Secretaries of India, *Cost and Management Study Material*, New Delhi.
2. I.M. Pandey, *Financial Management*, Vikas Publishing House Pvt. Ltd., 10th edition, 2010.

IV B.Tech. – ISemester

(16BT6HS04) ENTREPRENEURSHIP FOR MICRO, SMALL AND MEDIUM ENTERPRISES

(Open Elective)

(Common to EEE, ECE & EIE)

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

PREREQUISITES: —

COURSE DESCRIPTION:
Introduction to Entrepreneur Development; Idea generation and formation of Business Plan; Micro and Small Enterprises; Institutional Finance and Support to Entrepreneur; Woman Entrepreneurship.

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

CO1. Acquire Knowledge in
- Schemes and institutions encouraging entrepreneurship.
- Basic Principles and concepts of Accountancy.
- Significance of entrepreneurship.

CO2. Develop skills in providing solutions for
- Personal excellence through financial and professional freedom.
- Women entrepreneurship serving as contrivance in societal development

CO3. Develop critical thinking and evaluation ability.

CO4. Widens knowledge and build up attitude towards trouble shooting.

CO5. Demonstrate business acumen

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO ENTREPRENEURSHIP DEVELOPMENT (09 Periods)

Concept ofEntrepreneurship – Growth of Entrepreneurship in India - Factors affecting entrepreneurship growth - Characteristics of an Entrepreneur – Functions of Entrepreneur – Need for an Entrepreneur – Entrepreneurial Decision Process – Types of Entrepreneurs – Distinction between an Entrepreneur and a manager.

UNIT-II: IDEA GENERATION AND FORMULATION OF BUSINESS PLANS (09 Periods)

Sources of Ideas – Methods of idea generation – Steps in Setting up of a Small Business Enterprise – Formulation of Business Plan – Contents of Business Plan – Significance – Common Errors in Business Plan Formulation, The role of incubation centers for promoting Entrepreneurship, Start-up – New Guidelines.

UNIT-III: MICRO AND SMALL ENTERPRISES (09 Periods)

Meaning and Definition – Micro and Macro units – Essentials – Features – Characteristics– Scope of Micro and Small Enterprises – Objectives of Micro Enterprises – relationship between Micro and Macro Enterprises- Problems of Micro and Small Enterprises.

UNIT-IV: INSTITUTIONAL FINANCE (09 Periods)

Institutional Finance **–** Need-Scope-Services - Various Institutions offering Institutional support: – Small Industries Development of Bank of India (SIDBI), State Industrial Development Corporations (SIDCs)– Small Industries Development Organisation (SIDO) – Small Industries Service Institutes (SISIs) – District Industries Centres (DICs) – National Institute of Entrepreneurship and Small Business Development (NIESBUD) – Technical Consultancy Organizations (TCOS). Micro Units Development and Refinance Agency Bank (MUDRA).

UNIT-V:WOMEN AND RURAL ENTREPRENEURSHIP (09 Periods)

Concept of Women entrepreneur - Functions of Women entrepreneurs - Growth of women entrepreneurship in India - Challenges of Women entrepreneurs- Programmes supporting women entrepreneurship – Rural Entrepreneurship – Meaning, Need for Rural entrepreneurship, Problems of rural entrepreneurship, Role of NGOs, Role of BharatiyaMahila Bank for encouraging Women Entrepreneurs.

Total Periods: 45

TEXT BOOKS:

1. Dr.S.S.Khanka*, Entrepreneurial Development*, S. Chand and Company Ltd, Revised edition, 2012.
2. MadhurimaLall&ShikhaSahai, *Entrepreneurship*, Excel Books India, 2ndedition 2008.

REFERENCE BOOKS:

1. Nandan, H., *Fundamentals of Entrepreneurship*, PHI Learning Pvt. Ltd., 2013, New Delhi, 3rd edition 2013.
2. Vasanth Desai, *The Dynamics of Entrepreneurial Development and Management*, Himalaya Publishing House, 4th edition, 2009.
3. BholanathDutta, *Entrepreneurship Management* – Text and Cases, Excel Books, 1st edition 2009.

IV B. Tech. – I Semester

(16BT6HS05) **FRENCH LANGUAGE (La Langue Francais)**

(Open Elective)

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	0	3

PREREQUISITES:—

COURSE DESCRIPTION:

Oral communications; Basic grammar; advancedgrammar;basic writing; Business French (La Francais Commercial)

COURSE OUTCOMES:

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

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

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

CO3. Design and develop language skills for professional practice**.**

CO4. Apply basic writing skills in writing Emails and understanding wide range of technical terminologies.

CO5. Understand French culture and civilization.

CO6. Communicate effectively with the native French in day to day situation**.**

DETAILED SYLLABUS:

UNIT-I: ORAL COMMUNICATION (09 Periods)

Introduction - Language as a Tool of Communication, French alphabets, Phonetics and pronunciation, making contacts, giving information, Arranging things, Expression of feelings.

UNIT-II: BASIC GRAMMAR (09 Periods)
Introduction –Articles, -Er ending Verbs, Nouns, Numbers, Gender, Pronouns, Sentence structure – Case study.

UNIT-III: ADVANCED GRAMMAR (09 Periods)
Introduction -Adjectives, Prepositions, Introduction to tenses – Present tense, past tense and future tense, Active and Passive voice.

UNIT-IV: BASIC WRITING (09 Periods)
Introduction -Introduction to written communication, Pre-writing, Creating context for writing and Data collection, fill in forms, Write greeting cards, Invitations and Short personal announcements, Short text to describe photos and pictures.

UNIT-V: BUSINESS FRENCH (La Francais Commercial) (09 Periods)
Introduction - E-mail writing, Letter writing, Learning technical vocabulary and its application.
Case study of influential French companies, Learning computer/ desktop/new age- media vocabulary, Introduction to how to present a topic, Fixing an Appointment

Total Periods: 45

TEXT BOOK:
1. Annie Berther, *Alter Ego*, Hachette Publications, 2012.

REFERENCE BOOKS:
1. RegineMerieux, Yves Loiseau, *Connexions*, Goyall Publishers, 2011.
2. DelphineRipaud,*Saison*, French and Euroean Inc., 2015.

IV B.Tech. - I Semester

(16BT6HS06) **GERMAN LANGUAGE (Deutsch alsFremdsprache)**

(Open Elective)

(Common to EEE, ECE & EIE)

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

PREREQUISITES:—

COURSE DESCRIPTION:

Oral communication;Basic grammar; Advanced grammar; Basic writing; Berufsdeutcsch (Business German)

COURSE OUTCOMES:

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

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

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

CO3. Design and develop language skills for professional practice**.**

CO4. Apply basic writing skills in writing Emails and understanding wide range of technical terminologies.

CO5. UnderstandGerman culture and civilization.

CO6. Communicate effectively with the native German in day to day situation**.**

DETAILED SYLLABUS:

UNIT-I: ORAL COMMUNICATION (09 Periods)

Introduction - Language as a Tool of Communication, German alphabets, Phonetics and pronunciation, making contacts, giving information, Arranging things, Expression of feelings.

UNIT-II: BASIC GRAMMAR (09 Periods)
Introduction –Articles, Verbs, Nouns, Numbers, Gender, Pronouns, Sentence structure – Case study.

UNIT-III: ADVANCED GRAMMAR (09 Periods)
Introduction -Adjectives, Prepositions, Introduction to tenses – Present tense, past tense and future tense, Active and Passive voice, Introduction to Case- Akkusativ, Nominativ, Dativ&Genetiv Case.

UNIT-IV: BASIC WRITING (09 Periods)
Introduction -Introduction to written communication, Pre-writing, Creating context for writing and Data collection, fill in forms, Write greeting cards, Invitations and Short personal announcements, Short text to describe photos and pictures.

UNIT-V: BERUFSDEUTCSCH (BUSINESS GERMAN) (09 Periods)
Introduction - E-mail writing, Letter writing, Learning technical vocabulary and its application.
Case studies of influential German companies, Learning computer/desktop/new age- media vocabulary, Introduction to how to present a topic, Fixing an Appointment.

Total Periods: 45

TEXT BOOK:
1. Heuber,*Tangram Aktuelleins*, HeuberVerlagPublications, 2011.

REFERENCE BOOKS:
1. Anta Kursisa, Gerhard Newner,Sara vicenta, *Fir fuer Deutsch 1 und Deutsch 2,*HeuberVerlag Publications, 2005.
2. Herman Funk,*Studio D A1*, Cornelsen GOYAL SAAB Publication, 2011.

IV B.Tech. - I Semester

(16BT6HS07) **INDIAN CONSTITUTION**

(Open Elective)

(Common to EEE, ECE & EIE)

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

PREREQUISITES: —

COURSE DESCRIPTION:
Elements, functions and functionaries according to Indian Constitution, understanding forbetter professional practice and good citizenry.

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

CO1. Gain knowledge in
- Parliamentary proceedings, laws, legislature, administration and its philosophy
- Federal system and judiciary of India
- Socials problems and public services like central civil services and state civil services
- Indian and international political aspects and dynamics

CO2. Develop etiquette and professional behavior in line with the constitution of India for becoming a responsible citizen

DETAILED SYLLABUS:

UNIT-I: PREAMBLE AND ITS PHILOSOPHY (08 Periods)
Introduction and Evolution of Indian Constitution, preamble and its Philosophy.

UNIT-II: UNION GOVERNMENT (08 Periods)
Powers, Functions and Position of President, Vice-President and Council of Ministers, Composition of parliament, Constitution Amendment Procedure, Financial Legislation in Parliament.

UNIT-III:FEDERAL SYSTEM (14 Periods)
Centre-State relations, Directive Principles of State Policy, Fundamental Rights and Duties, Centre-State Relations, Features of Federal System, Administrative Relationship between Union and States, Powers, Functions and Position of Governors, Function of Chief Ministers, Council of Ministers, Composition and powers of the State Legislature.

UNIT-IV:JUDICIARY AND PUBLIC SERVICES (10 Periods)
The Union Judiciary - Supreme Court and High Court, All India Services, Central Civil Services, State Services, Local Services and Training of Civil Services.

UNIT-V: INTERNATIONAL POLITICS (05 Periods)
Foreign Policy of India, International Institutions like UNO, WTO, SAARC and Environmentalism.

Total Periods: 45

TEXT BOOK:
1. Briji Kishore Sharma, *Introduction to the Constitution of India*, Prentice Hall of India, 2005.

REFERENCE BOOKS:
1. Mahendra Pal Singh,V. N. Shukla's, *Constitution of India*, Eastern Book Company, 2011.
2. Pandey J. N, *Constitutional Law of India* - Central Law Agency, 1998.

IV B.Tech. - I Semester

(16BT6HS08) **INDIAN ECONOMY**

(Open Elective)

(Common to EEE, ECE & EIE)

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

PREREQUISITES: —

COURSE DESCRIPTION:
Introduction; Time Value of Money; Elementary Economic Analysis; Value analysis, Value Engineering; Economic Planning.

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

CO1. Acquire the knowledge in
- Micro and Macro Economics.
- Traditional and Modern methods of Capital Budgeting.
- Five year plans and NITI Aayog.

CO2. Analyze
- Capital Budgeting.
- Value Analysis and Value Engineering.
- Economic analysis
- Law of supply and demand

CO3. Understand the nuances of project management and finance

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION (09 Periods)
Economics- Flow in an Economy, Law of Supply and Demand; Micro and Macro Economics; Relationship between Science, Engineering, Technology, and Economic Development;Concept of Engineering Economics-Types of Efficiency, Definition and Scope of Engineering Economics.

UNIT-II: TIME VALUE OF MONEY (12 Periods)
Concepts and Application; Capital Budgeting-Traditional and Modern Methods; Simple and Compound Interest, Cash Flow Diagram, Principle of Economic Equivalence; Evaluation of Engineering Projects – Present Worth Method, Future Worth Method, Annual Worth Method, Internal Rate of Return Method, Cost-benefit Analysis in Public Projects; Depreciation Policy-Depreciation of Capital Assets, Causes of Depreciation, Straight Line Method and Declining Balance Method.

