INSTITUTE VISION

To emerge as a Centre of Excellence for Learning and Research in the domains of Engineering, Computing and Management.

INSTITUTE MISSION

- Provide congenial academic ambience with state-art of resources for learning and research.
- Ignite the students to acquire self-reliance in the latest technologies.
- Unleash and encourage the innate potential and creativity of students.
- Inculcate confidence to face and experience new challenges.
- Foster enterprising spirit among students.
- Work collaboratively with technical Institutes / Universities / Industries of National and International repute

DEPARTMENT VISION

To become a centre of excellence in Electronics and Communication Engineering and provide necessary skills to the students to meet the challenges of industry and society.

DEPARTMENT MISSION

- Provide congenial academic ambience with necessary infrastructure and learning resources
- Inculcate confidence to face and experience new challenges from industry and society.
- Ignite the students to acquire self-reliance in State-of-the-Art Technologies
- Foster Enterprising spirit among students

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(Autonomous)
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
(Accredited by NBA)

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

After few years of graduation the, graduates of Electronics and Communication Engineering shall

PEO1: Have Professional competency through the application of knowledge gained from subjects like Mathematics, Physics, Chemistry, Inter-Disciplinary and core subjects like Signal Processing, VLSI, Embedded Systems, Communication and Automation.**(Professional Competency)**

PEO2: Excel in one's career by critical thinking towards successful services and growth of the organization or as an entrepreneur or through higher studies. **(Successful Career Goals)**

PEO3: Enhance knowledge by updating advanced technological concepts for facing the rapidly changing world and contribute to society through innovation and creativity. **(Continuing Education and Contribution to Society)**

PROGRAMME OUTCOMES (PO's)

On Successful completion, the graduate will be able to,

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. **Design/development of solutions**: 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.

PO4. **Conduct investigations of complex problems**: 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.

PO5. **Modern tool usage**: 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.

PO6. **The engineer and society**: 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.

PO7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **Communication**: 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.

PO11. **Project management and finance**: 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.

PO12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context Technological change.

PROGRAM SPECIFIC OUTCOMES (PSO's)

On Successful completion, the graduate will be able to,

PSO1: Apply the knowledge obtained in core areas for the analysis and design of components in Signal Processing, VLSI, Embedded Systems, Communication and Automation.

PSO2: Adapt Innovation, Creativity and design to develop products which meet industrial and societal needs.

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
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ACADEMIC REGULATIONS (R-20) FOR B.TECH

(Regular-Full Time)

(Effective for the students admitted into I year from the Academic Year 2020-2021 and II year lateral entry from the Academic year 2021-2022 onwards)

Curriculum for Regular and Honors/Minors B.Tech Program of all Branches

1. Eligibility for Admission

1.1 Admission of the B.Tech program shall be made subjects to the eligibility qualifications and Specialization prescribed by the University for each Program from time to time and also as per the guidelines of Andhra Pradesh State Council of Higher Education (APSCHE).

1.2 Admission shall be made either on the basis of Merit / Rank Obtained by the Qualifying candidates in EAMCET/ECET or otherwise specified whichever is relevant.

2. Award of the Degree: A student will be declared eligible for the award of B. Tech. degree if he/she fulfills the following:

i. For regular entry students, shall pursues a course of study in not less than four and not more than eight academic years.

ii. For lateral entry students, shall pursue a course of study for not less than three academic years and in not more than six academic years.

iii. For regular entry students, after eight academic years from the year of their admission, he/she shall forfeit their seat in B.Tech course and their admission stands cancelled.

iv. For lateral entry students, after six academic years from the year of their admission, he/she shall forfeit their seat in B.Tech course and their admission stands cancelled.

v. For regular entry students shall register for 160 credits and must secure all the 160 credits. For lateral entry students shall register for 121 credits and secure all 121 credits

vi. A student shall be eligible for the award of B.Tech degree with Honors or Minor if he/she earns 20 credits in addition to the 160 credits for Regular entry students /121 credits for lateral entry students.

vii. A student shall be permitted to register either for Honors or for Minor and not for both simultaneously.

3. Structure of the Undergraduate Engineering program:

All subjects / courses offered for the under graduate program in B.Tech. Degree programs are broadly classified as follows.

S. No	Course Classification	Course Category	Course Code
1	FoundationCourses	Humanities and Social Science including Management Courses	HSM
		Basic Science Courses	BSC
		Engineering Science Courses	ESC
2	Core Courses	Professional Core Courses	PCC
3	Elective Courses	Professional Elective Courses	PEC
		Open Elective Courses	OEC
4	Employability Enhancement Courses	Internship, Seminar and Project Work	PROJ
		Skill Oriented Courses / Skill Advanced Courses	SOC/SAC
5	Audit Courses	Mandatory Audit Courses	MAC
6	Minor / Honor Courses	Minor Courses / Honor Courses	MR/HR

4. Assigning of Credits:

i. 1 Hr. Lecture (L) per week – 1 Credit
ii. 1 Hr. Tutorial (T) per week – 1 Credit
iii. 1 Hr. Practical (P) per week – 0.5 Credits
iv. 2 Hours Practical (Lab) per week – 1 Credit

5. Induction Program for I. B.Tech Program

i. There shall be mandatory student induction program for fresher's, with a three-week duration before the commencement of first semester.
ii. Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Department / Branch and Innovations etc., shall be included in the guidelines issued by AICTE.

6. Assessment

i. The performance of a student in each semester shall be evaluated subject wise with a maximum of 100 marks for theory as well as for practical subject and project work.
ii. The audit courses shall be evaluated for a maximum of 30 internal marks.
iii. For theory and practical subjects the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End Semester Examinations.
iv. A student has to secure not less than 35% of marks in the end semester examination and minimum 40% of marks in the sum total of Internal Examination and End Semester Examinations marks to earn the credits allotted to each course.

6.1 Internal Examination

6.1.1 For theory subjects, during the semester, there shall be two Mid-Term Examinations will be conducted.

6.1.2 Each Mid-Term Examination consists of objective paper for 10 marks and subjective paper for 15 marks with the duration of 1 hour 50 minutes (20 minutes for objective and 90 minutes for subjective paper).

6.1.3 The subjective paper shall contain 3 either-or type questions with equal Weightage of 10 marks and the marks obtained for 3 questions shall be condensed to 15 marks; any fraction shall be rounded off to the next higher mark.

6.1.4 If the student is absent for the any internal examination, no re-exam or make up exam shall be conducted and marks for that examination shall be considered as zero.

6.1.5 First Mid-Term Examination shall be conducted for I & II units of syllabus and second Mid-Term Examinations shall be conducted for III, IV & V units.

6.1.6 However 5 marks are awarded for 5 Assignments (unit-wise).

6.1.7 Final Internal marks shall be arrived at by considering the marks secured by the student in both the Mid-Term examinations with 80% weightage to the better mid exam and 20% to the other

For Example:
- Marks obtained in First Mid-Term: 25
- Marks obtained in Second Mid-Term: 25
- Internal Marks: (25x0.8) + (25x0.2) = 25
- Final internal marks = Internal Marks + Assignment marks

6.1.8 If the student is absent for any one Mid-Term Examinations, the final internal marks shall be arrived at by considering 80% Weightage to the marks secured by the student in the appeared examination and zero to the other.

For Example:
- Marks obtained in First Mid-Term: Absent
- Marks obtained in Second Mid-Term: 25
- Internal Marks: (25x0.8) + (0x0.2) = 20
- Final internal marks = Internal Marks + Assignment marks

6.1.9 For practical courses there shall be 30 internal marks. 15 marks allotted for Internal Practical Examination to be conducted before the last working day and 15 marks for Day-to-Day work in the laboratory shall be evaluated by the concerned laboratory teacher based on the regularity / record / viva-voce.

6.1.10 In a practical subject consisting of two parts (ex: Engineering Workshop & IT Workshop), Internal examination shall be evaluated as above for 30 marks in each part and final internal marks shall be arrived by considering the average of marks obtained in two parts.

6.1.11 The evaluation of the practical courses is done based on the rubrics designed for that curriculum component.

6.2 Semester End Examination

6.2.1 End examination of theory courses shall have the following pattern:

i. There shall be two parts, Part-A and Part-B.
ii. Part-A shall contain 10 compulsory short answer questions for a total of 20 marks such that each question carries 2 marks. There shall be 2 short answer questions from each unit.
iii. Part-B Shall be either-or type questions of 10 marks each. Student shall answer any one of it.
iv. Each of these questions from Part-B shall cover each unit of the syllabus.

6.2.2 End examination of practical courses shall have the following pattern:

i. End Semester Examination shall be for 70 marks.
ii. The end examination shall be conducted by the concerned laboratory teacher and senior expert in the same subject of the department.
iii. In a practical subject consisting of two parts (ex: Engineering Workshop & IT Workshop), the End Semester Examination shall be conducted for 35 marks ineach part.
iv. The evaluation of the practical courses is done based on the rubrics designed for that curriculum component.

6.3 Drawing Courses

6.3.1 For the subject having design and/or drawing, such as Engineering Drawing / Graphics.

6.3.2 The distribution shall be 30 marks for internal evaluation (15 marks for Day- to-Day work (unit wise chart work / Assignment) and for another 15 marks there shall be a two MID Term exams will be conducted) and 70 marks for semester end examinations.

6.3.3 There shall be two Mid-Term examinations in a semester for duration of 2hrs each for 15 marks with weightage of 80% to better mid marks and 20% for the other.

6.3.4 The internal subjective paper shall contain 3 either-or type questions with equalWeightage of 10 marks and the marks obtained for 3 questions shall be condensed to 15 marks; any fraction shall be rounded off to the next higher mark and there shall be no objective paper in internal examination.

6.3.5 The sum of Day-to-Day work evaluation / assignments and the internal MID Term test marks will be the final internal marks for the course.

6.3.6 In the end examination pattern for Engineering Drawing / Graphics there shall be 5 questions, either-or type, of 14 marks each.

6.4 Mandatory Audit Courses

6.4.1 Courses like Human Values and Ethics, Environmental Sciences, Constitution of India and Design Thinking for Innovation shall be included in the curriculum as non-credit mandatory audit courses.

6.4.2 However, attendance in the audit courses shall be considered while calculating aggregate attendance. A student has to secure 40% of the marks allotted in the internal evaluation for passing the course.

6.4.3 The Internal Marks will be calculated similar to that of Theory course.

6.4.4 In grade sheet the completion of the course indicated as Pass – "P", and No marks or letter

grade shall be allotted, for all non-credit mandatory audit courses.

6.4.5 Re-exam shall be conducted for failed candidates for every semester at a mutual convenient date of institution.

6.5 Professional Elective Courses

6.5.1 Students have to choose Professional Elective Courses PEC-I in V semester, PEC-II in VI semester and PEC-III, PEC-IV, PEC-V in VII semester, from the list of elective courses given.

6.5.2 Registration forms are invited from the students 10 days prior to the last instructional day of the preceding semester for registration process for offering the Professional Elective Courses.