UNIT-III: ELEMENTARY ECONOMIC ANALYSIS (09 Periods)
Economic Analysis – Meaning, Significance, Simple Economic Analysis; Material Selection for a Product, Substitution of Raw Material; Design Selection for a Product;Material Selection-Process Planning, Process Modification.

UNIT-IV: VALUE ENGINEERING (06 Periods)
Introduction- Value Analysis, Value Engineering,Functions, Aims; Value Analysis vs. Value Engineering; Value Engineering Procedure- Advantages, Application Areas.

UNIT-V: ECONOMICPLANNING (09 Periods)
Introduction- Need For Planningin India,Five year plans(1951-2012), NITI Aayog(from 2014 onwards); Inclusive Growth-Meaning, Significance, Need for inclusive growth in India, Strategy for more inclusive growth, Challenges and Prospects; Employment and Inclusive Growth in India, Role of engineers in sustaining inclusive growth.

Total Periods: 45

TEXT BOOKS:

1. PanneerselvamR ,*Engineering Economics*, PHI Learning Private Limited, Delhi, 2ndEdition,2013.
2. Jain T.R., V. K.Ohri, O. P. Khanna. *Economics for Engineers*, VK Publication, 1stEdition, 2015.

REFERENCE BOOKS:

1. DuttRudar&Sundhram K. P. M., *Indian Economy*, S. Chand, New Delhi, 62nd revised Edition, 2010.
2. Misra, S.K. & V. K. Puri., *Indian Economy: Its Development Experience*, Himalaya Publishing House, Mumbai 32ndEdition, 2010.

IV B.Tech. - I Semester

(16BT6HS09) INDIAN HERITAGE AND CULTURE

(Open Elective)

(Common to EEE, ECE & EIE)

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

PREREQUISITES: —

COURSE DESCRIPTION:
Basic traits of Indian Culture; Humanistic Reforms under Jainism and Buddhism; Culture in the medieval period; Socio Religious reforms in Indian Culture; Reform movements for harmonious relations.

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

CO1. Acquaint knowledge in
- Human aspirations and values in Vedic culture.
- Cultural aspects of Buddhism and Jainism
- Unification of our country under Mourya's and Gupta's administrations
- Socio Religious aspects of Indian culture
- Reform movements and harmonious relations.

CO2. Apply ethical principles and reforms as models for the upliftment of the societal status in the present cultural contexts

DETAILED SYLLABUS:

UNIT-I: BASIC TRAITS OF INDIAN CULTURE (09 Periods)
Meaning and definition and various interpretations of culture.Culture and its features.The Vedic and Upanishadic culture and society.Human aspirations and values in these societies.Chaturvidhapurushardhas, Chaturashrma and Chaturvarna theory.

UNIT-II: HUMANISTIC REFORMS UNDER JAINISM AND BUDDHISM (09 Periods)
Salient features of Jainism - contributions of Jainism to Indian culture. Contributions of Aachaarya and Mahaapragya.Buddhism as a humanistic culture.The four noble truths of Buddhism.Contributions of Buddhism to Indian culture.

UNIT-III: CULTURE IN THE MEDIEVAL PERIOD (09 Periods)
Unifications of India under Mouryas and Guptas and their cultural achievements. Cultural conditions under satavahanas. Contributions to pallavas and cholas to art and cultural achievements of vijayanagara rulers.

UNIT-IV: SOCIO RELIGIOUS REFORMS IN INDIAN CULTURE (09 Periods)
Western impact on India, Introduction of western education, social and cultural awakening and social reform movements of Rajaramohan Roy – DayanandhaSaraswathi- Anne Besant. (theosophical society)

UNIT-V: REFORM MOVEMENTS FOR HARMONIOUS RELATIONS (09 Periods)
Vivekananda, Eswar Chandra vidyasagar and Veeresalingam-emancipation of women and struggle against caste. Rise of Indian nationalism. Mahatma Gandhi- Nonviolence and satyagraha and eradication of untouchability.

Total Periods: *45*

TEXT BOOK:
1. ValluruPrabhakaraiah, *Indian Heritage and Culture*, Neelkamal Publications Pvt. Ltd. Delhi, 1st edition, 2015.

REFERENCE BOOKS:
1. L. P. Sharma, *History of Ancient India*, Konark Publishers, Pvt. Ltd., New Delhi, 2010.
2. L. P. Sharma, *History of Medieval India*, Konark Publishers, Pvt. Ltd., New Delhi, 2010.
3. L. P. Sharma, *History of Modern India*, Konark Publishers, Pvt. Ltd., New Delhi, 2010.
4. The Cultural Heritage of India Vol-I, II, III, IV, V, *The Ramakrishna Mission Institute of Culture*, Calcutta.

IV B.Tech. - I Semester

(16BT6HS10) **INDIAN HISTORY**

(Open Elective)

(Common to EEE, ECE & EIE)

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

PREREQUISITES: —

COURSE DESCRIPTION:
Introduction; Ancient India; Classical and Medieval era; Modern India; India after independence.

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

CO1. Gain knowledge on evolution and history of India as a nation
CO2. Analyze social and political situations of past and current periods
CO3. Practice in career or at other social institutions morally and ethically

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION (08 Periods)
Elements of Indian History; History Sources: Archaeology, Numismatics, Epigraphy & Archival research; Methods used in History; History & historiography; sociological concepts-structure, system, organization, social institutions, Culture and social stratification (caste, class, gender, power), State& Civil Society.

UNIT-II: ANCIENT INDIA (09 Periods)
Mohenjo-Daro civilization; Harappa civilization; Mauryan Empire.

UNIT-III: CLASSICAL AND MEDIEVAL ERA (12 Periods)
Classic Era (200 BC - 1200 AD); Hindu - Islamic Era (1200 - 1800 AD).

UNIT-IV: MODERN INDIA (06 Periods)
Age of Colonialism (17th - 19th centuries); First war of Indian Independence;Freedom Struggle (1857-1947).

UNIT-V:INDIA AFTER INDEPENDENCE (1947-) (10 Periods)
The Evolution of the Constitution and Main Provisions; Consolidation of India as a Nation; Politics in the States; Indian economy; Modernization and globalization, Secularism and communalism, Nature of development, Processes of social exclusion and inclusion, Changing, Nature of work and organization.

Total Periods: 45

TEXT BOOK:

1. K. Krishna Reddy, *Indian History*, Tata McGraw-Hill, 21st reprint,2017.

REFERENCE BOOKS:

1. Guha, Ramachandra, *India after Gandhi*, Pan Macmillan,2007.
2. Thapar, Romila, *Early India*, Penguin, 2002.

IV B.Tech. - I Semester

(16BT6HS11) **PERSONALITY DEVELOPMENT**

(Open Elective)

(Common to EEE, ECE & EIE)

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

PREREQUISITES: —

COURSE DESCRIPTION:
Self-esteem & Self-Management; Developing Positive Attitudes; Self-Motivation & Self-Management; Getting Along with the Supervisor; Workplace Success.

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

CO1. Demonstrate knowledge in
- Self-Management
- Planning Career

CO2. Analyze the situations based on
- Attitudes
- Thinking strategies

CO3. Design and develop the functional skills for professional practice in

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

CO5. Communicate effectively in public speaking in formal and informal situations.

DETAILED SYLLABUS:

UNIT-I: SELF-ESTEEM AND SELF-IMPROVEMENT (09 Periods)

Know Yourself – Accept Yourself; Self-Improvement: Plan to Improve - Actively Working to Improve Yourself.
Case study: 1

UNIT-II: DEVELOPING POSITIVE ATTITUDES (09 Periods)

How Attitudes Develop – Attitudes are Catching – Improve Your Attitudes.
Case study: 2

UNIT-III: SELF-MOTIVATION AND SELF-MANAGEMENT (09 Periods)

Show Initiative – Be Responsible Self-Management; Efficient Work Habits – Stress Management – Employers Want People Who can Think – Thinking Strategies.

Case study: 3

UNIT-IV: GETTING ALONG WITH THE SUPERVISOR (09 Periods)

Know your Supervisor – Communicating with Your Supervisor – Special Communications With Your Supervisor – What Should You Expect of Your Supervisor? – What Your Supervisor Expects of You - Moving Ahead Getting Along with Your Supervisor.

Case study: 4

UNIT-V: WORKPLACE SUCCESS (09 Periods)

First Day on the Job – Keeping Your Job – Planning Your Career – Moving ahead.

Case study: 5

Total Periods: 45

TEXT BOOK:

1. Harold R. Wallace and L. Ann Masters, *Personality Development*, Cengage Learning, Delhi, 6th Indian Reprint 2011.

REFERENCE BOOKS:

1. Barun K. Mitra, *Personality Development and Soft Skills,* Oxford University Press, New Delhi, 2011.
2. Stephen R. Covey, *The 7 Habits of Highly Effective People*, Free Press, New York, 1989.
3. K. Alex, *Soft Skills*, S. Chand & Company Ltd, New Delhi, Second Revised Edition 2011.
4. Stephen P. Robbins and Timothy A. Judge*, Organizational Behaviour*, Prentice Hall, Delhi, 16thEdition 2014.

IV B.Tech. - I Semester

(16BT6HS12) **PHILOSOPHY OF EDUCATION**

(Open Elective)

(Common to EEE, ECE & EIE)

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

PREREQUISITES: —

COURSE DESCRIPTION:
Introduction to Philosophy and Engineering Education; Philosophical methods and their implications in engineering; Philosophical education in India; Values and Engineering education; Outcome based education.

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

CO1. Acquire knowledge in
- Philosophy of Engineering education.
- Philosophical Methods.
- Knowledge acquiring methods.
- Engineering education and responsibilities.

CO2. Understand the impact of Outcome Based Education for effective educational outcomes

CO3. Apply reasoning to assess societal issues with the contextual knowledge of engineering education and responsibilities.

DETAILED SYLLABUS:

UNIT-I:INTRODUCTION TOPHILOSOPHY AND ENGINNERING EDUCATION (09Periods)
Concept , Significance, and Scope of Philosophy in Engineering – Aims of Engineering Education – relationship between philosophy and engineering education – speculative, normative and critical approaches of philosophy in engineering.

UNIT-II:PHILOSOPHICAL METHODS AND THEIR IMPLICATIONS INENGINEERING (09Periods)
Introduction to Philosophical approaches: Idealism, Naturalism, Pragmatism, Realism and Existentialism; Significance and Scope in Engineering Education.

UNIT-III: PHILOSOPHICAL EDUCATION IN INDIA (09 Periods)

Different branches of philosophy- meaning, Epistemology: nature and scope; Knowledge acquiring methods;Kinds and instruments of knowledge; Re-shapingof educational thoughts by Indian thinkers: Rabindranath Tagore, Sri Aurobindo Gosh, Mahatma Gandhi,Jiddu Krishnamurthy and Swamy Vivekananda.

UNIT-IV:VALUES AND ENGINEERING EDUCATION (09 Periods)

Introduction; Engineering educationand responsibilities: health,social, moral, ethics aesthetic;Value: crisis and strategies forinculcation;

Case study: Engineering Solutions given by Mokshagundam Visvesvaraya.

UNIT-V:OUTCOME-BASED EDUCATION (09 Periods)

Institutional visioning;educational objectives; programme outcomes, curriculum,stakeholders, infrastructure and learning resources; governance and management, quality in education.

Total periods: 45

TEXT BOOKS:

1. Ganta Ramesh, *Philosophical Foundations of Education*, Neelkamal Publications, 1stEdition,2013.
2. CarlMicham,*Thinking through technology(The Paths between Engineering and Philosophy)*, University of Chicago Press, 1stEdition,1994.
3. Louis L Bucciarelli,*Engineering Philosophy,*Delft University Press,1stEdition, 2003.
4. NBA/ABET Manuals.

REFERENCE BOOKS:

1. Louis L Bucciarelli, *Philosophy of Technology and Engineering Sciences*, North Holland, 1stEdition, 2009 (e-book).
2. Samuel Florman, *Existential pleasures of education*, Martins's Griffin S.T. publication, 1stEdition, 1992.

IV B.Tech. - I Semester

(16BT6HS13) **PUBLIC ADMINISTRATION**

(Open Elective)

(Common to EEE, ECE & EIE)

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

PREREQUISITES: —

COURSE DESCRIPTION:
Introduction; Public Policy; Good Governance; E-Governance; Development Administration.

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

CO1. Acquireknowledge in
- Public Policy.
- Good Governance.
- E-governance.
- Development Administration.

CO2. Analyze the possibilities and limitations ofexisting policies through Good Governance perspective.

CO3. Design and develop solutions in e-governance modelsto find and provide opportunities in e-governance.

CO4. Adopt principles ofe-governance in addressing the existing issues and challenges in e-governance sector.

CO5. Understand the significance of Administrative Development in finding professional engineering solutions by probing
- Bureaucracy.
- Role of civil society.

DETAILEDSYLLABUS:

UNIT-I: INTRODUCTION (09 Periods)
Public and Private Administration- Differences and Similarities, Meaning, Scope; Importance of Public Administration in Modern Era; Public Administration and its implications in the field of Engineering.
Case Study: Unique Identification Authority of India (UIDAI):Aadhaar Project: Challenges Ahead.

UNIT-II: PUBLIC POLICY (09 Periods)
Meaning and Scope; Policy Formulation in India; Policy making process; Policy Implementation.

Engineering and Public Policy**,**Social, ethical, Monetary and fiscal policies; policy implications of engineering;The engineer's role in Public Policy.

Case Study:NITI Aayog: Demonetization and Aftermath of Demonetization – Cashless transactions.

UNIT-III: GOOD GOVERNANCE (09 Periods)

Significance; Objectives;Concepts;Reforms;Organization and its basic problemsAdministrative and Governance reforms in India; Sustainable and Inclusive growth in India;Engineering and Sustainable Environment-Role of Engineers; Right to information Act.

Case Study: Strategies in Good Governance: A Case Study of Karnataka, Kerala and Orissa.

UNIT-IV: E-GOVERNANCE (09 Periods)

Meaning, Significance, Issues in E-governance; E-governance Models, Problems and Opportunities; Application of DataWarehousing and Data Mining in Governance; Engineers role in re-engineering E-governance.

Case Study: e-Housing System for Bhavana Nirman Dhanasahayam Online disbursement of housing assistance in Kerala.

UNIT-V: DEVELOPMENT ADMINISTRATION (09 Periods)

Introduction; Development Administration-Administrative Development- Sustainable Development -Significance-Objectives; Bureaucracy - Personnel administration and human resources development; Role of civil society-Citizens and administration;Development and Engineering: Issues Challenges and Opportunities.

Case Study: Neeru-Chettu (Water-Tree) of Andhra Pradesh.
Case Study: TPDDL of Delhi and Odisha.

Total Periods: 45

TEXT BOOKS:

1. M.P. Sharma, B.L. Sadana, HarpreetKaur,*Public Administration in Theory and Practice,* KitabMahal, Mumbai,1stEdition,2014.
2. CSR Prabhu, *E., Governance – concepts and case studies*, PHI, New Delhi,2ndEdition, 2012.

REFERENCE BOOKS:

1. SurendraMunshi, Bijupaul Abraham, *Good Governance, Democratic societies and Globalization,* Sage publications, New Delhi,1stEdition, 2004.
2. R.K.Sapru, *Public Policy,*Sterling Publishers Pvt. Ltd., New Delhi, 1stEdition, 2001.

IV B.Tech. - I Semester

(16BT60112) BUILDING MAINTENANCE AND REPAIR

(Open Elective)

(Common to EEE, ECE & EIE)

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

PREREQUISITES: —

COURSE DESCRIPTION:

Durability of buildings, Failure and repair of buildings, Material Techniques for repair, Maintenance of buildings, Conservation and recycling.

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

CO1. Acquire basic knowledge on durability and serviceability, failures, repair and rehabilitation of buildings.
CO2. Analyzefailures, repair and rehabilitation techniques.
CO3. Solve complex building maintenance problems through proper investigations and interpretation.
CO4. Use modern tools and techniques for various repairs and rehabilitation of structures.
CO5. Provide solutions for building maintenance and repair problems considering health and safety.
CO6. Consider environmental sustainability in building maintenance and repair.
CO7. Maintain ethical standards for quality in repairs and rehabilitation of structures.
CO8. Evaluate specifications and perform cost analysis of building components while repair and rehabilitation.

DETAILED SYLLABUS:

UNIT-I: DURABILITY AND SERVICEABILITY OF BUILDINGS (10 Periods)

Life expectancy of different types of buildings; Effect of environmental elements such as heat, dampness, frost and precipitation on buildings; Effect ofchemical agents on building materials, Effect of pollution on buildings, Effect of fire onbuilding; Damage by biological agents like plants, trees, algae, fungus, moss, insects, etc.; Preventive measures on various aspects, Inspection, Assessment procedure for evaluating for damaged structures, Causes of deterioration, Testing techniques.

UNIT-II:FAILURE AND REPAIR OF BUILDINGS (10 Periods)
Building failure – Types, Methodology for investigation; Diagnostictesting methodsandequipment, Repair of cracks inconcrete and masonry, Materials for Repair,Methods of repair, Repair and strengthening of concrete buildings, Foundationrepair and strengthening, Underpinning, Leakage of roofs and repair methods.

UNIT-III: TECHNIQUES FOR REPAIR (08 Periods)
Rust eliminators and polymers coating for rebars during repair, Foamed concrete, Mortar and dry pack, Vacuum concrete, Gunite and shotcrete, Epoxy injection, Mortar repairs for cracks, Shoring and underpinning.

UNIT-IV: MAINTENANCE OF BUILDINGS (09 Periods)
Reliability principles and its applications in selection of systemsfor building, Routine maintenance of building, Maintenance cost, Specifications formaintenance works, Dampness-Damp proof courses, Construction details for prevention ofdampness; Termite proofing, Fire protection, Corrosion protection.

UNIT-V: CONSERVATION AND RECYCLING (08 Periods)
Performance of construction materials and components in service, Rehabilitation of constructed facilities, Conservation movement, Materials and methodsfor conservation work, Recycling of old buildings and its advantages, Examples.

Total Periods: 45

TEXT BOOKS:

1. Dennison Campbell, Allen and Harold Roper, *Concrete Structures – Materials, Maintenance and Repair*, Longman Scientific and Technical, UK, 1991.
2. Allen, R.T. L., Edwards, S.C. and J. D. N. Shaw,*TheRepair of Concrete Structures*, Blackie Academic & Professional, UK, 1993.

REFERENCE BOOKS:

1. Peter H. Emmons, *Concrete Repair and Maintenance*, John Wiley and Sons Publications, 2002.
2. Building Constructionunder Seismic Conditions in the Balkan Region, UNDP/UNIDO Project Rer/79/015,Volume 5, *Repair and Strengthening of Reinforced Concrete, Stone and Brick Masonry Buildings*, United Nations Industrial Development Organisation, Vienna.
3. Shetty, M. S., *Concrete Technology*, S. Chand and Company.
4. Smith, P. and Julian, W., *Building Services*, Applied Science Publications, London, 1976.
5. SP: 25, BIS;*Causes and Prevention of Cracks in Buildings*.
6. Champion, S., *Failure and Repair of Concrete Structures*, John Wiley and Sons Publications, 1961.
7. Perkins, P. H., Repair, Protection and Water Proofing of Concrete Structures, E& FN Spon, UK, 3rdEdition, 1997.

IV B.Tech. - I Semester

(16BT60113) **CONTRACT LAWS AND REGULATIONS**

(Open Elective)

(Common to EEE, ECE & EIE)

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

PREREQUISITES: —

COURSE DESCRIPTION:
Construction contracts; Tenders; Arbitration; Legal requirements; Labour regulations.

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

CO1. Demonstrate basic Knowledge on construction contracts, tenders, arbitration, legalrequirements and labour regulations.
CO2. Analyze contracts and tenders.
CO3. Address the legal issues in contracts and tenders.
CO4. Follow laws and regulations in the preparation of contracts and tenders.
CO5. Prepare contract and tender documents as per the standards.
CO6. Consider project schedule, cost, quality and risk in the preparation of contracts and tenders.

DETAILED SYLLABUS:

UNIT-I:CONSTRUCTION CONTRACTS (09 Periods)
Indian contracts act, Elements of contracts, Types of contracts, Features, Suitability, Design of contract documents, International contract document and laws, Standard contract document, Law of torts.

UNIT-II: TENDERS (09 Periods)
Prequalification, Bidding, Accepting; Evaluation of tender from technical, contractual and financial points of view; Two cover system, Preparation of the documentation, Contract formation and interpretation, Potential contractual problems, Price variation clause, Comparison of actions and laws, Subject matter, Violations.

UNIT-III: ARBITRATION (09 Periods)

Arbitration, Comparison of actions and laws, Agreements, Appointment of arbitrators, Conditions of arbitration, Powers and duties of arbitrator, Rules of evidence, Enforcement of award, Arbitration disputes, Dispute review board.

UNIT-IV: LEGAL REQUIREMENTS (09 Periods)

Legal requirements for planning, Property law, Agency law, Tax laws – Income tax, Sales tax, Excise and custom duties, Local government approval, Statutory regulations, Insurance and bonding, Laws governing purchase and sale, Use of urban and rural land, Land revenue codes, EMD, Security deposits, Liquidated damages.

UNIT-V:LABOUR REGULATIONS (09 Periods)

Social security, Welfare legislation; Laws relating to wages, bonus and industrial disputes; Labour administration, Insurance and safety regulations, Workmen's compensation act, Maternity benefit act, Child labour act, Other labour laws.

Total Periods: 45

TEXT BOOKS:

1. SubbaRao,G.C.V., *Law of Contracts I & II*, S. Gogia& Co., 11thEdition, 2011.
2. Jimmie Hinze, *Construction Contracts,*McGraw Hill, 3rdEdition, 2011.

REFERENCE BOOKS:

1. Kishore Gajaria, *GT Gajaria's Law Relating to Building and Engineering Contracts in India*, Lexis NexisButterworths India,4thEdition, 2000.
2. Patil, B. S,*Civil Engineering Contracts and Estimates*, University Press (India) Private Ltd., 4thEdition, 2015.
3. Joseph T. Bockrath, *Contracts and the Legal Environment for Engineers and Architects*, McGraw Hill Education,7thEdition, 2010.
4. AkhileshwarPathak, *Contract Law*, Oxford University Press, 2011.

IV B.Tech. - I Semester

(16BT60114) DISASTER MITIGATION AND MANAGEMENT

(Open Elective)

(Common to EEE, ECE & EIE)

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

PREREQUISITES: —

COURSE DESCRIPTION:
Disasters; Earthquakes; Floods; Cyclones; Droughts; Landslides; Disaster management.

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

CO1. Demonstrateknowledge on disasters, their vulnerability and mitigation measures.
CO2. Analyze disasters and their vulnerability.
CO3. Design strategies for effective disaster mitigation.
CO4. Address pre and post disaster issues for better preparedness and mitigation measures, through proper analysis and interpretation.
CO5. Use appropriate methods in disaster mitigation and management.
CO6. Use historical data of disasters to inform the people over preparedness and mitigation measures.
CO7. Solve disaster related issues considering environment.
CO8. Consider economical issues in disaster management.