6.5.3 There shall be a limit on the minimum and maximum number of registrations based on class/section strength.

6.5.4 The assessments of Professional Elective Courses are same as regular theory courses.

6.6 Open Elective Courses

6.6.1 A student shall opt for any 4 courses from the list given by the institute from time to time, complying with the requirement of the prerequisite course(s), if any.

6.6.2 Students have to choose Open Elective Courses OEC-I in V semester, OEC-II in VI semester and OEC-III, OEC-IV in VII semester, from the list of elective courses given.

6.6.3 All Open Elective Courses are offered to the students of across all branches in general.

6.6.4 Registration forms are invited from the students 10 days prior to the last instructional day of the preceding semester for registration process for offering the Open Elective Courses.

6.6.5 However, a student shall choose an open Elective from the list in such a manner that he/she has not studied the same course in any form during their Program.

6.6.6 There shall be a limit on the minimum and maximum number of registrations based on class/section strength.

6.7 Massive Online Open Courses

6.7.1 MOOC courses under Professional Elective / Open Elective

6.7.2 A student shall be permitted to pursue up to a maximum of two elective courses (Professional Elective Courses or Open Elective Courses) under MOOCs during the Program. Each of the courses must be of minimum 12 weeks in duration for 3 credits. Attendance will not be monitored for MOOC courses.

6.7.3 Student has to pursue and acquire a certificate for a MOOC course only from the organizations / agencies approved by the BoS in order to earn the 3 credits. The Head of the department shall notify the list of such courses at the beginning of the semester.

6.8 Mandatory Internships

6.8.1 Students shall undergo two mandatory summer internships for a minimum of four weeks duration at the end of second and third year of the Program.

6.8.2 The internship can be done by the students at Local Industries, Government Organizations, Public Sector Companies, Research Laboratories, Construction agencies, Power Plants and

also in software MNCs.

6.8.3 A student will be required to submit a summer internship report to the concerned department and appear for an oral presentation before the Department Evaluation Committee nominated by the Principal at the end of the semester for the evaluation of summer internship.

6.8.4 The performance of a student in each mandatory summer internships shall be evaluated with a maximum of 100 marks.

6.8.5 The report and the oral presentation shall carry 40% and 60% weightage respectively.

6.9 Project work and Internships

6.9.1 In the final semester, the student should undergo Internship / Project Work with well-defined objectives.

6.9.2 Students Project Batch will have maximum of four students comprising the fast and slow learners.

6.9.3 Every student shall be required to undertake a Project Work in the Institution / Internship cum Project Work in Local Industries / Government Organizations / Public Sector Companies / Research Laboratories / Construction agencies / Power Plants and also in software MNCs in consultation with Head of the Department and Department Project Evaluation Committee.

6.9.4 The Department project evaluation committee continuously monitors and evaluates the progress of the Project Work / Internship cum Project Work by conducting three reviews including abstract review during the project period.

6.9.5 During the project review meetings, batch presentation and individual contributions are monitored to assess individual student performance and also team performance.

6.9.6 The evaluation of the project is done based on the rubrics designed for that curriculum component.

6.9.7 At the end of the semester the candidate shall submit an Internship cum Project completion certificate along with project report on the work carried out during the project work at the industry.

6.9.8 A student shall be permitted to submit project report on the work carried out during the project work at the institution/department.

6.9.9 The project work submitted to the department shall be evaluated for 100 marks, out of which 30 marks are for internal evaluation and 70 marks for external viva-voce.

6.9.10 The internal evaluation shall be made by the Department Project Evaluation Committee, on the basis of three reviews given by each students / batch on the topic of his/her project.

6.9.11 The final viva-voce shall be conducted by a committee consisting of HOD, Project Supervisor and an External Examiner nominated by the Principal at the end of the Semester.

6.9.12 In case a student fails in viva voce he /she shall reappear as and when supplementary examinations are conducted.

6.9.13 The distribution of marks for the Internal assessment and End Semester Examination is given below:

Internal Assessment (30 Marks)			**End Semester Examination (70 Marks)**		
Review - I	Review - II	Review - III	Supervisor	Internal Examiner	External Examiner
10	10	10	20	25	25

6.10 Eligibility to appear for Semester End Examinations

6.10.1 A student shall be eligible to appear for Semester End Examinations if he/she acquires a minimum of 75% of attendance in aggregate of all the courses in a semester.

6.10.2 Condonation for 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. Shortage of Attendance below 65% in aggregate shall in NO case be condoned.

6.10.3 Students whose shortage of attendance is not condoned in any semester are not eligible to take their Semester End Examination of that class and their registration shall stand cancelled.

6.10.4 A student will not be promoted to the next semester unless he satisfies the attendance requirements of the present semester, as applicable. They may seek readmission for that semester when offered next.

6.10.5 A stipulated fee shall be payable towards condonation of shortage of attendance to the college.

6.11 Issue of Photocopy of Answer Script

6.11.1 A student can request for the photo copy of answer script of any theory examination within one week after the declaring the results by paying fee.

6.11.2 The examination section shall issue a notification inviting applications for the issue of photocopy of answer script after publishing the results.

6.11.3 The application forms can be obtained from the examination section.

6.12 Revaluation

6.12.1 A candidate can apply for revaluation of his / her end examination answer paper in a theory courses.

6.12.2 The examination section shall issue a notification inviting applications for the revaluation after publishing the results.

6.12.3 The application forms can be obtained from the examination section.

6.12.4 A candidate can apply for revaluation of answer scripts in not more than 5 courses at a time.

6.12.5 No revaluation for practical courses, comprehensive viva-voce / Examination and project work.

6.13 Challenge Valuation

6.13.1 A student can apply for challenge valuation by prescribed fee.

6.13.2 Challenging valuation shall be carried out by an external subject expert.

6.13.3 The challenging valuation should be done strictly as per the scheme of valuation supplied by the examination section in the presence of Principal.

6.13.4 The examination section shall issue a notification inviting applications for the challenging valuation after publishing the revaluation results.

6.13.5 The application forms can be obtained from the examination section.

7. Promotion Rules

7.1 A student shall be promoted from first year to second year if he fulfills the minimum attendance requirements.

7.2 A student will be promoted from II year to III year if he fulfills the academic requirement of 40% of credits up to II year IV Semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in II year IV semester.

i. **One** regular and **three** supplementary examinations of I B.Tech I Semester.
ii. **One** regular and **two** supplementary examinations of I B.Tech II Semester.
iii. **One** regular and **one** supplementary examinations of II B.Tech III Semester.
iv. **One** regular examination of II B.Tech IV semester.

7.3 A student shall be promoted from III year to IV year if he fulfills the academic requirements of 40% of the credits up to III year 6^{th} semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year 6^{th} semester.

i. **One** regular and **five** supplementary examinations of I B.Tech I Semester.
ii. **One** regular and **four** supplementary examinations of I B.Tech II Semester.
iii. **One** regular and **three** supplementary examinations of II B.Tech III Semester.
iv. **One** regular and **two** supplementary examinations of II B.Tech IV Semester.
v. **One** regular and **one** supplementary examinations of III B.Tech V Semester.
vi. **One** regular examination of III B.Tech VI Semester.

7.4 For Lateral entry student promoted from III year to IV year if he fulfills the academic requirements of 40% of the credits up to III year VI semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year VI semester.

i. One regular and three supplementary examinations of II B.Tech III Semester.
ii. One regular and two supplementary examinations of II B.Tech IV Semester.
iii. One regular and one supplementary examinations of III B.Tech V Semester.
iv. One regular examination of III B.Tech VI Semester.

8. Extra Curricular Activities

i. Students shall enroll, on admission, in any one of the personality and character development programs (NSS/YRC etc.,) and undergo training and attend a camp.
ii. The training shall include classes on hygiene and health awareness and also training in first-aid.
iii. National Service Scheme (NSS) and Youth Red Cross (YRC) will have social service activities in and around the Institution.
iv. A student will be required to participate in an activity for an hour in a week during their second and third years.

9. Skill Oriented / Skill Advanced Courses

i. There shall be 05 Mandatory Skill-Oriented Courses offered during III to VII semesters.
ii. The list of such courses shall be included in the curriculum structure of each branch of Engineering.

10. Curricular Framework for Honors Program

i. Under Graduate degree with Honors shall be issued by the Institution to the students who fulfill all the academic eligibility requirements for the B.Tech program and Honors program.
ii. Students of a Department are eligible to opt for Honors Program offered by the same Department / Discipline, subject to a maximum of two additional courses per semester.
iii. A student shall be permitted to register for Honors program at the beginningof IV semester provided that the student must have acquired a minimum average of 8.0 SGPA upto the end of II semester without any backlogs. In case of the declaration of the III semester results after the commencement of the IV semester and if a student fails to score the required minimum of 8.0 SGPA, his/her registration for Honors Program stands cancelled and he/she shall continue with theregular Program.
iv. Students can select the additional and advanced courses from their respective branch in which they are pursuing the degree and get an honors degree in the same. In addition to fulfilling all the requisites of a Regular B.Tech . Program, a student shall earn 20 additional credits to be eligible for the award of B.Tech (Honors) degree. This is in addition to the credits essential for obtaining the Under Graduate Degree in Major Discipline (i.e. 160/121 credits).
v. Of the 20 additional Credits to be acquired, and 16 credits (four courses) shall be earned by undergoing specified courses listed as pools (two courses per pool either theory course or theory with lab component), and each carrying 4 credits. The remaining 4 credits (two courses) must be acquired through two MOOCs, which shall be domain specific, each with 2 credits and with aminimum duration of 8/12weeks as recommended by the Board of studies.
vi. The courses offered in each pool (two courses per pool) shall be domain specific courses and advanced courses.
vii. MOOC courses must be of minimum 8 weeks in duration. Attendance will not be monitored

for MOOC courses. Students have to acquire a certificate from the agencies approved by the BOS with grading or marks or pass/fail in order to earn 4 credits. If the MOOC course is a pass/fail course without any grades, the grade to be assigned will be as decided by the academic council.

viii. It is the responsibility of the student to acquire/complete prerequisite before taking the respective course.

ix. The concerned BoS shall decide on the minimum enrolments for offering Honors program by the department. If minimum enrolments criteria are not met then the students shall be permitted to register for the equivalent MOOC courses as approved by the concerned Head of the department in consultation with BoS.

x. The concerned BoS shall also consider courses listed under professional Elective Courses of the respective B.Tech programs for the requirements of B.Tech (Honors). However, a student shall be permitted to choose only those courses that he/she has not studied in any form during the Program.

xi. If a student drops or is terminated from the Honors program, the additional credits so far earned cannot be converted into open or core electives; they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate). In such cases, the student may choose between the actual grade or a "pass (P)" grade and also choose to omit the mention of the course as for the following: All the courses done under the dropped Honors will be shown in the transcript. None of the courses done under the dropped Honors will be shown in the transcript.

xii. In case a student fails to meet the CGPA requirement for Degree with Honors at any point after registration, he/she will be dropped from the list of students eligible for Degree with Honors and they will receive regular B.Tech degree only. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.

xiii. Honors must be completed simultaneously with a major degree program. A student cannot earn Honors after he/she has already earned bachelor's degree.