DETAILED SYLLABUS:

UNIT-I: DISASTERS (09 Periods)
Types of disasters - Natural disasters; Impact of disasters on environment, infrastructure and development; Concepts of hazards and vulnerability analysis, Hazard Assessment, Guidelines for hazard assessment and vulnerability analysis, Basic principles and elements of disaster mitigation.

UNIT-II: EARTHQUAKES (09 Periods)
Introduction to earthquake, Intensity scale (MSK–64), Seismic activity in India, Seismic zones of India, Earthquakes in A.P., Action plan for earthquake disaster preparedness, Elements at risk, Recovery and rehabilitation after earthquake, Earthquake resistant design and construction of buildings; Tsunami – Onset, Types and causes,Warning, Elements at risk, Typical effects, Specific preparedness and mitigation strategies.

UNIT-III: FLOODS, CYCLONES AND DROUGHTS
(11 Periods)

Floods and Cyclones: Onset, Types, Warnings; Elements at risk, Typical effects, Indian floods and cyclones, Hazard zones, Potential for reducing hazards, Mitigation strategies and community based mitigation.

Droughts: Onset, Types and warning; Causes, Impact, Early warning and response mechanisms, Mitigation strategies, Droughts in India.

UNIT-IV: LANDSLIDES (08 Periods)

Onset, Types and warning; Causes, Elements at risk, Indian landslides, Hazards zones, Typical effects, Mitigation strategies and community based mitigation.

UNIT-V: DISASTER MANAGEMENT (08 Periods)

Disaster management organization and methodology, Disaster management cycle, Disaster management in India – Typical cases; Cost–benefit analysis with respect to

various disaster management programs implemented by NGOs and Government of India.

Total Periods: 45

TEXT BOOKS:

1. V. K. Sharma, *Disaster Management, Medtech Publishing,* 2ndEdition, 2013.
2. Anand S. Arya, AnupKaranth, and AnkushAgarwal, *Hazards, Disasters and Your Community: A Primer for Parliamentarians*, GOI–UNDP Disaster Risk Management Programme, Government of India, National Disaster Management Division, Ministry of Home Affairs, New Delhi, Version 1.0, 2005.

REFERENCE BOOKS:

1. Donald Hyndman and David Hyndman, *Natural Hazardsand Disasters*, Cengage Learning, 3rdEdition, 2011.
2. *Disaster Management in India,*AStatus Report, Ministry of Home Affairs, Govt. of India, May, 2011.
3. Rajendra Kumar Bhandari, *Disaster Education and Management: A Joyride for Students, Teachers, and Disaster Managers*, Springer India, 2014.
4. R. B. Singh, *Natural Hazards and Disaster Management*, Rawat Publications, 2009.

IV B.Tech - I Semester

(16BT60115) ENVIRONMENTAL POLLUTION AND CONTROL

(Open Elective)

(Common to EEE, ECE & EIE)

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

PREREQUISITES: —

COURSE DESCRIPTION:
Fundamentals ofair pollution;Dispersion of pollutants; Effects and control of air pollution; Water pollution;Soil pollution and control; Municipal solid waste management.

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

CO1. Demonstrateknowledge on air, water, soil pollution and their control and solid waste management.
CO2. Analyze causes and effects of air, water and soilpollution and their remedial measures.
CO3. Recommend suitable solutionsto complex environmental pollution problems.
CO4. Use appropriate remedial technique to solve environmental pollution problems.
CO5. Understand the effects of environmental pollutionon human health and vegetation.
CO6. Encourage sustainable development through implementation of pollution control measures.
CO7. Maintain IS Codes for environmental quality control.

DETAILED SYLLABUS:

UNIT-I: AIR AND NOISE POLLUTION (08 Periods)
Air Pollution: Scope, Significance, Classification, Sources – Line, Area, Stationary, Mobile; Effects of air pollutants on man, material and vegetation; Global effects of air pollution; Air pollution meteorology - Lapse rate, Inversion, Plume pattern;Dispersion of air pollutants - Dispersion models and applications; Ambient air quality standards.
Noise Pollution: Sound pressure, Power and intensity,Impacts of noise, permissible limits of noise pollution, measurement of noise.

UNIT-II: AIR AND NOISE POLLUTIONCONTROL (10 Periods)
Self-cleansing properties of the environment,Dilution method, Control at source, Process changes and equipment modifications, Control of particulates–Types of equipment, Design and operation –Settlingchambers,Centrifugal separators, Bag house filters, Wet scrubbers, Electrostatic precipitators; Control of gaseouspollutants – Adsorption, Absorption, Condensation, Combustion; Control of air pollution from automobiles, Control of noise pollution.

UNIT-III: WATER POLLUTIONAND CONTROL (10 Periods)
Water pollution – Sources, Causes, Effects; Surface and groundwater quality – Physical, Chemical, Biological; Drinking water quality standards, Water purification – Processes, Engineered systems – Aeration, Solids separation, Settling operations, Coagulation, Softening, Filtration, Disinfection; Wastewater – Sources, Causes, Effects, Treatment and disposal – Primary, Secondary, Tertiary; Case studies.

UNIT-IV: SOIL POLLUTION AND CONTROL (08 Periods)
Soil pollutants, Sources of soil pollution, Causes, Effectsand control of soil pollution, Diseases caused by soil pollution, Methods to minimize soil pollution, Effective measures to control soil pollution, Case studies.

UNIT-V: MUNICIPAL SOLID WASTE MANAGEMENT (09 Periods)
Types of solid waste, Composition of solid waste, Collection and transportation of solid waste, Methods of disposal – Opendumping, Sanitary landfill, Composting, Incineration, Utilization - Recovery and recycling, Energy Recovery.

Total Periods: 45

TEXT BOOKS:

1. Peavy, H. S, Rowe, D. R., and Tchobanoglous, G., *Environmental Engineering*, McGraw Hill Inc., 1985.
2. C.S.Rao, *Environmental Pollution Control Engineering*, New Age International Pvt. Ltd., 2ndEdition, 2007.
3. Ibrahim A. Mirsa, *Soil Pollution: Origin, Monitoring & Remediation*, Springer, UK, 2ndEdition, 2008.

REFERENCE BOOKS:

1. M.N. Rao and H.V.N. Rao, *Air Pollution,* Tata McGraw–Hill Education Pvt. Ltd., 19thEdition, 2010.
2. Daniel Vallero, *Fundamentals of Air Pollution,* Academic Press (Elsevier)*,* 5thEdition, 2014.
3. S.M.Khopkar,*Environmental Pollution Monitoring and Control,* New Age International Pvt. Ltd., 2ndEdition, 2007.
4. V. M. Domkundwar, Environmental Engineering, DhanpatRai& Co. Pvt. Ltd., New Delhi, 2014.

IV B.Tech - I Semester

(16BT60116) PLANNING FOR SUSTAINABLE DEVELOPMENT

(Open Elective)

(Common to EEE, ECE & EIE)

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

PREREQUISITES: —

COURSE DESCRIPTION:
Sustainable development;Environmental impact;Sustainable Policies; Governance; Theories and strategies; Media and education for sustainability.

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

CO1. Demonstrate the knowledge on sustainable development, environmental impact, sustainable policies, governance, systems and strategies, media and education for sustainability.
CO2. Analyze theories, environmental impact, policies, systems and strategies for sustainable development.
CO3. Develop suitable methods and systems for sustainable development.
CO4. Use appropriate techniquesin solving issues related to sustainable development.
CO5. Provide solutions to problems associated with sustainable development considering society.
CO6. Consider environment while planning sustainable development.
CO7. Communicate effectively on sustainable development issues through media and education.
CO8. Consider economical issues while planning for sustainable development.

DETAILED SYLLABUS:

UNIT-I: SUSTAINABLE DEVELOPMENT (09 Periods)
Definition and concepts of sustainable development, Capitalization of sustainability - National and global context;Millennium development goals, Emergence and evolution of sustainability and sustainable development, Theories of sustainability, Case studies.

UNIT-II: ENVIRONMENTAL IMPACT (09 Periods)

Climate change – Science, Knowledge and sustainability; Unforeseen environmental impacts on development, Challenges of sustainable development, Centrality of resources in sustainable development, Case studies.

UNIT-III: SUSTAINABLE POLICIES AND GOVERNANCE (09 Periods)

Governance - Democracy and Eco–welfare; Global civil society and world civil politics, Civic environmentalism, Policy responses to sustainable development, Economics of sustainability, Social responsibility in sustainability, National action, ISO 14001: Environmental management system.

UNIT-IV: SUSTAINABLE SYSTEMS AND STRATAGIES (09 Periods)

Need for system innovation, Transition and co–evolution, Theories and methods for sustainable development, Strategies for eco–innovation, Ecological foot print analysis, Socio ecological indicators – Eco labels; Policy programmes for system innovation, Case studies.

UNIT-V: MEDIA AND EDUCATION FOR SUSTAINABILITY (09 Periods)

Role of emerging media, Remarkable design and communication art, Activism and the public interest, Education for sustainability, Participation in decision making, Critical thinking and reflection, Case studies.

Total Periods: 45

TEXT BOOKS:

1. John Blewitt, *Understanding Sustainable Development*, Earth Scan Publications Ltd., 2ndEdition, 2008.
2. Jennifer A. Elliot, *An Introduction to Sustainable Development*, Earth Scan Publications Ltd., 4thEdition, 2006.

REFERENCE BOOKS:

1. Peter Rogers, Kazi F Jalal and John A Boyd, *An Introduction to Sustainable Development*, Earth Scan Publications Ltd., 2006.
2. Simon Dresner, *The Principles of Sustainability*, Earth Scan Publications Ltd.,2ndEdition, 2008.
3. Peter Bartelmus, *Environment Growth and Development: The Concepts and Strategies of Sustainability*, Routledge, 3rdEdition, 2003.
4. Gabriel Moser, Enric Pol, Yvonne Bernard, MiriliaBonnes, Jose Antonio Corraliza and Maria Vittoria Giuliani, *People Places and Sustainability*, Hogrefe& Huber Publishers, 2ndEdition, 2003.

IV B.Tech. - I Semester

(16BT60117) **PROFESSIONAL ETHICS**

(Open Elective)

(Common to EEE, ECE & EIE)

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

PREREQUISITES: —

COURSE DESCRIPTION:
Engineering ethics; Professional ideals and virtues; Engineering as social experimentation; Responsibilities and rights; Global issues.

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

CO1. Demonstrate the principles of ethics, importance of professional values and social responsibility.
CO2. Analyze the problems in the implementation of moral autonomy and use ethical theories in resolving moral dilemmas.
CO3. Develop suitable strategies to resolve problems arise in practicing professional ethics.
CO4. Provide solutions to complex problems associated with professional ethics by proper analysis and interpretation.
CO5. Use appropriate theories in resolving issues pertain to professional ethics.
CO6. Understand the impact of professional ethics on society and address the limitations of codes of ethics.
CO7. Practice engineering with professionalism, accountability and ethics.
CO8. Function as a member, consultant, manager, advisor and leader in multi-disciplinary teams.
CO9. Write reports without bias and give instructions to follow ethics.

DETAILED SYLLABUS:

UNIT-I: ENGINEERING ETHICS (09 Periods)
Scope and aim of engineering ethics, Senses of engineering ethics, Variety of moral issues, Types of inquiry, Moral dilemmas, Moral autonomy-Kohlberg's theory, Gilligan's theory, Consensus and controversy.

UNIT-II:PROFESSIONAL IDEALS AND VIRTUES (08 Periods)
Theories about virtues, Professions, Professionalism, Characteristics, Expectations, Professional responsibility, Integrity, Self-respect, Sense of responsibility, Self-interest, Customs and religion, Self-interest and ethical egoism, Customs and ethical relativism, Religion and divine command ethics, Use of ethical theories, Resolving moral dilemmas and moral leadership.

UNIT-III:ENGINEERING AS SOCIAL EXPERIMENTATION (10 Periods)
Engineering as experimentation, Similarities to standard experiments, Learning from the past and knowledge gained, Engineers as responsible experimenters, Conscientiousness, Moral autonomy and accountability, The challenger case, Codes of ethics and limitations, Industrial standards, Problems with the law of engineering.

UNIT-IV: RESPONSIBILITIES AND RIGHTS (09 Periods)
Collegiality and loyalty, Respect for authority, Collective bargaining, Confidentiality, Conflict of interests, Occupational crime, Rights of engineers, Professional rights, Whistle-blowing, The BART case, Employee rights and discrimination.

UNIT-V: GLOBAL ISSUES (09 Periods)
Multinational corporations, Professional ethics, Environmental ethics, Computer ethics, Engineers as consultants, Witnesses, Advisors and Leaders, Engineers as Managers, Managerial ethics applied to Engineering Profession, moral leadership.

Total Periods: 45

TEXT BOOKS:

1. Mike W. Martin and Roland Schinzinger, *Ethics in Engineering*, Tata McGraw-Hill, 3rdEdition, 2007.
2. Govindarajan, M., NataGovindarajan, M., Natarajan, S. and Senthilkumar, V. S., *Engineering Ethics*, Prentice Hall of India, 2004.

REFERENCE BOOKS:

1. S. Kannan and K. Srilakshmi, *Human Values and Professional Ethics*, Taxmann Allied Services Pvt Ltd., 2009.
2. Edmund G. Seebauer and Robert L. Barry, *Fundamental of Ethics for Scientists and Engineers*, Oxford University Press, 2001.
3. Charles F. Fledderman, *Engineering Ethics*, Pearson Education, 2ndEdition, 2004.

IV B.Tech. - I Semester

(16BT60118) **RURAL TECHNOLOGY**

(Open Elective)

(Common to EEE, ECE & EIE)

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

PREREQUISITES: —

COURSE DESCRIPTION:
Rural technology; Non conventionalenergy; Community development; IT in rural development.

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

CO1. Demonstrate the knowledge on technologies for rural development.
CO2. Analyze various technologies available which are appropriate for rural development.
CO3. Carryout feasibility study on the public and private partnership for rural development.
CO4. Develop and use latest technologies for rural development.
CO5. Address health and safety issues while choosing technologies for rural development.
CO6. Educate the rural populace on the positive impacts of bio-fertilisers and usage of agro machinery in agriculture.

DETAILED SYLLABUS:

UNIT-I:RURAL TECHNOLOGY (09 Periods)
India - Technology and rural development, Pre and post-independence period,Rural India Life, Indian farmer, Role of science and technology in rural development, Rural technology and poverty eradication, Rural business hubs, Technology in improving rural infrastructure,Various organizations related to innovation, Issues of technology transfer - CAPART, NABARD, CSIR, NIF.

UNIT-II: NON CONVENTIONAL ENERGY (09 Periods)
Definition of energy, Types of alternative sources of energy, Sources of non-conventional energy – Solar energy: Solar cooker,Solar heater; Biogas, Recycling and management,Wastes conservation, Assessment and production of biomass products and their utilization.

UNIT-III: TECHNOLOGIES FOR RURAL DEVELOPMENT (09 Periods)

Food and agro based technologies, Tissue culture, Nursery,Building and construction technologies, Cultivation and processing of economic plants, Cottage and social industries.

UNIT-IV: COMMUNITY DEVELOPMENT (09 Periods)

Water conservation, Rain water Harvesting, Drinking water, Environment and Sanitation, Bio fertilizers, Medical and aromatic plants, Employment generating technologies–Apiculture, Pisciculture and Aquaculture.

UNIT-V:IT IN RURAL DEVELOPMENT (09 Periods)

Role of information technology (IT) in rural areas, Impact of IT in rural development, Need and necessity of technology, Corporate social responsibilities, Private sector participation (Activities in different spheres: Employment, Education, Health, Agriculture and service sectors) and SaansadAdarsh Gram Yojana (SAGY), Village adoptionschemes.

Total Periods: 45

TEXT BOOKS:

1. M.S.Virdi, *Sustainable Rural Technologies*, Daya Publishing House, 2009.
2. S.V. Prabhathand, P. Ch. Sita Devi, *Technology and Rural India*, Serials Publications, 2012.

REFERENCE BOOKS:

1. R. Chakravarthy and P.R.S. Murthy, *Information Technology and Rural Development,* Pacific Book International, 2012.
2. Shivakanth Singh, *Rural Development Policies and Programmes,* Northern Book Centre, 2002.
3. L.M.Prasad, *Principles and Practice of Management*, S. Chand & Sons, 8th edition, 2014.
4. Venkata Reddy, K., *Agriculture and Rural Development - Gandhian Perspective*,Himalaya Publishing House, 2001.

IV B.Tech - I Semester

(16BT60308) GLOBAL STRATEGY AND TECHNOLOGY

(Open Elective)

(Common to EEE, ECE & EIE)

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

PREREQUISITES: —

COURSE DESCRIPTION:
Introduction to strategic management; Strategic management process; Principles of good strategy; Globalization strategies; Research and Development strategies; Technology Management and Transfer; Elements of Transfer Process; Corporate Governance in the Indian scenario.

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

CO1. Demonstrate the knowledge on Strategic management, Research & development strategies, Technology management and transfer, Globalization and Corporate governance.
CO2. Identify and analyze crucial problems in strategic management to improve performance of the organizations.
CO3. Develop the products and production process by using research and development strategies.
CO4. Conduct investigations on the impact of globalization in current scenario in the context of corporate governance.
CO5. Appraise the resources and capabilities of the firm in terms of their ability to confer sustainable development.
CO6. Apply ethics in strategic decision making.

DETAILED SYLLABUS:

UNIT-I: STRATEGIC MANAGEMENT (09 Periods)
Introduction, Classes of decisions, Levels of strategy, Core competence, Strategic intent and stretch, Approaches to strategy making, Roles of different strategists, Strategic management- Process, Benefits, Limitations; Ethics in strategic decision making, Principles of good strategy, Strategic Management in India.

UNIT-II: RESEARCH & DEVELOPMENT STRATEGIES (09 Periods)

Concept, Evolution of R&D Management, R&D as a business, R&D as competitive advantage, Elements of R & D strategies, Integration of R & D, Selection and implementation of R & D strategies, R & D trends.

UNIT-III: TECHNOLOGY MANAGEMENT AND TRANSFER (09 Periods)

Technology Management: Introduction, Technology - Definition, Components, Classification Features; Technology Management- Concept, Nature; Drivers of Management of Technology-Significance, Scope, Responding to technology challenges.

Technology Transfer: Introduction, Definition, Classification, Significance, Elements of process, Types of Technology Transfer, Package, Modes of Transfer, Routes, Channels and Effectiveness of Technology Transfer.

UNIT-IV: GLOBALISATION (09 Periods)

Definition, Stages, Essential conditions for globalization, Globalization strategies, Competitive advantage of Nations, Factors affecting Globalization, Globalization of Indian business.

UNIT-V: CORPORATE GOVERNANCE: THE INDIAN SCENARIO (09 Periods)

Emergence of corporate governance in India- Landmarks, Models, Codes and status in India, Role and Responsibilities of Regulators, The Board of Directors; Corporate Governance-Specific issues in India, Family owned Business, Corporate Governance and the Indian ethos.

Total periods: 45

TEXT BOOKS:

1. Francis Cherunilam, *Strategic Management*, Himalaya Publishing House, 3rdEdition, 2002.
2. C.S.G.Krishnamacharyulu and Lalitha Ramakrishnan, *Management of Technology*, Himalaya Publishing House, 2ndEdition, 2012.

REFERENCE BOOKS:

1. White and Bruton, *The Management of Technology and Innovation: A Strategic Approach*, Cengage Learning, 1stEdition, 2007.
2. S.K.Mandak, *Ethics in Business and Corporate Governance*, TMH, 2ndEdition, 2012.

IV B.Tech - I Semester

(16BT60309) **INTELLECTUAL PROPERTY RIGHTS AND MANAGEMENT**

(Open Elective)

(Common to EEE, ECE & EIE)

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

PREREQUISITES: —

COURSE DESCRIPTION:

Protection of ideas; innovation and artistic endeavors; Acts and procedure related to patents, trademarks, copy right, design registration, trade secrets and cyber laws; Infringement; Commercialization of intellectual property rights; Case studies in each.

COURSE OUTCOMES:

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

CO1. Demonstrate knowledge on intellectual property rights, patents, trademarks, copyrights, trade secrets and commercialization of intellectual property.

CO2. Analyse the commercial significance of discoveries and developments and to assist in bringing these into public use.

CO3. Investigate and ensure smooth transition from concept to final product by following National & International Laws of Intellectual Property.

CO4. Utilize the various policies and procedures related to patents, trademarks and copyrights relating to IPR.

CO5. Safeguard, review and manage the intellectual property so that it may receive adequate and appropriate legal protection against unauthorized use.

CO6. Follow ethical standards in capacity building and work as a platform for development, promotion, protection, compliance, and enforcement of intellectual property and knowledge.

CO7. Prepare documents and fill applications needed for filing a patent, design, copyright and trade mark.

DETAILED SYLLABUS:

UNIT-I: OVERVIEW OF INTELLECTUALPROPERTY RIGHTS (09 Periods)

Introduction, Intellectual Property vs. Conventional Property, and importance of intellectual property rights (IPRs), types of intellectual property, International Treaties for protection of IPR-Paris Convention, World Intellectual Property Organization (WIPO), World Trade Organization (WTO), Trade Related Aspects of Intellectual Property Rights (TRIP) Agreement, General Agreement on Tariffs and Trade(GATT).

UNIT-II: TRADEMARKS (09 Periods)

Introduction, Functions and kinds of trademarks, Trade Mark Registration Process, Post registration procedures, Trade Mark maintenance, Transfer of rights, Inter parties Proceedings, Infringement and Dilution of Ownership of Trade Mark, Trade Mark claims, International Trade Mark Law.

UNIT-III: PATENTS (09 Periods)

Introduction, Rights under Patent Law, Patent Application Process, Terms and Maintenance of Patents Requirements, Patent Ownership and Transfer, Licensing of Patent Rights, Sole and Joint Inventors, Disputes over Inventorship, Patent Infringement, International Patent Law, Patent Cooperation Treaty (PCT), Patent Law Treaty (PLT), Substantive Patent Law Treaty (SPLT).

UNIT-IV: COPY RIGHTS, TRADE SECRETS, CYBER LAWS (09 Periods)

Copy Rights: Introduction, nature and scope, subject matter, Rights afforded by copyright law, Copyrights ownership, transfers and duration, Copyright registration process.

Trade Secrets: Introduction, Determination of Trade Secret Status, Employer-Employee Relationships, Protection of submissions.

Cyber laws: E-commerce and cyber laws, cybercrime and legislation- need, objective and scope; IT Act 2000, Information Technology and Information Security.

UNIT-V: INDUSTRIAL DESIGN AND COMMERCIALIZATION OF INTELLECTUAL PROPERTY RIGHTS (09 Periods)

Industrial Design: Introduction, Indian Law related to registration of Industrial Designs, Essential requirements for registration of a design in India, International Agreements – Hague System; Conflicts related to registration of design.

Commercialization of Intellectual Property Rights: Competition and Confidentiality Issues, Antitrust Laws, Assignment of Intellectual Property Rights, Technology, Transfer Agreements, Intellectual Property Issues in the Sale of Business, Legal Auditing of Intellectual Property, Due Diligence of Intellectual Property Rights in a Corporate Transaction.

Total Periods: 45

TEXT BOOKS:

1. Deborah E. Bouchoux, *Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets*, Cengage Learning, 4thEdition, 2016.
2. KompalBansal and ParikshitBansal, *Fundamentals of Intellectual Property for Engineers*, BS Publications, 1stEdition, 2013.