11. Curricular Framework for Minor Program

i. Under graduate Degree with Minor Program shall be issued by the Institution to the students who fulfill all the academic eligibility requirements for the B.Tech program and Minor Program.

ii. Students who are desirous of pursuing their special interest areas other than the chosen discipline of Engineering may opt for additional courses in minor specialization groups offered by a department other than their parent department. For example, If Mechanical Engineering student selects subjects from Computer Science Engineering under this scheme; he/she will get Major degree of Mechanical Engineering with minor degree of Computer Science Engineering. Student can also opt for Industry relevant tracks of any branch to obtain the Minor Degree, for example, a B.Tech Mechanical student can opt for the industry relevant tracks like Data Mining track, IOT track, Machine learning track etc.

iii. The concerned BOS shall identify as many tracks as possible in the areas of emerging technologies and industrial relevance / demand. For example, the minor tracks can be the fundamental courses in CSE, ECE, EEE, CE, ME etc or industry tracks such as Artificial Intelligence (AI), Machine Learning (ML), Data Science (DS), Robotics, Electric vehicles, Virtual Realty, VLSI etc.

iv. The list of disciplines/branches eligible to opt for a particular industry relevant minor specialization shall be clearly mentioned by the respective BoS.

v. The concerned BoS shall decide on the minimum enrolments for offering Minor program by the department. If a minimum enrolments criterion is not met, then the students may be permitted to register for the equivalent MOOC courses as approved by the concerned Head of the department in consultation with BoS.

vi. A student shall be permitted to register for Minors program at the beginning of IV semester subject to a maximum of two additional courses per semester, provided that the student must have acquired 8.0 SGPA (Semester Grade point average) upto the end of II semester without any history of backlogs. It is expected that the III semester results may be announced after the commencement of the IV semester. If a student fails to acquire 8.0 SGPA upto III semesters or failed in any of the courses, his registration for Minors program shall stand cancelled. An SGPA of 8.0 has to be maintained in the subsequent semesters without any backlog in order to keep the Minors registration active.

vii. A student shall earn additional 20 credits in the specified area to be eligible for the award of B.Tech degree with Minor. This is in addition to the credits essential for obtaining the Under Graduate Degree in Major Discipline (i.e. 160/121 credits).

viii. Of the 20 additional Credits to be acquired and 16 credits shall be earned by undergoing specified courses listed in course structure and each carrying 4 credits. The remaining 4 credits must be acquired through two MOOCs, which shall be domain specific, each with 2 credits and with a minimum duration of 8/12weeks as recommended by the Board of studies.

ix. Attendance will not be monitored for MOOC courses. Student has to acquire a certificate from the agencies approved by the BOS with grading or marks or pass/fail in order to earn 4 credits. If the MOOC course is a pass/fail course without any grades, the grade to be assigned as decided by the BoS.

x. A student shall be permitted to choose only those courses that he/she has not studied in any form during the Program.

xi. If a student drops or terminated from the Minor program, they cannot convert the earned credits into open or core electives; they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate). In such cases, the student may choose between the actual grade or a "pass (P)" grade and also choose to omit the mention of the course as for the following: All the courses done under the dropped Minors will be shown in the transcript. None of the courses done under the dropped Minor will be shown in the transcript.

xii. In case a student fails to meet the CGPA requirement for B.Tech degree with Minor at any point after registration, he/she will be dropped from the list of students eligible for degree with Minors and they will receive B.Tech degree only. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.

xiii. Minor must be completed simultaneously with a major degree program. A student cannot earn the Minor after he/she has already earned bachelor's degree.

12. Grading

After each subject is evaluated for 100 marks, the marks obtained in each course willbe converted to a corresponding letter grade as given below, depending on the rangein which the marks obtained by the student fall.

Marks Range	Level	Letter Grade	Grade Point
≥ 90	Outstanding	S	10
80-89	Excellent	A	9
70-79	Very Good	B	8
60-69	Good	C	7
50-59	Fair	D	6
40-49	Satisfactory	E	5
< 40	Fail	F	0
-	Absent	Ab	0

13. Calculation of Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA)

i. The Semester Grade Point Average (SGPA) is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.

$$SGPA = \frac{\sum(C_i \, X \, G_i)}{\sum C_i}$$

where, C_i is the number of credits of the i^{th} subject and G_i is the grade point scored by the student in the i^{th} course

ii. The Cumulative Grade Point Average (CGPA) will be computed in the same manner taking into account all the courses undergone by a student over all the semesters of a program, i.e.

$$CGPA = \frac{\sum(C_j \, X \, S_j)}{\sum C_j}$$

where 'S_j' is the SGPA of the j^{th} semester and C_j is the total number of credits in that semester

iii. Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

iv. While computing the SGPA/CGPA, the subjects in which the student is awarded Zero grade points will also be included.

v. *Grade Point:* It is a numerical weight allotted to each letter grade on a 10-pointscale.

vi. *Letter Grade:* It is an index of the performance of students in a said course. Grades are denoted by letters S, A, B, C, D, E and F.

vii. As per AICTE regulations, conversion of CGPA into equivalent percentage asfollows:

viii. Equivalent Percentage = (CGPA – 0.50) x 10.

14. Award of Class

After a student has satisfied the requirements prescribed for the completion of the program and are eligible for the award of B.Tech. Degree, he/she shall be placed in one of the following:

Class Awarded	CGPA Secured
First Class with Distinction	≥ 7.5
First Class	≥ 6.5 < 7.5
Second Class	≥ 5.5 < 6.5
Pass Class	≥ 4.0 < 5.5

15. With-Holding the Result

If the candidate has any dues not paid to the institution or if any case of indiscipline or malpractice is pending against him, the result of the candidate shallbe withheld and he will not be allowed / promoted into the next higher semester. The issue of awarding degree is liable to be withheld in such cases.

16. Transitory Regulations and Gap – Year

i. Discontinued, detained, or failed candidates are eligible for readmission as and when the semester is offered after fulfillment of academic regulations. Candidates who have been detained for attendance shortage or not fulfilled academic requirements or who have failed after having undergone the course in earlier regulations or have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered and they will be in the academic regulations into which they get readmitted.

ii. Gap Year – concept of Student Entrepreneur in Residence shall be introduced and outstanding students who wish to pursue entrepreneurship are allowed to take a break of one year at any time after I year/ II year/ III year to pursue entrepreneurship full time. This period shall be counted for the maximum time forgraduation.

iii. An evaluation committee at university level shall be constituted to evaluate the proposal submitted by the student and the committee shall decide on permitting the student for availing the Gap Year.

iv. Candidates who were permitted with Gap Year shall be eligible for rejoining into the succeeding year of their B.Tech from the date of commencement of class work and they will be in the academic regulations into which the candidate is presently rejoining.

17. Industrial Collaborations

i. Institution-Industry linkages refer to the interaction between firms and universities or public research centers with the goal of solving technical problems,working on R&D, innovation

ii. projects and gathering scientific as well as technological knowledge.

iii. The Departments are permitted to design any number of Industry oriented minor tracks as the respective BoS feels necessary. In this process the departments can plan to have industrial collaborations in designing the minor tracks and to developthe content and certificate programs.

18. Community Service Project

i. Community Service Project should be an integral part of the curriculum, as an alternative to the Internships, whenever there is an exigency when students cannot pursue their internships.

ii. Every student should put in a minimum of 144 hours for the Community Service Project during the summer vacation. Each class/section should be assigned with a mentor.

iii. Specific Departments could concentrate on their major areas of concern. For example, Dept. of Computer Science can take up activities related to Computer Literacy to different sections of people like - youth, women, house-wives, etc

iv. A log book has to be maintained by each of the student, where the activities undertaken/involved to be recorded. The log book has to be countersigned by the concerned mentor/faculty in-charge.

v. Evaluation to be done based on the active participation of the student and grade could be awarded by the mentor/faculty member. The final evaluation to bereflected in the grade memo of the student. The Community Service Project should be different from the regular programs of NSS/NCC/Green Corps/Red Ribbon Club, etc. Minor project report should be submitted by each student. An internal Viva shall also be conducted by a committee constituted by the principalof the college. Award of marks shall be made as per the guidelines of Internship.

vi. A group of students or even a single student could be assigned for a particular habitation or village or municipal ward, as far as possible, in the near vicinity of their place of stay, so as to enable them to commute from their residence and return back by evening or so.

vii. The Community Service Project is a twofold one – First, the student/s could conduct a survey of the habitation, if necessary, in terms of their own domain or subject area. Or it can even be a general survey, incorporating all the different areas. A common survey format could be designed. This should not be viewed as a duplication of work by the Village or Ward volunteers; rather, it could be another primary source of data.

viii. Secondly, the student/s could take up a social activity, concerning their domain or subject area. The different areas, could be like – Agriculture, Health, Marketing and Cooperation Animal Husbandry, Horticulture, Fisheries, Sericulture, Revenue and Survey, Natural Disaster Management, Irrigation, Law & Order, Excise and Prohibition, Mines and Geology, Energy, Internet, Free Electricity, Drinking Water etc.,

19. Transfer Details

i. Student transfers shall be as per the guidelines issued by the Government of Andhra Pradesh from time to time.

20. Preservation of Records

i. The laboratory records, internal test papers and end examination answer booklets shall be preserved for minimum of 2 years from the date of completion of their degree in the institution.

21. Amendments to Regulations

The Academic Council of SITAMS (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. General

i. The academic regulations should be read as a whole for purpose of any interpretation. Malpractices rules- nature and punishments are appended.

ii. Where the words "he", "him", "his", occur in the regulations, they also include "she", "her", "hers", respectively.

23. Conduct and Discipline

i. Students shall conduct themselves within and outside the precincts of the Institute in a manner befitting the students of an Institute of National importance.

ii. As per the order of the Hon'ble Supreme Court of India, ragging in any form is banned: acts of ragging will be considered as gross indiscipline and will be severely dealt with.

iii. The following additional acts of omission and /or commission by the students within or outside the precincts of the college shall constitute gross violation of code of conduct and are liable to invoke disciplinary measures

a. Ragging
b. Lack of courtesy and decorum: indecent behaviour anywhere within or outside the campus.
c. Willful damages or stealthy removal of any property /belongings of the Institute / Hostel or of fellow students
d. Possession, consumption of distribution of alcoholic drinks or any kind of hallucinogenic drugs
e. Mutilation or unauthorized possession of library books
f. Hacking in computer systems
g. Furnishing false statements to the disciplinary committee, or willfully withholding information relevant to an enquiry
h. Organizing or participation in any activity that has potential for driving fellow students along lines of religion caste batch of admission hostel or any other unhealthy criterion.
i. Resorting to noisy and unseemly behavior, disturbing studies of students.
j. Physical or mental harassment of fresher through physical contact or oral abuse
k. Adoption of unfair means in the examination
l. Organizing or participating in any group activity except purely academic and scientific Programmers in company with others in or outside campus without prior permission of the Principal
m. Disturbing in drunken state or otherwise an incident in academic or students function or any

other public event.

n. Not obeying traffic rules in campus not following safety practices or causing potential danger to oneself or other persons in any way.

o. Any other act or gross indiscipline

iv. Commensurate with the gravity of the offence the punishment may be reprimand fine and expulsion from the hostel debarment from an examination rustication for a specified period or even outright expulsion from the College.

v. The reprimanding Authority for an offence committed by students in the Hostel and in the Department or the classroom shall be respectively, the managers ofthe Hostels and the Head of the concerned Department

vi. In all the cases of offence committed by students in jurisdictions outside the purview the Principal shall be the Authority to reprimand them.

vii. All Major acts of indiscipline involving punishment other than mere reprimand shall be considered and decided by the Principal Students Disciplinary Committee appointed by the Principal.

viii. All other cases of Indiscipline of Students like adoption of unfair means in the examinations shall be reported to the Vice-Principal for taking appropriate action and deciding on the punishment to be levied.

ix. In all the cases of punishment levied on the students for any offence committed the aggrieved party shall have the right to appeal to the Principal who shall constitute appropriate Committees to review the case.

NATURE OF MALPRACTICES/ IMPROPER CONDUCT PUNISHMENT	**PUNISHMENT**
1. (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 inside or outside the exam hall in respect of any matter. Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he/she will be handed over to the police and a case is registered against him/her.	Expulsion from the examinations hall and cancellation of the performance in that subject only of all the candidates involved in case of an outsider He / She will be handed over to the police and a case is registered against him/her.

2. Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examinations hall and cancellation of the performance in that subject and all other subjects thecandidates has already appeared including practical examinations and projects workand shall not be permitted to appear for the reaming examinations of the subjects of that semester/Year. The Hall Ticket of the candidate will be cancelled and retained by the CE.
3. Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practical's and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all university examinations. The continuation of the course by the candidateis subject to the academic regulations in connection with forfeiture of seat.

4. Smuggles in the answer book or additional sheet or takes out or arranges to send out the question paper or answer book or additional sheet, during or after the examination.	If the imposter is an outsider, he/she will be handed over to the police and a case is registered against him/her. Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all university examinations. The continuation of the course by the candidateis 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 subject.
6. Refuses to obey the orders of the Chief - Superintendent / Assistant- Superintendent / 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 officer-in charge or any person on duty in or outside the examination hall or causes any injury to his person or to any of his relatives whether by offensive words spoken or written or by signs or by visible representation or assaults the officer-in-charge, or any person on duty inside or outside the examination hall or any of his relatives, or indulges in any other act of misconduct or mischief which results in damage to or destruction of property in the	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates are also debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.

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

9. Belongs to college, who is not a candidate for the particular examination or any person not connected with the college but indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the college will be expelled from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the college will be handed over to police and, a Police case will be registered against them.
10. Comes in a drunken state to the examination hall.	Expulsion from the examination hall and cancellation of the performance.
11. Copying is detected on the basis of internal evidence, such as, during valuation or during special scrutiny	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that Semester / year examinations.
12. If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the Principal for further action to award suitable punishment.	

Note: Failing to read the regulation is not considered as an excuse

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R20 - COURSE STRUCTURE AND SYLLABUS (2021 ADMITTED BATCH)

SEMESTER I (FIRST YEAR)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20BSC111	Algebra and Calculus	2	1	0	3	30	70	100
2	20BSC112	Applied Chemistry	3	0	0	3	30	70	100
3	20BSC113	Applied Physics	3	0	0	3	30	70	100
4	20ESC111	Engineering Graphics	1	0	4	3	30	70	100
5	20CSE111	C and Data Structures	2	1	0	3	30	70	100
6	20BSC114	Engineering Chemistry Lab	0	0	2	1	30	70	100
7	20BSC115	Engineering Physics Lab	0	0	2	1	30	70	100
8	20CSE112	C and Data Structures Lab	0	0	3	1.5	30	70	100
9	20ESC112	Engineering Workshop & IT Workshop	0	0	2	1	30	70	100
Contact hours per week			11	2	13	-	-	-	-
Total hours per week			26			-			
Total credits						19.5	-	-	-
Total Marks							270	630	900

SEMESTER II (FIRST YEAR):

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20HSM111	Communicative English for Engineers	3	0	0	3	30	70	100
2	20BSC121	Differential Equations and Transformation techniques	2	1	0	3	30	70	100
3	20ESC115	Programming with Python	2	1	0	3	30	70	100
4	20ECE111	Electronic Devices and Circuits	3	0	0	3	30	70	100
5	20EEE121	Electrical Circuit Analysis	2	1	0	3	30	70	100
6	20HSM112	Communicative English Language Lab	0	0	3	1.5	30	70	100
7	20ECE121	Electronic Devices and Circuits Lab	0	0	3	1.5	30	70	100
8	20ESC118	Programming with Python Lab	0	0	3	1.5	30	70	100
Contact hours per week			12	3	9	-	-	-	-
Total hours per week			24			-	-	-	-
Total credits						19.5			
Total Marks							240	560	800

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SEMESTER III (SECOND YEAR)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20BSC232	Special Functions & Complex Analysis	2	1	0	3	30	70	100
2	20ESC233	Principles of Electrical Engineering	2	1	0	3	30	70	100
3	20ECE231	Digital Electronics	2	1	0	3	30	70	100
4	20ECE232	Electronic Circuit Analysis	2	1	0	3	30	70	100
5	20ECE233	Signals and Systems	2	1	0	3	30	70	100
6	20HSM231	Soft Skills **(SOC Course)**	0	1	2	2	30	70	100
7	20ESC234	Principles of Electrical Engineering Lab	0	0	3	1.5	30	70	100
8	20ECE234	Digital Electronics Lab	0	0	3	1.5	30	70	100
9	20ECE235	Electronic Circuit Analysis lab	0	0	3	1.5	30	70	100
10	20MAC231	Environmental Science	2	0	0	0	P	-	-
Contact Hours per week			12	6	11	-	-	-	-
Total Hours per week			29			-	-	-	-
Total credits						21.5	-	-	-
Total Marks							270	630	900

SEMESTER IV (SECOND YEAR)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20BSC231	Numerical Methods and Probability Theory	3	1	0	4	30	70	100
2	20ECE241	Linear Control Systems	2	1	0	3	30	70	100
3	20ECE242	Computer Architecture and Microprocessor	2	1	0	3	30	70	100
4	20ECE243	Linear and Digital IC applications	2	1	0	3	30	70	100
5	20ECE244	Pulse and Digital Circuits	2	1	0	3	30	70	100
6	20ECE245	PCB Design **(SOC Course)**	0	1	2	2	30	70	100
7	20ECE246	Linear IC applications Lab	0	0	3	1.5	30	70	100
8	20ECE247	Microprocessor and Interfacing Lab	0	0	3	1.5	30	70	100
9	20ECE248	Pulse and Digital circuits Lab	0	0	3	1.5	30	70	100
		Internship during summer vacation	-	-	-	-	-	-	-
Contact Hours per week			11	6	11	-	-	-	-
Total Hours per week			28			-	-	-	-
Total credits						22.5	-	-	-
Total Marks							270	630	900
1		Honors / Minor Courses*	HNR/MNR		4	0	0	4	30	70	100

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Semester V (Third Year)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20ECE351	Communications Systems	2	1	0	3	30	70	100
2	20ECE352	Electro Magnetic waves and Transmission lines	2	1	0	3	30	70	100
3	20ECE353	VLSI Design	2	1	0	3	30	70	100
4	20ECE354	Professional Elective Course – 1	3	0	0	3	30	70	100
5	OE-I	Open Elective Course – 1	3	0	0	3	30	70	100
6	20ECE355	Microcontroller & Arduino Programming **(SOC Course)**	0	1	2	2	30	70	100
7	20ECE356	Communication Systems Lab	0	0	3	1.5	30	70	100
8	20ECE357	VLSI Design Lab	0	0	3	1.5	30	70	100
9	20MAC351	Constitution of India	2	0	0	0	P	-	-
10	20ECE358	Industry Internship / Community Service Project – Evaluation	0	0	0	1.5	-	-	100
Contact Hours per week			14	4	8	-	-	-	-
Total Hours per week			26			-	-	-	-
Total credits						21.5	-	-	-
Total Marks							240	560	900
1		Honors / Minor Courses*	3	1	-	4	30	70	100

Semester VI (Third Year)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20HSM241	Principles of Management	2	1	0	3	30	70	100
2	20ECE361	Digital Signal processing	2	1	0	3	30	70	100
3	20ECE362	Microwave and Optical Communications	2	1	0	3	30	70	100
4	20ECE363	Professional Elective Course – 2	3	0	0	3	30	70	100
5	OE-II	Open Elective Course – 2	3	0	0	3	30	70	100
6	20ECE364	Antenna System Design **(SOC Course)**	0	1	2	2	30	70	100
7	20ECE365	Creativity and Innovation lab	0	0	3	1.5	30	70	100
8	20ECE366	Microwave and Optical Communication Lab	0	0	3	1.5	30	70	100
9	20ECE367	Digital signal processing Lab	0	0	3	1.5	30	70	100
10	20MAC352	Design Thinking and Innovation	2	0	0	-	P	-	100
11	-	Industrial / Research Internship during Summer Vacation	-	-	-	-	-	-	-
Contact Hours per week			14	4	11	-	-	-	-
Total Hours per week			29			-	-	-	-

Total credits						21.5	-	-	-
Total Marks							270	630	1000
1		Honors / Minor Courses*	3	1	-	4	30	70	100

Semester VII (Fourth Year)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20HSM471	Humanities and Social Science Elective	3	0	0	3	30	70	100
2	20HSM472	Universal Human values and Ethics	3	0	0	3	30	70	100
3	20ECE471	Professional Elective Course – 3	3	0	0	3	30	70	100
4	20ECE472	Professional Elective Course – 4	3	0	0	3	30	70	100
5	20ECE473	Professional Elective Course – 5	3	0	0	3	30	70	100
6	OE-III	Open Elective Course – 3	3	0	0	3	30	70	100
7	OE-IV	Open Elective Course – 4	3	0	0	3	30	70	100
8	20ECE474	ARM & PIC Programming **(SAC Course)**	0	1	2	2	30	70	100
9	20ECE475	Industrial / Research Internship Evaluation	-	-	-	2	-	-	100
Contact Hours per week			21	1	2	-	-	-	-
Total Hours per week			24			-	-	-	-
Total credits						25	-	-	-
Total Marks							240	560	900
1		Honors / Minor Courses*	3	1	-	4	30	70	100

Semester VIII (Fourth Year)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20ECE481	Project Work	0	0	0	12	30	70	100
Contact Hours per week			0	0	0	12	-	-	-
Total Hours per week			-			-	-	-	-
Total credits						12	-	-	-
Total Marks							30	70	100

** Eligible and interested students can register either for Honors or for a Minorin IV Semester onwards, as per the regulation guidelines.*

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Professional Elective Course – 1 (Semester V)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20ECE354A	Computer Communication Networks	3	0	0	3	30	70	100
2	20ECE354B	Electronic Measurements and Instrumentation	3	0	0	0	30	70	100
3	20ECE354C	Fundamentals of Nano Electronics	3	0	0	0	30	70	100
4	MOOC	Massive Open Elective Course	-	-	-	3	-	-	-