REFERENCE BOOKS:

1. PrabuddhaGanguli, *Intellectual Property Rights-Unleashing the Knowledge Economy*, McGraw Hill Education, 6th reprint, 2015.
2. P. Narayanan, *Intellectual Property Law*, Eastern Book Company, 3rdEdition, 2013.
3. R.Radha Krishnan, S. Balasubramanian, *Intellectual Property Rights: Text and Cases*, Excel Books, 1stEdition, 2008.

IV B.Tech. - I Semester

(16BT60310) MANAGING INNOVATION AND ENTREPRENEURSHIP

(Open Elective)

(Common to EEE, ECE & EIE)

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

PREREQUISITES:—

COURSE DESCRIPTION:
Evolution of entrepreneurship from economic theory Managerial and entrepreneurial competencies; Concepts of Shifting Composition of the Economy Purposeful Innovation & Sources of Innovative Opportunity; The Innovation Process; Innovative Strategies; Entrepreneurial Motivation; Entrepreneurs versus inventors; Ethics and International Entrepreneurship; Strategic Issues in International Entrepreneurship; Problem solving Innovation and Diversification.

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

CO1. Demonstrate the principles of business innovation and entrepreneurship for establishing industrial ventures.
CO2. Analyze business plans for potential investors and stakeholders and effectively answer probabilistic questions on the substance of plan.
CO3. Develop a comprehensive and well planned business structure for a new venture.
CO4. Conduct investigation on complex problems, towards the development of Project.
CO5. Apply modern statistical and mathematical tools to design projects and subsequent work procedures.
CO6. Apply ethics in constructive innovation framework.
CO7. Exhibit professionalism by employing modern project management and financial tools.

DETAILED SYLLABUS:

UNIT-I: CREATIVITY AND INNOVATION (07 Periods)
Introduction, Levels of innovation, Purposeful innovation and the sources of innovative opportunity, The innovation process, Innovative strategies, Strategies that aim at introducing and innovation, Dynamics of ideation and creativity – Inbound, Outbound; Context and process of new product development, Theories of outsourcing.

UNIT-II: PARADIGMS OF INNOVATION (11Periods)

Systems approach to innovation, Innovation in the context of developed economies and Emerging economies, Examining reverse innovation and its application, Performance gap, Infrastructure gap, Sustainability gap, Regulatory gap, Preference gap, organizational factors effecting innovation at firm level.

UNIT-III: SOURCES OF FINANCE AND VENTURE CAPITAL (07 Periods)

Importance of finance, Comparison of venture capital with conventional development capital, Strategies of venture funding, Investment phases, Investment process, Advantages and disadvantages of venture capital, Venture capital developments in India.

UNIT-IV: INTELLECTUAL PROPERTY INNOVATION AND ENTREPRENEURSHIP (11 Periods)

Introduction to Entrepreneurship, Evolution of entrepreneurship from economic theory, Managerial and entrepreneurial competencies, Entrepreneurial growth and development, Concepts, Ethics and Nature of International Entrepreneurship, Intellectual property – forms of IP, Patents, Trademarks, Design registration, Copy rights, Geographical indications, Patent process in India.

UNIT-V: OPEN INNOVATION FRAMEWORK AND PROBLEM SOLVING (09 Periods)

Concept of open innovation approach, Difference between open innovations and Cloud innovation approaches, Limitations and Opportunities of open innovation framework, Global context of strategic alliance, Role of strategic alliance, Problem Identification and Problem Solving, Innovation and Diversification.

Total Periods: 45

TEXT BOOKS:

1. Vinnie Jauhari, SudhanshuBhushan, *Innovation Management*, Oxford University Press, 1stEdition, 2014.
2. Drucker, P. F., *Innovation and Entrepreneurship*, Taylor & Francis, 2ndEdition, 2007.

REFERENCE BOOKS:

1. Robert D Hisrich, Claudine Kearney, *Managing Innovation and Entrepreneurship,* Sage Publications, 1stEdition, 2014.
2. V.K.Narayanan, *Managing Technology and Innovation for Competitive Advantage*, Pearson India, 1stEdition, 2002.

IV B.Tech. - I Semester

(16BT60311) **MATERIALS SCIENCE**

(Open Elective)

(Common to EEE, ECE & EIE)

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

PREREQUISITES:—

COURSE DESCRIPTION:
Structure and Bonding in metals; Steels, Cast Irons and Non Ferrous alloys; Material Selection for conductors, Insulators and semiconductors; Strengthening mechanisms of metals; Plastics and Ceramics as Insulators; AC and DC properties of Insulators; Semiconductors and Magnetic materials; Composite materials in Electrical and Electronics engineering; Material Selection and manufacturing of Optical fibers.

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

CO1. Demonstrate the knowledge on concepts of fundamental science and engineering principles relevant to materials.
CO2. Analyze the structures of various types of Ferrous, Non-ferrous alloys influencing various engineering applications.
CO3. Conduct investigations to select suitable materials with desired properties for engineering applications.
CO4. Use phase diagrams to interpret the data regarding microstructure of materials.
CO5. Consider health and safety issues while providing materials to real time applications.
CO6. Use composite materials that reduce material waste in design and manufacturing for sustainability.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO MATERIAL SCIENCE **(07 Periods)**

Structure of metals: Bonds in Solids, Crystallization of metals, Grain and grain boundaries, Effect of grain boundaries on the properties of metals / alloys, Determination of grain size measurement.

Constitution of alloys: Necessity of alloying, Types of solid solutions, Hume rothery rules, Intermediate alloy phases.

UNIT-II: CAST IRONS, STEELS AND NON-FERROUS METALS (12 Periods)

Structure and properties of Grey cast iron, Spheroidal cast iron, White Cast iron, Malleable Cast iron, Alloy cast irons, Classification of steels, structure and properties of plain carbon steels, Structure and properties of Copper and its alloys, Aluminum and its alloys.

UNIT-III: ELECTRIC CONDUCTORS AND INSULATORS (12 Periods)

Type of materials selected for conductors, Insulators and semiconductors, Introduction to ceramics - Bonding and microstructure, DC properties of ceramic materials, AC properties of ceramic materials, mechanical properties, Ceramics as Conductors, Insulators and capacitors; Introduction to Plastics - DC properties, AC properties, Mechanical properties.

UNIT-IV: SEMICONDUCTORS AND MAGNETIC MATERIALS (09 Periods)

Fabrication of Semiconductors, Producing a silicon wafer-Lithography and Deposition packaging of semiconductors materials; Types of magnetic materials, Measuring magnetic properties, Application of soft magnetic materials in Electromagnets and relays, AC transformers, Generators and motors.

UNIT-V: ADVANCED MATERIALS AND APPLICATIONS (05 Periods)

Composites - Fiber reinforced metal matrix, Ceramic matrix, Polymer matrix, Properties and applications of composites; Ceramics - Alumina, Zirconia, Silicon Carbide, SiAlONs, Reaction Bonded Silicon Nitride (RBSN); Glasses- properties and applications, manufacturing of optical fibers.

Total Periods: 45

TEXT BOOKS:

1. Kodgire V D, *Material Science and Metallurgy*, Everest Publishing House, Pune, 31stEdition, 2011.
2. Ian. P.Jones, *Material Science for Electrical and Electronic Engineers*, Oxford University Press, 1stEdition, 2000.

REFERENCE BOOKS:

1. V. Raghavan, *Physical Metallurgy: Principles and Practices*, PHI, New Delhi, 2nd Edition, 2006.
2. William. D. Callister, *Materials Science & Engineering-An Introduction*, John Wiley and Sons, New Delhi, 6th Edition, 2002.

IV B.Tech. - I Semester

(16BT70412) **GREEN TECHNOLOGIES**

(Open Elective)

(Common to EEE, ECE & EIE)

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

PREREQUISITES: —

COURSE DESCRIPTION:
Principles of green engineering; Green communications; Green energy; Green computing; Green construction; Green manufacturing.

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

CO1. Deploy conceptual knowledge in green technologies pertaining toengineering practice.
CO2. Analyze various green technologies for engineering practice.
CO3. Provide green solutions to engineering problems.
CO4. Apply various green techniques in the engineering practice.
CO5. Consider health and safety issues while providing green solutions to the society.
CO6. Understand issues related to environment sustainability.
CO7. Apply ethical standards for environmental sustainability in the engineering practice.

DETAILED SYLLABUS:

UNIT-I: PRINCIPLES OF GREEN ENGINEERING AND GREEN COMMUNICATIONS (11 Periods)

Principles of Green Engineering:
Introduction, Definition of green engineering, Principles of green engineering.

Green Communications:
Introduction, Origin of Green Communications, Energy Efficiency in Telecommunication systems, Telecommunication system model and energy Efficiency, Energy saving concepts, Quantifying energy efficiency in ICT, Energy efficiency metrics of green wireless networks, Embodied energy of communication devices- Introduction, The extended energy model, Embodied/Operating Energy of a BS in Cellular network- A Case study; Energy efficient standards for wireline communications.

UNIT-II: GREEN ENERGY (09 Periods)

Introduction, adverse impacts of carbon emission, control of carbon emission– methods, greenhouse gas reduction – methods, Energy sources and their availability, Green energy for sustainable development. Green energy sources – Solar energy, Wind energy, Fuel cells, Biofuels, Wave and Geothermal energy (Principle of generation only).

UNIT-III: GREEN IT (09 Periods)

The importance of Green Information technologies, Strategizing Green Initiatives, Implementation of Green IT, Information Assurance, Communication and Social Media, Regulating Green IT- Laws, Standards and Protocols; RoHS, REACh, WEEE, Legislating for GHG Emissions and Energy Use of IT Equipment, Non-regulatory Government Initiatives, Industry Associations and Standard Bodies, Green Building Standards, Green Data Centres, Social Movements and Greenpeace, Conclusions.

UNIT-IV: GREEN CONSTRUCTION (09 Periods)

Green Building: Definition, Typical features, Benefits, Requisites for green building construction, Sustainability, Concept of REDUCE, REUSE, RECYCLE, RETHINK, REPLENISH AND REFUSE (6 R's), Sustainable construction focus point – Site selection, Planning, Water, Energy, Material, Indoor air quality, Construction procedures.

Indian Green Building Council: Introduction to IGBC green homes, Benefits of IGBC, IGBC green home rating system, Introduction to USGBC, LEED rating system, Procedure to get IGBC certification, GRIHA Rating.

UNIT-V: GREEN MANUFACTURING (09 Periods)

Introduction, background, definition, motivation and barriers to green manufacturing, Impact of manufacturing in environmental ecology, Need for green manufacturing, Advantages and Limitations, green manufacturing strategies, Green manufacturing and sustainability, Sustainability tools; Waste stream mapping and application, Green manufacturing through clean energy supply, green lean manufacturing, green packaging and supply chain.

Total Periods: 47

TEXT BOOKS:

1. KonstantinosSamdanis, Peter Rost, Andreas Maeder, MichelaMeo, Christos Verikoukis, *Green Communications: Principles, Concepts and Practice,*John Wiley & Sons, 2015.
2. Soli J. Arceivala, *Green Technologies for a better future,* McGraw Hill Education (India) Pvt. Ltd, 2014.
3. San Murugesan, G.R. Gangadharan, *Harnessing Green IT – Principles and Practices,* John Wiley & Sons Ltd., 2008.
4. Tom Woolley, Sam Kimmins, Paul Harrison and Rob Harrison, *Green Building Handbook*, *Volume 1*, E & FN Spon, an imprint of Thomson Science & Professional.
5. *IGBC Green Homes Rating System Version 1.0* – A bridged reference guide.
6. J Paulo Davim, Green Manufacturing: Processes and Systems, Springer, 2012.
7. David A Dornfeld, Green Manufacturing: Fundamentals and Applications, Springer, 2013.