Professional Elective Course – 2 (Semester VI)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20ECE363A	Bio Medical Instrumentation	3	0	0	3	30	70	100
2	20ECE363B	Embedded Systems	3	0	0	3	30	70	100
3	20ECE363C	Television Engineering	3	0	0	3	30	70	100
4	MOOC	Massive Open Elective Course	-	-	-	3	-	-	-

Professional Elective Course – 3 (Semester VII)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20ECE471A	Satellite & Radar communication	3	0	0	3	30	70	100
2	20ECE471B	Sensors and Transducers	3	0	0	3	30	70	100
3	20ECE471C	FPGA Design	3	0	0	3	30	70	100
4	MOOC	Massive Open Elective Course	-	-	-	3	-	-	-

Professional Elective Course – 4 (Semester VII)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20ECE472A	Micro Electro Mechanical Systems	3	0	0	3	30	70	100
2	20ECE472B	Cellular Mobile Communications	3	0	0	3	30	70	100
3	20ECE472C	Advanced Computer Architecture	3	0	0	3	30	70	100
4	MOOC	Massive Open Elective Course	-	-	-	3	-	-	-

Professional Elective Course – 5 (Semester VII)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20ECE473A	Digital Image Processing	3	0	0	3	30	70	100
2	20ECE473B	Wireless Communication Networks	3	0	0	3	30	70	100
3	20ECE473C	Low Power VLSI Design	3	0	0	3	30	70	100
4	MOOC	Massive Open Elective Course	-	-	-	3	-	-	-

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Open Elective Course – 1 (Semester V)

S.No	Course Code	Course Title	Offered Department	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
				L	T	P	C	I	E	Total
1	20OCIV351	Air Pollution and Control	CIV	3	0	0	3	30	70	100
2	20OEEE351	Renewable Energy Sources	EEE	3	0	0	3	30	70	100
3	20OMEC351	Industrial Robotics	MEC	3	0	0	3	30	70	100
4	20OCSE351	Relational Data Base Management system	CSE/CSM	3	0	0	3	30	70	100
5	20OHSM351	Graph Theory with Applications	S&H	3	0	0	3	30	70	100

Open Elective Course – 2 (Semester VI)

S.No	Course Code	Course Title	Offered Department	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
				L	T	P	C	I	E	Total
1	20OCIV361	Building Technology	CIV	3	0	0	3	30	70	100
2	20OEEE361	Power Plant Engineering	EEE	3	0	0	3	30	70	100
3	20OMEC361	3D Printing Concepts	MEC	3	0	0	3	30	70	100
4	20OCSE361	Data Communication and Computer Networks	CSE/CSM	3	0	0	3	30	70	100
5	20OHSM361	LASER and Fiber Optics	S&H	3	0	0	3	30	70	100

Open Elective Course – 3 (Semester VII)

S.No	Course Code	Course Title	Offered Department	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
				L	T	P	C	I	E	Total
1	20OCIV471	Disaster Management and Mitigation	CIV	3	0	0	3	30	70	100
2	20OEEE471	PLC and Applications	EEE	3	0	0	3	30	70	100
3	20OMEC471	Product Design and Innovation	MEC	3	0	0	3	30	70	100
4	20OCSE471	Fundamentals of Artificial Intelligence	CSE/CSM	3	0	0	3	30	70	100
5	20OHSM471	Nano Science and Technology	S&H	3	0	0	3	30	70	100

Open Elective Course – 4 (Semester VII)

S.No	Course Code	Course Title	Offered Department	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
				L	T	P	C	I	E	Total
1	20OCIV472	Industrial Waste Treatment and Disposal	CIV	3	0	0	3	30	70	100
2	20OEEE472	Electric Vehicle Technology	EEE	3	0	0	3	30	70	100
3	20OMEC472	Solar Energy Technology	MEC	3	0	0	3	30	70	100
4	20OCSE472	Foundations of Machine learning	CSE/CSM	3	0	0	3	30	70	100
5	20OHSM472	Total Quality Management	S&H	3	0	0	3	30	70	100

Humanities and Social Science Elective Course (Semester VII)

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20HSM471A	Industrial Engineering and Psychology	3	0	0	3	30	70	100
2	20HSM471B	Intellectual Property Rights and Patents	3	0	0	3	30	70	100
3	20HSM471C	Managing Innovation and Entrepreneurship	3	0	0	3	30	70	100

SUMMARY OF CREDIT ALLOCATION

S.NO	Subject Area	Credits As Per Semester								Total Credits	Percentage – wise Credit Distribution
		I	II	III	IV	V	VI	VII	VIII		
1.	HSMC	-	4.5	-	-	-	3	6	-	13.5	8.28
2.	BSC	11	3	3	4	-	-	-	-	21	12.88
3.	ESC	8.5	12	4.5	-	-	-	-	-	25	15.33
4.	PCC	-	-	12	16.5	12	10.5	-	-	51	31.29
5.	SOC/SAC	-	-	2	2	2	2	2	-	10	6.13
6.	PEC	-	-	-	-	3	3	9	-	15	9.20
7.	OEC	-	-	-	-	3	3	6	-	12	7.36
8	PROJ	-	-	-	-	1.5	-	2	12	15.5	9.51
9	MAC	-	-	-	-	-	-	-	-	-	-
Total		19.5	19.5	21.5	22.5	21.5	21.5	22	12	163	100

Note: ***HSMC - Humanities and Social Science including Management Courses; BSC - Basic Science Courses; ESC - Engineering Science Courses; PCC - Professional Core Courses; PEC - Professional Elective Courses; OEC - Open Elective Courses; SOC/SAC - Skill Oriented Courses / Skill Advanced Courses; PROJ - Internship, Seminar and Project Work; MAC - Mandatory Audit Courses; MNRC/HNRC - Minor Courses / Honor Courses***

I B.Tech. – I Semester

		L	T	P	C
20BSC111	**ALGEBRA AND CALCULUS** (Common to All Branches)	**2**	**1**	**0**	**3**

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To familiarize the students with the theory of matrices.
2. To explain the series expansion using means value theorem and basic concepts of partial derivatives and its applications
3. To learn the methods of evaluation of double and triple integrals
4. To explain the concept of vector differentiation
5. To explain the concept of vector integration

UNIT I: MATRICES **(9)**

Rank - Echelon form and Normal form - Solution of linear system of homogeneous and non-homogeneous equations - Direct method: Gauss elimination method - Eigen values and Eigen vectors of a matrix and properties (without proofs) - Cayley-Hamilton theorem (without proof): Inverse and powers of a matrix. – Diagonalization of a matrix using similarity transformation only.

UNIT – II: DIFFERENTIAL CALCULUS AND ITS APPLICATIONS **(9)**

Rolle's Theorem, Lagrange's Theorem(without proof) - Taylor's and Maclaurin's series for single variable (simple examples) - Functions of several variables - Jacobian – Taylor's and Maclaurin's series for two variables - Maxima and minima of functions of two variables - Lagrangian method of undetermined multipliers with three variables only.

UNIT III: MULTIPLE INTEGRALS **(9)**

Double and triple integrals: Evaluation of Double integrals (Cartesian and polar coordinates), Change of order of integration (Cartesian form only), Change of variables: double integration from Cartesian to polar coordinates, Evaluation of Triple integrals (Cartesian coordinates).

UNIT IV: VECTOR DIFFERENTIAL CALCULUS **(9)**

Introduction to Vector Differentiation, Scalar and Vector point functions - Gradient of a Scalar function, directional derivative, Divergence of a Vector function, Solenoidal vector, Curl of a Vector function, Irrotational vector, Laplacian operator.

UNIT V: VECTOR INTEGRAL CALCULUS **(9)**

Line Integral - Potential function - Surface and volume integrals - Green's, Stoke's and Gauss divergence theorem (without proofs) - Verification of Green's, Stoke's and Gauss divergence theorems.

TOTAL HOURS: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	To solve system of homogenous and non-homogenous linear equations, find the Eigen values and Eigen vectors of a matrix and identify special properties of a matrix.	**PO1,PO2,PO3**
CO2	Illustrate series expansion of functions using mean value theorems, Interpret partial derivatives as a function of several variables, Apply Jacobean concept to deal with the problems in change of variables, Evaluate maxima and minima of functions.	**PO1,PO2,PO3**
CO3	To evaluate double and triple integrals of functions of several variables	**PO1,PO2,PO3**
CO4	To illustrate the physical interpretation of gradient, divergence and curl and apply operator del to scalar and vector point functions.	**PO1,PO2,PO3**
CO5	To find line, surface, volume integrals and the work done in moving a particle along the path over a force field and apply Green's, Gauss divergence and Stokes theorem in evaluation of line, surface and volume integrals.	**PO1,PO2,PO3**

TEXT BOOKS:

1. T.K.V. Iyengar, B.Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad, "Engineering Mathematics–I", S. Chand and Company Ltd, New Delhi.
2. T.K.V. Iyengar, B.Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad ."Mathematical Methods", S. Chand and Company Ltd, New Delhi.
3. Dr. B. S. Grewa,"Higher Engineering Mathematics", Khanna Publishers, Delhi, , 44/e, 2017

REFERENCE BOOKS:

1. B.V. Ramana, "Higher Engineering Mathematics", Tata McGraw Hill Publishers, New Delhi.
2. N.P.Bali ,"A Text Book of Engineering Mathematics", Laxmi publications (P)Ltd, Delhi.
3. Dr. M. K. Venkata Ramana ,"Higher Engineering Mathematics", National Pub, Madras
4. E.Rukmangadachari, E.Keshava Reddy, "Engineering Mathematics-I", Pearson Educations, Chennai.

REFERENCE WEBSITE:

1. https://nptel.ac.in/courses/110/105/111105111/
2. https://www.youtube.com/watch?v=8D3WViAyJvc
3. https://www.youtube.com/watch?v=fKzDtjq0ks4
4. https://www.youtube.com/watch?v=wMd4YRyBmjA
5. https://www.youtube.com/watch?v=ArkDa6d5h9I
6. https://www.youtube.com/watch?v=KgItZSst2sU
7. https://www.youtube.com/watch?v=-I3HUeHi1Ys
8. https://www.youtube.com/watch?v=SZCsFS9izfQ
9. https://www.youtube.com/watch?v=ma1QmE1SH3I

CO-PO MAPPING

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-
CO5	3	3	2	-	-	-	-	-	-	-	-	-
CO*	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

I B.Tech. – I Semester

		L	T	P	C
20BSC112	**APPLIED CHEMISTRY** (Common to E.C.E, E.E.E, C.S.E, CSM, AI & DS)	**3**	**0**	**0**	**3**

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To learn different purification methods and analyse the impurities present in water.
2. To develop skill to describe the mechanism and control of corrosion.
3. To train the students on the fundamentals and applications of polymers.
4. To understand and apply the concepts of electrochemistry effectively.
5. To introduce basic principles of spectroscopy and chromatography

UNIT I: WATER AND WATER FOR INDUSTRIAL PURPOSE (9)

Water: Sources of water - Types of Impurities in Water - Hardness of water - Temporary and permanent hardness - Estimation of hardness by EDTA Method and numerical problems - Analysis of water - Dissolved oxygen - Disadvantages of hard water - Methods of treatment of water for domestic purpose - Sterilization - Chlorination , Ozonisation.

Water for industrial purpose: Water for steam making - Boiler troubles - Priming and foaming , Boiler corrosion , Scales and sludge ,Caustic embrittlement - Water treatment - Internal treatment - Colloidal , Phosphate ,Calgon , Carbonate and Sodium aluminate conditioning of water - External treatment - Ion - exchange process - Demineralization of brackish water – Reverse osmosis.

UNIT - II: SCIENCE OF CORROSION (9)

Definition - Types of corrosion - Dry corrosion(Direct chemical attack) - Wet corrosion - Theories of corrosion and mechanism - Electro chemical theory of corrosion - Galvanic corrosion - Concentration cell corrosion - Oxygen absorption type - Factors influencing the corrosion - Control of corrosion - Cathodic protection - Sacrificial anode and impressed current cathodic protection method.

UNIT -III: POLYMERS (9)

Polymerization reactions - Basic concepts - Types of polymerization - Addition polymerization - condensation polymerization - Plastics - Thermosetting and thermoplastics - Composition, Properties and Engineering applications of teflon, bakelite, nylon and rubber - Processing of natural rubber and compounding .Elastomers: Buna S - Buna N - Polyurethane Rubber and Silicone Rubber.

UNIT - IV: ELECTRO CHEMISTRY AND APPLICATIONS (9)

Electrodes-concepts-Reference electrodes- (Standard hydrogen electrode and calomel electrode)-Nernst equation. Electro Chemistry: Conductance - Equivalent conductance - Molar conductance –Effect of dilution- Conduct metric titrations (Acid –Base titrations) - Conductivity Measurements. Photo voltaic cells - working and applications- Fuel cells- Introduction - Hydrogen oxygen fuel cell and methanol fuel cell

UNIT - V: FUNDAMENTAL ASPECTS OF INSTUMENTAL METHODS (9)

Chromatography:- Principle and methods of thin layer chromatography-separation of liquid of Paper chromatography. Electromagnetic spectrum-Absorption of radiation-Beer-Lamberts law-UV-Visible and IR spectroscopy-principle and instrumentation

TOTAL HOURS: 45

COURSE OUTCOMES:

On successful completion of the course the will be able to,		POs related to Cos
CO1	To understand the fundamentals of water technology and develop analytical skills in determining the hardness of water and to acquire awareness to societal issues on quality of water.	**PO1, PO2,PO6**
CO2	Acquire the knowledge in corrosion phenomenon and develop skills in the design of methods for control of corrosion	**PO1, PO2**
CO3	Acquire knowledge on polymeric materials and to prepare polymeric material for environmental safety and society need.	**PO1, PO2,PO6**
CO4	Understand and apply the concept of electrochemistry and analyse the standard Electrodes and different types of fuels cells	**PO1, PO2**
CO5	Demonstrate the basic knowledge of instrumental methods and their applications in the structural analysis of materials	**PO1, PO2,PO3**

TEXT BOOKS:

1. Prof. K. N. Jayaveera, Dr. G. V. Subba Reddy and Dr. C. Ramachandraiah, "Chemistry for Engineers", Tata McGraw Hill Publishers, New Delhi, 4/e, 2009.
2. Jain and Jain, "Text book of Engineering Chemistry", Dhanpat Rai Publishing Company, New Delhi.15/e, 2008
3. Text book of Engineering Chemistry, 18/e, 2008, S. S. Dara, S. Chand & Co, New Delhi.

REFERENCE BOOKS:

1. Dr. K. B. Chandrasekhar, Dr. U.N. Dash, Dr. Sujatha Mishra, Scitech Publications(India) Pvt. Ltd, Hyderabad,"Engineering Chemistry, 5/e, 2009.
2. B.Viswanath, M. Aulice Scibioh, "Fuel Cells Principles and Applications", Universities press, Hyderabad, 4/e, 2008.
3. Skoog and West, "Principles of Instrumental analysis",6/e Thomson,2007.
4. Glasston & Lewis, Dhanptharai Publishers, Physical Chemistry, New Delhi ,12/e, 2009.
5. JC Kuriacose and J. Rajaram ,"Engineering Chemistry (Vol.1&2)", Tata McGraw Hill Publishers, New Delhi, 5/e, 2004.
6. Elementary Organic Spectroscopy, Y.R.Sharma, S.Chand &CO.

REFERENCE WEBSITE:

1. https://www.youtube.com/watch?v=zVZ9c6EXfTA
2. https://nptel.ac.in/courses/113/104/113104082/
3. https://nptel.ac.in/courses/104/105/104105039/
4. https://nptel.ac.in/courses/104/106/104106132/
5. https://www.digimat.in/nptel/courses/video/103108100/L01.html

CO-PO MAPPING

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	-	-	-	2	-	-	-	-	-	-
CO2	2	2	-	-	-	-	-	-	-	-	-	-
CO3	2	2	-	-	-	2	-	-	-	-	-	-
CO4	2	2	-	-	-	-	-	-	-	-	-	-
CO5	2	2	2	-	-	-	-	-	-	-	-	-
CO*	2	2	2	-	-	2	-	-	-	-	-	-

20BSC113	APPLIED PHYSICS	L	T	P	C
	(Common to E.C.E, E.E.E, C.S.E, CSM, AI&DS)	3	0	0	3

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To identify the importance and applications Wave Optics in various Streams of Engineering
2. To understand the working principle and applications of Lasers and Optical fibers.
3. To elucidate the importance, properties and applications of Magnetic materials and Dielectrics
4. To use ideas with mathematical solutions to Quantum mechanics and its applications in Various atomic phenomena
5. To provide knowledge about semiconductors and Nanomaterials.

UNIT-I WAVE OPTICS (7)

Interference- Principle of superposition – Interference of light – Conditions for sustained interference - Interference in thin films (Reflection Geometry) – Colors in thin films – Newton's Rings – Determination of wavelength and refractive index.

Diffraction- Introduction – Fresnel and Fraunhofer diffraction – Fraunhofer diffraction due to single slit, double slit – Grating spectrum.

UNIT-II LASERS & FIBER OPTICS (9)

Lasers-Introduction – Characteristics of laser – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Conditions for Lasing action – Pumping mechanisms – Nd-YAG laser – He-Ne laser – Applications of lasers.

Fiber optics-Introduction – Principle of optical fiber – Acceptance Angle – Numerical Aperture – Classification of optical fibers based on refractive index profile and modes – Propagation of electromagnetic wave through optical fibers – Applications.

UNIT-III DIELECTRIC MATERIALS & MAGNETIC MATERIALS (9)

Dielectric Materials-Introduction – Dielectric polarization – Dielectric polarizability, Susceptibility and Dielectric constant – Types of polarizations: Electronic, Ionic and Orientation polarizations (Qualitative) – Lorentz internal field – Clausius-Mossotti equation.

Magnetic Materials-Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and Permeability – Origin of permanent magnetic moment – Classification of magnetic materials: Dia,para & Ferro-Domain concept of Ferromagnetism (Qualitative) – Hysteresis – Soft and Hard magnetic materials.

UNIT IV: QUANTUM MECHANICS, FREE ELECTRON AND BAND THEORY OF SOLIDES (10)

Quantum Mechanics- Dual nature of matter – Schrodinger's time independent and dependent wave equation – Significance of wave function – Particle in a one-dimensional infinite potential well

Free Electron Theory-Classical free electron theory (Merits and demerits only) – Quantum free electron theory – Equation for electrical conductivity based on quantum free electron theory – Fermi-Dirac distribution – Density of states – Fermi energy.

Band theory of Solids- Bloch's Theorem (Qualitative) – Kronig-Penney model (Qualitative) – E vs K diagram – Classification of crystalline solids – Effective mass of electron – m^* vs K diagram – Concept of hole.

UNIT V: SEMICONDUCTOR PHYSICS & NANOMATERIALS (10)

Introduction- Intrinsic and extrinsic semiconductor (Qualitative Analysis) – Carrier transport in Semiconductors - Drift & Diffusion –Einstein Equation – Direct and indirect band Gap Semiconductors-Hall Effect and its applications

NANOMATERIALS –Types of Nanomaterials (One dimensional, Two dimensional and Three-dimensional Nanomaterials) - Significance of Nanoscale - surface to volume ratio –Quantum Confinement effect-Synthesis of Nanomaterials - Ball milling Method - Chemical vapour deposition methods –Optical, thermal, mechanical and electrical properties of Nanomaterials - Applications of Nanomaterials.

TOTAL HOURS: 45

COURSE OUTCOME:

On successful completion of the course the students will be able to		**POs related to COs**
CO1	Identify the importance and applications Wave Optics in various Streams of Engineering	**PO1, PO2**
CO2	Understand the working principle and applications of Lasers and Optical fibers	**PO1,PO2**
CO3	To elucidate the importance, properties and applications of Magnetic materials and dielectrics	**PO1, PO2**
CO4	Use ideas with mathematical solutions to Quantum mechanics and its applications in various atomic phenomena	**PO1,PO2,**
CO5	Provide knowledge about semiconductors and Nanomaterials	**PO1,PO2,PO12**

TEXT BOOKS:

1. Palanisamy ,"Engineering Physics", Palanisamy, Scitech Publications
2. K.Thyagarajan ,"Engineering Physics", McGraw Hill Publications
3. Maninaidu,"Engineering Physics", Pearson Publications

REFERENCE BOOKS:

1. Kittel ,"Solid State Physics", Wiley Publications
2. Gaur and Gupta , "Engineering Physics", Dhanpatrai Publications

REFERENCE WEBSITE:

1. https://www.youtube.com/watch?v=PEXSH8dB-Uk
2. https://www.youtube.com/watch?v=YvrwVK9ZqQY
3. https://www.digimat.in/nptel/courses/video/115107095/L01.html
4. https://www.youtube.com/watch?v=6QUFuZpCgGw
5. https://www.youtube.com/watch?v=etjZmdmrjSU
6. https://nptel.ac.in/courses/115/105/115105122/
7. https://nptel.ac.in/courses/108/108/108108122/
8. https://nptel.ac.in/courses/118/104/118104008/

CO-PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	2
CO*	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**

I B.TECH. – I SEMESTER

		L	T	P	C
20ESC111	**ENGINEERING GRAPHICS**				
	(Common to all branches)	**1**	**0**	**4**	**3**

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To expose them to existing national standards related to technical drawings and develop knowledge of basic engineering curves.
2. To develop drawing skills for communication of concepts, ideas and design of projections of points, lines and planes.
3. To develop geometrical shapes and multiple views of projections of solids and sections of solids.
4. To develop drawing skills for communication of concepts, ideas and design the development of surfaces of objects and isometric views.
5. To develop geometrical shapes and multiple views of orthographic projections of solids and perspective views.

CONCEPTS AND CONVENTIONS (Not for Examination) (3)

Importance of drawings in engineering applications - Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets - Lettering, numbering and dimensioning – Basic geometrical constructions – Scales.