REFERENCE BOOKS:

1. Athanasios V Alavanidis, ThomaisVlachogianni, *Green Chemistry and Green Engineering*, SynchronaThemata, 2012.
2. G.D. Rai, *Non-conventional Energy Sources*, Khanna Publishers, Delhi, 5thEdition,2011.
3. Marty Poniatowski, *Foundation of Green Information Technology, Prentice Hall, 2009.*
4. R. K. Gautham, *Green Homes*, BS publications, 2009.

IV B.Tech. - I Semester

(16BT70413) **INTRODUCTION TO NANOSCIENCE AND NANOTECHNOLOGY**

(Open Elective)

(Common to EEE, ECE & EIE)

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

PREREQUISITES:—

COURSE DESCRIPTION:

Introduction to the concept ofnano;Description of nanomaterial;Nanostructure characterization tools;Classification of nanomaterials;Fabrication of nanomaterial;Different applications of nanostructures and nanomaterials.

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

CO1. Demonstrate knowledge in
- Nanoscale technology.
- Difference between micro and nanotechnology
- Classification of Nanostructure and Nanomaterial
- Fabrication of various nanomaterials and nanostructures.

CO2. Analyze numerical and analytical problems in
- Nanomaterial size by using Scanning Electron Microscope and X-Ray diffraction

CO3. Design and fabricate devices based on nanostructures like
- Nano solar cell
- Nano cantilever
- Nano bio-sensor

CO4. Synthesize nano particle of different materials to solve the problems related to fabrication of nanostructures.

CO5. Select appropriate technique for fabrication ofnanostructures and Nano composites.

CO6. Apply ethical standards and legal issues while using chemical substances infabrication of new nanostructures.

DETAILED SYLLABUS:

UNIT-I: FUNDAMENTALS OF NANOTECHNOLOGY (08 Periods)

Introduction – Scientific revolutions, Time and length scale in structures, Definition of a nanosystem; Dimensionality and size dependent phenomena - Surface to volume ratio Fraction of surface atoms, Surface energy and surface stress, surface defects, Properties at nanoscale (optical, mechanical, electronic, and magnetic).

UNIT-II:IDENTIFICATION AND CHARACTERIZATION TOOLS FOR NANOMATERIALS AND NANOSTRUCTURE (10 Periods)

Field Emission Scanning Electron Microscopy (FESEM), Environmental Scanning ElectronMicroscopy (ESEM) High Resolution, Transmission Electron Microscope (HRTEM), Scanning Tunneling Microscope(STM), Surface enhanced Raman spectroscopy (SERS), Secondary Ion Mass Spectroscopy, Focused Ion Beam Photoelectron Spectroscopy, X-ray Photoelectron Spectroscopy (XPS), Auger electron spectroscopy (AES), Rutherford backscattering spectroscopy (RBS), X-Ray Diffraction, Intensities in X-Ray Scattering Particle Size Effect.

UNIT-III:CLASSIFICATION OF NANOMATERIALS(10 Periods)

Classification based on dimensionality, Quantum Dots,Wells and Wires-III-V Nanoparticles, Electronic Structure of Nanosemiconductor, Carbon based nanomaterials (buckyballs, nanotubes, graphene), Metal based nano materials (nanogold, nanosilver and metal oxides), Nanocomposites, Nanopolymers, Nanoglasses, Nano ceramics, Biological nanomaterials, Fulrene-discovery and early years,.

UNIT-IV: SOME FABRICATION TECHNIQUES OF NANOMATERIALS AND NANOSTRUCTURES (09 Periods)

Chemical Methods: Metal Nanocrystals by Reduction, Solvothermal Synthesis, Photochemical Synthesis,Sonochemical Routes, Chemical Vapor Deposition (CVD), Metal Oxide Chemical Vapor Deposition (MOCVD), Plasma Enhanced Chemical Vapour Deposition Technique(PECVD), Hydrothermal Method, Sol-Gel.

PhysicalMethods: Ball Milling, Electrodeposition, Spray Pyrolysis, Flame Pyrolysis, DC/RF Magnetron Sputtering, Molecular Beam Epitaxy (MBE) Thermal Evaporation Method.

UNIT-V:APPLICATIONS (08 Periods)

Solar energy harvesting, Catalysis,Molecular electronics and printed electronics Nanoelectronics, Polymers with aspecial

architecture, Liquid crystalline systems, Linear and nonlinear optical and electro-optical properties, Applications in displays and other devices, Nanomaterials for data storage, Photonics, Plasmonics, Chemical and biosensors, Nanomedicine and Nanobiotechnology, MESFET.

Total Periods: 45

TEXT BOOKS:

1. Pradeep T., *A Textbook of Nanoscience and Nanotechnology*, Tata McGraw Hill Education Pvt. Ltd., 2012.
2. Hari Singh Nalwa, *Nanostructured Materials and Nanotechnology*,Academic Press, 2002.

REFERENCE BOOKS:

1. Nabok A., *Organic and Inorganic Nanostructures*, Artech House, 2005.
2. Dupas C., Houdy P., Lahmani M*, Nanoscience: Nanotechnologies and Nanophysics*, Springer - Verlag Berlin Heidelberg, 2007.
3. S.M. Sze, Physics of Semiconductor Devices, 2ndEdition, 2001.

IV B.Tech. - I Semester

(16BT60505) ENGINEERING SYSTEM ANALYSIS AND DESIGN

(Open Elective)

(Common to EEE, ECE & EIE)

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

PREREQUISITES:—

COURSE DESCRIPTION:
Systems Process; Technologies for Systems; System Development Life Cycle; System Analysis and Modeling; Levels of Management; Project Management; Systems Implementation and Importance of UML Prototyping; Maintaining and Managing the Systems Output Process.

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

CO1. Demonstrate knowledge in

- Systems Process and System Design
- Systems Analysis and Modeling
- System Development Life Cycle
- Design Management and Maintenance Tools.

CO2. Analyzesystem Process and estimate the given models by using case tools.

CO3. Design and develop a model to the organizational systems.

CO4. Solve complex problems related to engineering systems and produce accurate results

CO5. Apply object oriented techniques for modeling dynamic systems.

CO6. Contribute towards societal issues and responsibilities in designing, modeling and developing of organizational systems.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION (09 Periods)
Systems, Types of systems, Integrating technologies for systems, Need for system analysis and design, Role of the systems analyst, System development life cycle, CASE tools for analysis and design.

UNIT-II: ANALYSIS AND MODELING ORGANIZATIONAL SYSTEM (09 Periods)

Organization as system, System analysis, Depicting systems graphically, Use case modeling, Levels of management, Organizational culture.

UNIT-III: PROJECT MANAGEMENT (10 periods)

Project initiation, Problem in organization, Determining feasibilities, Ascertaining hardware and software needs, Identifying, Forecasting, Comparing costs and benefits, Activity planning and control, Managing the project.

UNIT-IV: OBJECT ORIENTED ANALYSIS AND DESIGN USING UML (08 Periods)

Introduction, Object modeling, Dynamic modeling, functional modeling, packages and other UML artifacts, the importance of using UML for modeling.

UNIT-V: DESIGNING EFFECTIVE OUTPUT (09 Periods)

Output design objectives, Relating output content to output method, Realizing how output bias affects users, Designing output for display, Case studies-Designing a web site management, Online exam management, Online portal design.

Total Periods:45

TEXT BOOK:

1. Kenneth E. Kendall and Julie E. Kendall,*System Analysis and Design*, Pearson Education, 9thEdition, 2011.

REFERENCE BOOKS:

1. Dennis, Wixom and Roth,*Systems Analysis and Design*, John Wiley, 5thEdition, 2012.
2. Shelly and Rosenblatt,*Systems Analysis and Design*, Cengage Learning, 9thEdition, 2012.

IV B.Tech.- I Semester

(16BT71011) MICRO-ELECTRO-MECHANICAL SYSTEMS

(Open Elective)

(Common to EEE, ECE & EIE)

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

PREREQUISITES:—

COURSE DESCRIPTION:
Overview of Micro Electro Mechanical Systems (MEMS); scaling laws; working principles of microsensors and microactuators; materials; microfabrication processes; packaging of Microsystems.

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

CO1. Demonstrate knowledge on MEMS devices, scaling laws, microsensors and microactuators
CO2. Analyze the properties of materials and identify its suitability for MEMS devices.
CO3. Design MEMS devices that meet desired specifications and requirements.
CO4. Analyze and synthesize the information to provide effective solution to engineering problems with MEMS devices.
CO5. Use modern techniques in micro manufacturing process.
CO6. Develop efficient and cost effective MEMS based products for society.

DETAILED SYLLABUS:

UNIT-I: OVERVIEW OF MEMS AND SCALING LAWS **(09 periods)**

MEMS and Microsystems, Microsystems and microelectronics, miniaturization, applications of MEMS in the automotive industry and in other industries.

Scaling laws of miniaturization: Introduction to scaling, scaling in: geometry, rigid- body dynamics, electrostatic forces, electromagnetic forces, Electricity, Fluid mechanics, Heat transfer.

UNIT-II: **WORKING PRINCIPLES OF MICROSYSTEMS** **(09 periods)**

Microsensors,acoustic wave sensors, biomedical and biosensors, chemical sensors, pressure sensors, thermal sensors. Microactuation: actuation using thermal forces, shape-memory alloys, piezoelectric crystals, electrostatic forces. MEMS with microactuators, microgrippers, micromotors, microvalves, micropumps.Microaccelerometers, microfludics.

UNIT-III:MATERIALS FOR MEMS AND MICROSYSTEMS **(09 periods)**

Substrate and wafers, silicon as a substrate material, silicon compounds, silicon piezoresistors, gallium arsenide, quartz, piezoelectric crystals, polymers, carbon nano tube (CNT), development of CNTs, application of CNTs.

UNIT-IV: MEMS FABRICATION PROCESS AND MICROMANUFACTURING (09 periods)

Photolithography, ion implantation, diffusion, oxidation, chemical vapor deposition, physical vapor deposition, deposition by epitaxy, etching, bulk micromanufacturing, surface micromanufacturing, LIGA process.

UNIT-V: MEMS PACKAGING (09 periods)

Introduction to microsystem packaging, objectives and general considerations in packaging design, three levels of microsystem packaging, interfaces in microsystem packaging, packaging technologies, three-dimensional packaging, selection of packaging materials, signal mapping and transduction, Design case: Pressure sensor packaging.

Total Periods: 45

TEXT BOOK:

1. Tai-Ran Hsu, *MEMS & Microsystems, Design and Manufacture*, McGraw Hill Education (India) Pvt. Ltd., 2002.

REFERENCES BOOKS:

1. G.K.Ananthasuresh, K.J.Vinoy,*Micro and Smart Systems*, Wiley India, 2010.
2. NitaigourPremchandMahalik, *MEMS*, McGraw Hill Education (India) Pvt. Ltd., 2007.

IV B.Tech. – I Semester

(16BT61205) **CYBER SECURITY AND LAWS**

(Open Elective)

(Common to EEE, ECE & EIE)

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

PREREQUISITES:—

COURSE DESCRIPTION:
Cyber Crimes and Indian IT Act; Cyber Offenses; Tools and Methods used in Cyber Crime; Phishing ad Identity Theft; Indian and Global Perspective on Cyber Crimes and Cyber Security; Organizational Implications on Cyber Security; IPR Issues; Cyber Crime and Terrorism; Cyber Crime Illustrations

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

CO1. Demonstrate knowledge in Cyber security, Cybercrimes and its related laws in Indian and Global Act.
CO2. Analyze the legal perspectives and laws related to cybercrimes in Indian context.
CO3. Apply security and privacy methods in development of modern applications and in organizations to protect people and to prevent cybercrimes.
CO4. Solve Cyber security issues using privacy policies.
CO5. Use antivirus tools to minimize the impact of cyber threats.
CO6. Follow security standards for the implementation of Cyber Security and laws.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO CYBER CRIMES AND OFFENSES (09 Periods)

Cyber Crimes: Introduction, Definition, Origin, Cybercrime and information security, Cyber criminals, Classifications of cybercrimes, The legal perspectives and Indian perspective, Cybercrime and Indian ITA 2000, Global perspective on cybercrimes.