UNIT – 1: ENGINEERING CURVES (9)

Engineering Curves: Conics **–** Construction of ellipse, parabola and hyperbola by eccentricity method and rectangular hyperbola **–** Construction of cycloid, epi cycloid and hypo cycloid **–** Involutes of square, circle, pentagon and hexagon **–** Drawing of tangents and normal to the above curves

UNIT – 2: PROJECTION OF POINTS, LINES AND PLANE SURFACES (12)

Projection of Points: Principles of orthographic projection **–** First angle and third angle projections **–** Projection of points. **Projection of Lines:** Projection of straight lines (only first angle projections) inclined to one and both the principal planes **–** Determination of true lengths, true inclinations by rotating line and trapezoidal method and traces. **Projection of Planes:** Planes (polygonal and circular surfaces) inclined to both the principal planes by change of position method.

UNIT – 3: PROJECTION OF SOLIDS AND SECTION OF SOLIDS (12)

Projection of Solids: Projection of simple solids like prisms, pyramids, cylinder and cone, when the axis is inclined to one principal plane. **Section of Solids:** Sectioning of right regular solids like prisms, pyramids, cylinder and cone, solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other plane **–** Obtaining true shape of section.

UNIT – 4: DEVELOPMENT OF SURFACES AND ISOMETRIC PROJECTIONS (12)

Development of Surfaces: Development of lateral surfaces of simple and sectioned solids like prisms, pyramids, cylinder and cone. **Isometric Projection:** Principles of isometric projection **–** Isometric scale **–** Isometric views of simple solids and truncated solids like prisms, pyramids, cylinder and cone – Combination of two solid objects in simple vertical positions.

UNIT – 5: ORTHOGRAPHIC PROJECTIONS AND PERSPECTIVE PROJECTIONS (12)

Orthographic Projections: Visualization principles **–** Plane of projections **–** Representation of three dimensional objects **–** Layout of views **–** Sketching of multiple views from pictorial views of objects. **Perspective Projection:** Perspective projection of simple solids like prisms and pyramids by visual ray method.

Total Hours: 60

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POS RELATED TO COS
CO1	Construct the Engineering curves and generate tangent and normal for those curves.	**P01,P02,P03,P10**
CO2	Draw the projection of points, lines and plane surfaces.	**P01,P02,P03, P10**
CO3	Draw the projection of solids, sections of solids like prisms, pyramids, cylinder and cone.	**P01,P02,P03, P10**
CO4	Draw the isometric projections and views and also develop the development of surfaces.	**P01,P02,P03, P10**
CO5	Draw the orthographic and perspective projections of solids.	**P01,P02,P03, P10**

TEXT BOOKS:

1. N.D. Bhatt and V. M. Panchal , "Engineering Drawing" , Charotar Publishing House, 50th edition, , 2010.
2. K.V.Natrajan , "A Text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai.
   2009.

REFERENCES BOOKS:

1. K.V.Natrajan , "A Text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2009.
2. Luzzader, Warren.J and Duff,John M, "Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production", Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
3. K.Venugopal and V.Prabhu Raja ,"Engineering Graphics", New Age International (P) Limited. 2008.
4. M.B.Shah and B.C.Rana , "Engineering Drawing", Pearson Education, 2/e, 2009.
5. Basant Agarwal and C.M.Agarwal ,"Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, , 2008,

REFERENCE WEBSITE:

1. https://nptel.ac.in/courses/112/102/112102304/
2. https://nptel.ac.in/courses/112/105/112105294/
3. https://nptel.ac.in/courses/112/103/112103019/
4. https://nptel.ac.in/courses/112/104/112104172/

CO-PO MAPPING

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	-	-	-	1	-	-
CO2	3	3	3	-	-	-	-	-	-	1	-	-
CO3	3	3	3	-	-	-	-	-	-	1	-	-
CO4	3	3	3	-	-	-	-	-	-	2	-	-
CO5	3	3	3	-	-	-	-	-	-	2	-	-
CO*	**3**	**2.8**	**2.8**	**-**	**-**	-	**-**	**-**	**-**	**1.4**	-	**-**

I B.TECH. – I SEMESTER

		L	T	P	C
20CSE111	**C &DATA STRUCTURES** (Common to ECE, EEE, CSE, CSM)	**2**	**1**	**0**	**3**

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To provide knowledge on algorithm, flowchart for a given problem and introducing the C programming basics.
2. To impart adequate knowledge on conditional and iterative statements for problem solving.
3. To familiarize with the pointers, structures and union.
4. To understand basic data structures.
5. To familiarize with several sub-quadratic sorting and searching algorithms.

UNIT -1: INTRODUCTION TO C **(9)**

Overview of Computers: Computer Software- Algorithm–Flowchart–Software Development Method.
C Programming Basics: Introduction to "C" Programming – Characteristics of C – Structure of a "C" program – Tokens –Constants- Variables – Data Types – Operators and their types- Expressions – Operator Precedence and Associativity.

UNIT -2: CONTROL STATEMENTS AND FUNCTIONS **(9)**

Control Flow statements: If-Else- Constructs – Loop Structures/Iterative Statements – While Loop – For Loop – Break Statement - Arrays: Initialization–Declaration - One-Dimensional Arrays-Two-Dimensional Arrays– Function Call and Returning Values – Parameter Passing – Local and Global- Scope – Recursive Functions.

UNIT -3: POINTERS, STRUCTURES AND UNIONS **(9)**

Pointers: Definition–Initialization–Pointers Arithmetic–Pointers and Arrays.
Structures and Union: Introduction – Need for Structure Data type – Structure Definition – Structure Declaration – Accessing Structure Members - Structure within a Structure – Copying and Comparing Structure Variables – Array of structures – Union.

UNIT-4: INTRODUCTION TO DATA STRUCTURES **(9)**

Overview and importance of algorithms and data structures, Definition- Abstract Data Type, - Classification of Data Structures - Linear and Non Linear-List ADT –Single Linked List - Applications. Dynamic Memory Allocation and Deallocation

UNIT-5: SORTING AND SEARCHING TECHNIQUES **(9)**

Sorting Techniques: Insertion sort - Selection sort - Bubble sort - Quick sort - Merge sort.
Searching Techniques: Linear search - Binary Search

TOTAL HOURS: 45

COURSE OUTCOMES:

On successful completion of the course the student will be able to,		POs related to COs
CO1	Understand the problem solving basics.	**PO1, PO2**
CO2	Identify and develop programs using control structures like selection control and iterative control statements.	**PO1, PO2, PO3**
CO3	Apply and Demonstrate knowledge on pointers, structure and union.	**PO1,PO2, PO3, PO4**
CO4	Categorize the basic data Structures and its applications	**PO1, PO2,PO5**
CO5	Illustrate different sorting and searching techniques to solve real-world problems	**PO1, PO3, PO4**

TEXT BOOKS:

1. PradipDey, and Manas Ghosh, "Programming in C", Oxford University Pres, 2018.
2. D. Samanta,"Classic Data Structure", Eastern Economy Edition, 2014
3. YashavantKanetkar,"Let us C", 15th Edition, BPB Publications, 2016.

REFERENCE BOOKS:

1. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education, 2010, Chennai.
2. 2.Data Structures Using C, ReemaThareja, Oxford University Press, 2011.
3. Mark Allen Weiss**,** "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education, 2005.

REFERENCE WEBSITES:

1. https://onlinecourses.swayam2.ac.in/cec22_cs11
2. https://onlinecourses.nptel.ac.in/noc22_cs40
3. https://www.geeksforgeeks.org..

CO-PO MAPPING

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-
CO3	3	3	2	2	-	-	-	-	-	-	-	-
CO4	3	3	-	-	2	-	-	-	-	-	-	-
CO5	3	-	2	2	-	-	-	-	-	-	-	-
CO*	**3**	**3**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

I B.TECH. – I SEMESTER

20BSC114	**ENGINEERING CHEMISTRY LABORATORY** (Common to E.C.E, E.E.E, C.S.E, CSM, AI& DS)	**L**	**T**	**P**	**C**
		0	**0**	**2**	**1**

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To provide solid foundation in chemistry laboratory to solve engineering problems.
2. To apply the theoretical principles and perform experiments on hardness of water
3. To apply the theoretical principles and perform experiments dissolved oxygen, alkalinity and acidity.
4. To Illustrates the properties of analytical equipments like red wood, Viscometer and conductometry

LIST OF EXPERIMENTS:

1. Preparation of Standard EDTA solution and Estimation of Hardness of Water
2. Preparation of Standard EDTA and Estimation of Copper
3. Estimation of dissolved oxygen in given water sample
4. Estimation of alkalinity of water
5. Estimation of Acidity of water sample.
6. Preparation of Standard Potassium Dichromate and Estimation of Ferrous Iron
7. Preparation of Standard Potassium Dichromate and Estimation of Copper by Iodometry
8. Determination of strength of the given Hydrochloric acid against standard sodium hydroxide Solution by Conductometric titration
9. Conduct metric titration of $BaCl_2$ Vs Na_2SO_4 (Precipitation Titration).
10. Determination of viscosity of the given oils through Redwood viscometer

COURSE OUTCOMES:

On successful completion of the course the students will be able to		**POs related to COs**
CO1	Prepare standard solutions	**PO1,PO3**
CO2	Acquire knowledge about volumetric analysis of estimation copper by EDTA and by Iodometry	**PO1,PO2,PO3**
CO3	Acquire analytical skills in estimation of hardness of water, Alkanility and Acidity of water, dissolved oxygen in water and estimation of iron through laboratory methods	**PO1,PO2,PO3,PO6,PO12**
CO4	Acquire skills to use instrumental techniques for the determination of electrical conductance of electrolytes and viscosity of lubricants	**PO1,PO2,PO3**
CO5	Provide solutions for environmental issues through determination of quality of water	**PO1,PO2,PO3,PO6,PO7**
CO6	Communicate verbally and in written form pertaining to results of the Experiments	**PO1,PO2,PO8,PO9,**

CO7	Learns to perform experiments involving chemistry in future years.	**PO1,PO2,PO8,PO9, PO10**
CO8	Communicate verbally and in written form, the understanding about the experiments.	**PO1,PO2,PO8,PO9,PO10**
CO9	Continue updating their skill related to chemistry laboratory.	**PO1,PO2,PO8, PO9,PO10**

Reference Book:

1. **Vogels Text book of Quantitative chemical Analysis, scientific and Technical.**

CO-PO MAPPING

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	3	-	-	-	-	-	-	-	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-
CO3	3	3	3	-	-	3	-	-	-	-	-	3
CO4	3	3	3	-	-	-	-	-	-	-	-	-
CO5	3	3	3	-	-	3	3	-	-	-	-	-
CO6	3	3	-	-	-	-	-	3	3	-	-	-
CO7	3	3	-	-	-	-	-	3	3	3	-	-
CO8	3	3	-	-	-	-	-	3	3	3	-	-
CO9	3	3	-	-	-	-	-	3	3	3	-	-
CO*	3	3	3	-	-	3	3	3	3	3	-	3

I B.TECH. – I SEMESTER

		L	T	P	C
20BSC115	**ENGINEERING PHYSICS LABORATORY** (Common to E.C.E, E.E.E, C.S.E, CSM)	**-**	**-**	**2**	**1**

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To understands the concepts of interference, diffraction and their applications.
2. To understand the role of optical fiber parameters in communication.
3. Recognize the importance of energy gap in the study of conductivity
4. To Illustrates the properties of Magnetic and their applications
5. To understand and evaluate the properties of materials and sounds