Cyber Offenses: Introduction, Criminals planning on attacks, Social engineering, Cyber stalking, Cyber cafe and crimes, Botnets.

UNIT-II: TOOLS AND METHODS USED IN CYBER CRIME AND PHISHING AND IDENTITY THEFT (09 Periods)

Introduction, Proxy servers and Anonymizers, Phishing, Password cracking, Key loggers and Spywares, Virus, Worms and Ransomware, Trojan horses and Backdoors, Steganography, DoS and DDoS attacks.

Phishing and Identity Theft: Introduction, Phishing, Identity Theft (ID Theft).

UNIT-III: CYBER CRIMES AND CYBER SECURITY-LEGAL PERSPECTIVES (08 Periods)

Introduction, Cyber laws in Indian context, The Indian IT act, Challenges to Indian law and Cybercrime scenario in India, Consequences of not addressing the weakness in IT act, Digital signatures and the Indian IT Act, Cyber Crime and Punishment, Cyber law, Technology and Students in India scenario.

UNIT-IV: CYBER SECURITY-ORGANIZATIONAL IMPLICATIONS (10 Periods)

Introduction, Web threats for organizations – evils and perils, Security and privacy implications from cloud computing, Social Media Marketing-Security risks and Perils for organizations, Social computing and associated challenges for organizations, Protecting people's privacy in organization, Organizational guidelines for internet usage, Safe computing and Usage policy, Incident handling and Best practices.

UNIT-V: CYBER CRIME AND TERRORISMAND ILLUSTRATIONS (09 Periods)

Cyber Crime & Terrorism: Introduction, Intellectual property in the cyber space, The ethical dimension of cybercrimes, The psychology, Mindset and skills of hackers and cyber criminals, Sociology of cyber criminals, Information warfare.

Cyber Crime Illustrations: Indian banks lose millions of rupees, Justice vs. Justice, Parliament attack, The Indian case of online gambling, Bank and credit card related frauds, Purchasing goods and services scam, Nigerian 419 scam.

Total Periods: 45

TEXT BOOK:

1. Nina Gobole and SunitBelapure, *Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives,* Wiley India, 2011.

REFERENCE BOOK:

1. Prashant Mali, *Cyber Law and Cyber Crimes,* Snow White Publications Pvt. Ltd., 2013.

IV B.Tech. - I Semester

(16BT61505) **BIO-INFORMATICS**

(Open Elective)

(Common to EEE, ECE & EIE)

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

PREREQUISITES: —

COURSE DESCRIPTION:
Introduction to Bioinformatics; Biology and Information; Sequence alignment and dynamic programming; Biological Database; Homology Modeling; Structure Prediction; Molecular Dynamics.

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

CO1. Demonstrate knowledge on concepts of biological databases, Genome and proteome.
CO2. Analyze biological sequences for Homology Modeling.
CO3. Apply clustering methods for Phylogenetic trees.
CO4. Solve bio sequencing problems using dynamic programming.
CO5. Select and apply appropriate techniques and tools to structure Prediction.

DETAILED SYLLABUS:

UNIT-I: NUCLEIC ACIDS, PROTEINS AND AMINO ACIDS (08 periods)

Bioinformatics - Definition, Nucleic acid structure, Protein structure, the central dogma, Physico-chemical properties of the amino acids and their importance in protein folding, Polymerase chain reaction (PCR)

UNIT-II: INFORMATION RESOURCES FOR GENES AND PROTEIN (10 periods)

Database file formats, Nucleic acid sequence databases, Protein sequence databases.

Sequence Alignment Algorithm

Pair wise sequence alignment – The problem, Pair wise sequence alignment – Dynamic programming methods, The effect of scoring parameters on the alignment, Multiple sequence alignment.

UNIT-III: PREDICTION OF THE THREE-DIMENSIONAL STRUCTURE OF A PROTEIN AND HOMOLOGY MODELING (09 Periods)

Secondary Structure Prediction, Basic Principles, The Steps of Comparative Modeling, Accuracy of Homology Models, Manual versus Automatic Models, SNPs, Motifs**.**

UNIT-IV: PHYLOGENETIC METHODS (10 periods)

Phylogenetic trees, choosing sequences, Distance matrices and clustering methods, Calculation of distances in the neighbor-joining method, Bootstrapping, Tree optimization criteria and tree search methods, The maximum-likelihood criterion, Calculating the likelihood of the data on a given tree, The parsimony criterion.

UNIT-V: NEW FOLD MODELING (08 periods)

Estimating the Energy of a Protein Conformation, Energy Minimization, Molecular Dynamics, The "Omics" Universe-Transcriptomics, Proteomics, Interactomics, Structural Genomics, Pharmacogenomics.

TEXTBOOKS:

1. Paul G. Higgs and Teresa K. Attwood, *Bioinformatics and Molecular Evolution* Blackwell Publishing, 2005.
2. Anna Tramontano, *Introduction to Bioinformatics* Chapman and Hall/CRC, 2006.

REFERENCE BOOKS:

1. Hooman H. Rashidi and Lukas K. Buehler, *Bioinformatics Basics, Applications in Biological Science and Medicine*, CRC Press, Taylor & Francis Group, 2ndEdition, 2005.
2. Rastogi S. C., NamitaMendiratta and ParagRastogi, *Bioinformatics: Methodsand Applications: Genomics, Proteomics and Drug Discovery*, PHI Learning Pvt. Ltd., 3rdEdition, 2011.

IV B.Tech. - I semester
(16BT70431) **ANTENNAS AND MICROWAVE ENGINEERING LAB**

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

PREREQUISITES: Courses on EM theory, Antennas and Microwave Engineering.

COURSE DESCRIPTION:
Design and verification of various antennas; Study of Microwave components' characteristics; Power supplies.

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

CO1. Apply the knowledge of antennas and microwaves to understand the working of various devices.

CO2. Analyze the characteristics of different microwave components like
- Attenuators
- Directional Couplers
- Horn antennas etc.,

CO3. Design various antennas for different communication needs.

CO4. Solve problems using different antenna designs and microwave devices.

CO5. Apply appropriate tools to design and analyze various antennas.

CO6. Understand the working of various antennas and microwave components and provide engineering solutions for societal use.

CO7. Commit to ethical principles in the design of antennas and microwave components.

CO8. Work individually or in a group in the field of antennas and microwaves**.**

CO9. Communicate effectively in verbal and written form in the area of antennas and microwaves.

List of Exercises:

PART – A: (Antennas)
(Minimum of **six experiments** to be conducted)

1. Design of Monopole and Half Wave Dipole antenna
2. Design of Folded dipole antenna
3. Design of End fire and Broadside antenna array
4. Design of Yagi-Uda (minimum of 5 elements) antenna
5. Design of Helical antenna
6. Design of Horn antenna
7. Design of Microstrip patch antenna (strip and probe feeding)
8. Design of Parabolic antenna

Note: Verification for couple of antennas may be demonstrated.

PART – B: (Microwave Engineering)
(Minimum of **six experiments** to be conducted)

1. Reflex Klystron Characteristics
2. Gunn Diode Characteristics
3. Attenuation Measurement
4. Directional Coupler Characteristics
5. VSWR Measurement
6. Impedance Measurement
7. Waveguide parameters measurement
8. Scattering parameters of circulator.

IV B.Tech. - I semester

(16BT70432) **EMBEDDED SYSTEMS LAB**

(Common to EEE, ECE & CSSE)

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

PREREQUISITES: Courses on Embedded systems, C Programming.

COURSE DESCRIPTION:

IDE for Embedded System Design using MSP430; Interfacing Switch & LED; Timers-WDT, Configuring, Programming; ADC-usage; Power down modes; DAC; PWM Generator; Networking – SPI, Wi-Fi.

COURSE OUTCOMES:

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

CO1. Demonstrate knowledge in designing complex energy efficient embedded systems.

CO2. Analyze usage of various on-chip resources like GPIO, Timers, Interrupts, ADC, DAC,Comparator, SPI.

CO3. Design embedded systems to suit market requirements.

CO4. Solve engineering problems by proposing potential solutions using industry choice advanced Microcontrollers.

CO5. Apply appropriate techniques, resources, and CCSV6 based IDE for modeling embedded systems with understanding of limitations.

CO6. Provide embedded system solutions for societal needs.

CO7. Work individually and in a group to develop embedded systems.

CO8. Communicate effectively in oral and written form in the field of embedded systems.

LIST OF EXCERSISES:

1. Introduction to MSP430 launch pad and Programming Environment.
2. Read input from switch and Automatic control/flash LED (software delay).
3. Interrupts programming example using GPIO.
4. Configure watchdog timer in watchdog & interval mode.
5. Configure timer block for signal generation (with given frequency).
6. Read Temperature of MSP430 with the help of ADC.
7. Test various Power Down modes in MSP430.
8. PWM Generator.
9. Use Comparator to compare the signal threshold level.
10. Speed Control of DC Motor
11. Master slave communication between MSPs using SPI.
12. Networking MSPs using Wi-Fi.

Tool Requirement:

Code Composer Studio Version 6, MSP430 based launch pads, Wi-Fi booster pack.

REFERENCE BOOKS:

1. John H Davies, *MSP430 Microcontrollers Basics*, Newnes Publishers, 1st Edition, 2008.
2. C P Ravikumar, *MSP430 Microcontrollers in Embedded System Projects*, Elite Publishing House, 1st Edition, 2012.

IV B.Tech. - I semester

(16BT70433) **COMPREHENSIVE ASSESSMENT**

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

PREREQUISITES: All the courses of the program.

COURSE DESCRIPTION:
Assessment of student learning outcomes in the courses of the program.

COURSE OUTCOMES:
Comprehensive Assessment enables a successful student to demonstrate:

CO1. Knowledge in the courses of the program.
CO2. Analytical ability in the courses of the program.
CO3. Design skills in the courses of the program.
CO4. Ability to investigate and solve complex engineering problems in the courses of the program.
CO5. Ability to apply tools and techniques to complex engineering activities with anunderstanding of limitations in the courses of the program.
CO6. Ability to provide solutions as per societal needs with consideration to health, safety, legal and cultural issues in the courses of the program.
CO7. Understanding of the impact of the professional engineering solutions in environmental context and need for sustainable development in the courses of the program.
CO8. Ability to apply ethics and norms of the engineering practice in the courses of the program.
CO9. Ability to function effectively as an individual in the courses of the program.
CO10. Ability to present views cogently and precisely in the courses of the program.
CO11. Ability to engage in life-long leaning in the courses of the program.

IV B.Tech. - II semester

(16BT80431) **PROJECT WORK**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
100	100	200	-	-	-	12

PREREQUISITES: All the courses of the program.

COURSE DESCRIPTION:
Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Preparation of thesis and presentation.

COURSE OUTCOMES:
Completion of the project work enables a successful student to demonstrate:

CO1. Knowledge on the project topic.
CO2. Analytical ability exercised in the project work.
CO3. Design skills applied on the project topic.
CO4. Ability to investigate and solve complex engineering problems faced during theproject work.
CO5. Ability to apply tools and techniques to complex engineering activities with anunderstanding of limitations in the project work.
CO6. Ability to provide solutions as per societal needs with consideration to health, safety, legal and cultural issues considered in the project work.
CO7. Understanding of the impact of the professional engineering solutions in environmental context and need for sustainable development experienced duringthe project work.
CO8. Ability to apply ethics and norms of the engineering practice as applied in theproject work.
CO9. Ability to function effectively as an individual as experienced during the project work.
CO10. Ability to present views cogently and precisely on the project work.
CO11. Project management skills as applied in the project work.
CO11. Ability to engage in life-long leaning as experience during the project work.

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(AUTONOMOUS)

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.**