LIST OF EXPERIMENTS

1	Diffraction grating - Measurement of wavelength of given Laser.
2	Determination of magnetic field along the axis of a current carrying circular coil - Stewart Gees method
3	Determination of numerical aperture and acceptance angle of an optical fiber
4	Determination of particle size using a laser source
5	Parallel fringes – Determination of thickness of thin object using wedge method
6	Newton's rings – Determination of radius of curvature of given plano convex lens
7	B-H curve – Determination of hysteresis loss for a given magnetic material
8	Determination of Energy band gap of semiconductor

TEXT BOOKS:

1. Palanisamy ,"Engineering Physics", Palanisamy, Scitech Publications
2. K.Thyagarajan ,"Engineering Physics", McGraw Hill Publications
3. Maninaidu,"Engineering Physics", Pearson Publications

Course Outcomes:

On completion of the laboratory course the student will be able to,		POs related to COs
CO1	Demonstrate Knowledge on measurement of various physical quantities using optical methods and fundamentals of magnetic fields	**PO1**
CO2	Identify different physical properties of materials like band gap, magnetic field intensity etc, for engineering and technological applications	**PO2**
CO3	Provide valid conclusions on phenomena Interference and Diffraction	**PO4**
CO4	Follow the ethical principles in implementing the programs	**PO8**
CO5	Do experiments effectively as an individual and as a team member in a group.	**PO9**
CO6	Communicate verbally and in written form, the understanding about the experiments.	**PO10**
CO7	Continue updating their skill related to loops, pointers and files implementing programs in future.	**PO12**

CO-PO MAPPING

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	3	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	3	-	-	-	-
CO5	-	-	-	-	-	-	-	-	3	-	-	-
CO6	-	-	-	-	-	-	-	-	-	3	-	-
CO7	-	-	-	-	-	-	-	-	-	-	-	3
CO*	3	3	-	3	-	-	-	3	3	3	-	3

I B.TECH. – I SEMESTER

20CSE112	**C &DATA STRUCTURE LAB**	**L**	**T**	**P**	**C**
	(Common to CSE, ECE, EEE, CSM, AI&DS)	**0**	**0**	**3**	**1.5**

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To provide knowledge on flowchart and algorithm to the given problem
2. To exercise conditional and iterative statements to Write C programs
3. To develop the skill of C programs using arrays, strings and functions.
4. To understand C programs using pointers and allocate memory using dynamic memory management functions.
5. To familiarize with sorting and searching techniques.

LIST OF EXERCISES:

1. a. Write a C Program to Calculate the Simple Interest.
   b. Write a C Program to Convert the Temperature Unit from Fahrenheit to Celsius using the Formula C= (F-32)/1.8.
   c. Assume that any Month is of 30 Days. Now you are given Total Days. Write a C Program to find out the exact Number of Years - Months & Days.

2. 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. 5000and <= Rs. 10000.
      iii) Commission is 5% for Sales Amount >Rs. 10000.
   c. Write a C Program to find the Roots of Quadratic Equation.

3. a. Write a Program, which takes two integer Operands and one Operator from the User, Performs the Operation and then Prints the Result. (Consider the Operators +,-,*, /, %, use switch Statement).
   b. 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. Write a C 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 C Program to Generate the first n terms of the Sequence.

5. a. i) A Perfect Number is a Number that is the Sum of all its Divisors Except Itself. Six is the Perfect Number. The only Numbers that Divide 6 evenly are 1, 2, 3 and 6 (i.e.,1+2+3=6).
      ii) An Abundant Number is one that is Less than the Sum of its Divisors (Ex: 12 <1+2+3+4+6).
      iii) A Deficient number is one that is Greater than the Sum of its Divisors

(Ex: 9 > 1+3).

Write a Program to Classify N Integers (Read N from keyboard) each as Perfect, Abundant or Deficient.

b. An Armstrong Number is a Number that is the Sum of the Cubes of its Individual Digits.Write a C Program to Print Armstrong Numbers below 1000.

6. a. Write a C Program to generate all the Prime Numbers between 1 And N, Where N is a Value Supplied by the User.
   b. Write a C Program to Calculate the Following Sum: Sum = 1 - x2/2! + x4/4! - x6/6! + x8/8! - x10/10!

7. A.Write a C Program to find both the Largest and Smallest Number in a List of Integers using Arrays.
   B.Write a C Program to Perform the Following:
   i) Addition of Two Matrices. ii) Multiplication of Two Matrices.

8. a. Write C Programs that use both Recursive and Non-Recursive Functions to find the Factorial of a given Integer.
   b. Write C Programs that use both Recursive and Non-Recursive Functions to find the GCD (Greatest Common Divisor) of two given integers.
   c. Write C Program to solve Towers of Hanoi Problem using recursive function.

9. a. Write C Programs for Swap/Exchange values of two Integer variables using Call by Reference.
   b. Write a C Program using Pointers to Read in an Array of Integers and Print its Elements in Reverse Order.

10. Write a C Program using Dynamic Memory Allocation.

11. You are supposed to generate a Result Table which Consists of Student Id - Student Name - Marks of three Subject and Total Marks. Write a Program which takes Input for Five Students and Displays Result Table. Also Display Student Information Separately Who Got the Highest Total? Use Structures to do it.

12. Write C programs to perform the following searching operations for a Key value in a given list of integers: i) Linear search ii) Binary search

13. Write a C program that implements the following sorting methods to sort a given list of integers in ascending order i) Bubble sort ii) Selection sort iii) Insertion sort

14. Write a C Program that Implements the Following Sorting Methods to Sort a Given List of Integers in Ascending Order i) Quick sort ii) Merge sort

COURSE OUTCOMES:

After the successful completion of this course, the students able to:		POs related to COs
CO1	Design the algorithm and flowchart for the given problem.	**PO1, PO2,PO3**
CO2	Develop the programs on control statements and arrays.	**PO1, PO2, PO3**
CO3	Analyze the concepts on functions	**PO1, PO2**
CO4	Solve the memory access problems by using pointers and design the programs on structures and unions.	**PO1, PO2, PO4**
CO5	Analyze the dynamic memory allocation and deallocation.	**PO1, PO2**
CO6	Follow the ethical principles in implementing the programs	**PO8**
CO7	Do experiments effectively as an individual and as a team member in a group.	**PO9**
CO8	Communicate verbally and in written form, the understanding about the experiments.	**PO10**
CO9	Continue updating their skill related to loops, pointers and files implementing programs in future.	**PO12**

REFERENCE BOOKS:

1. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education, 2010, Chennai.
2. Let us C, YashavantKanetkar, BPB, Thirteenth Revised and Updated edition (2013).
3. Programming in C and Data Structures, E.Balaguruswamy, Tata McGraw Hill,2nd edition.
4. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. AnandaRao, Pearson Education.
5. The Spirit of C, an introduction to modern programming, M.Cooper, Jaico Publishing House.
6. Mastering C, K.R. Venugopal and S.R. Prasad, TMH Publications.
7. Computer Basics and C Programming, V. Rajaraman, PHI Publications.

REFERENCE WEBSITES:

1. https://onlinecourses.swayam2.ac.in/cec22_cs11
2. https://onlinecourses.nptel.ac.in/noc22_cs40
3. https://www.geeksforgeeks.org.

CO-PO MAPPING

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	3	3	3	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	3	3	-	-	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	3	3	-	3	-	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	3	3	-	-	-	**-**	**-**	-	**-**	**-**	**-**	**-**
CO6	**-**	**-**	**-**	**-**	**-**	**-**	**-**	3	-	**-**	**-**	**-**
CO7	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	3	-	**-**	**-**
CO8	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	3	**-**	
CO9												3
CO*	**3**	**3**	3	**3**	**-**	**-**	**-**	**3**	**3**	**3**		**3**

I B.TECH. – I SEMESTER

		L	T	P/D	C
20ESC112	**ENGINEERING WORKSHOP & IT WORKSHOP (Common to all branches)**	**0**	**0**	**2**	**1**

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To provide exposure to the students with hands on experience on various basic engineering practices in civil, mechanical and electrical engineering.
2. To include training on PC Hardware, Internet & World Wide Web and Productivity Tools including Word, Excel and Power Point.

A. ENGINEERING WORKSHOP

TRADES FOR EXERCISES:

1. **Carpentry:** Two exercises from: Middle T lap joint – Dove tail lap joint – Mortise and tenon joint from out of 300 x 50 x 35 mm soft wood stock.
2. **Sheet Metal:** Two exercise from: Square tray – Open scoop – Frustum of pyramid from out of 22 or 20 gauge G.I. sheet.
3. **Fitting:** Two exercises from: Square joint – V joint – Dove tail joint from out of 50 x 50 x 5 mm M.S. flat piece.
4. **House Wiring:** Two exercise from: Two lamps controlled by one switch in series and parallel – One lamp controlled by 2 two way switches (stair case) – Wiring for fluorescent lamp.
5. **Plumbing:** Two exercise from: Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.
6. **Machining:** Exercise on drilling and tapping.

TRADES FOR DEMONSTRATION:

- **a.** Lathe machine.
- **b.** Grinding machine.
- **c.** Arc and gas welding.

COURSE OUTCOMES (ENGINEERING WORKSHOP):

On successful completion of the course, students will be able to		POs related to COs
CO1	Demonstrate the knowledge on different tools used in carpentry, fitting, sheet metal, house wiring and plumbing sections and also basic machining process	**PO1**
CO2	Analyze the basic pipeline connection using different joints	**PO2**
CO3	Design and develop simple components by using different materials includes wood, GI sheet and MS plates	**PO3**
CO4	Apply basic electrical engineering tools on the house wiring practice	**PO5**
CO5	Follow the ethical principles in while doing the exercises.	**PO8**

CO6	Do the exercises effectively as an individual and as a team member in a Group	**PO9**
CO7	Communicate verbally among team members and in written form, the understanding about the trade exercises.	**PO10**
CO8	Continue updating their skill related to trades.	**PO12**

TEXT BOOKS:

1. Lab manual provided by the department.

CO-	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	2	-	-	-	-	-	-	-	-	-	-
CO3	-	-	2	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	2	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	-	-	3	-	-	-
CO7	-	-	-	-	-	-	-	-	-	3	-	-
CO8	-	-	-	-	-	-	-	-	-	-	-	3
CO*	**3**	**2**	**2**	**-**	**2**	**-**	**-**	**3**	**3**	**3**	**-**	**3**

B. IT WORKSHOP

PC HARDWARE

1. Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.
2. Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video shall be given as part of the course content.
3. Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.
4. Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both windows and Linux. Lab instructors should verify the installation and follow it up with a Viva
5. **Hardware Troubleshooting:** Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva
6. **Software Troubleshooting:** Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

LATEX AND WORD

7. Word Orientation: The mentor needs to give an overview of LaTeX and Microsoft (MS) office 2007/ equivalent (FOSS) tool word: Importance of LaTeX and MS office 2007/ equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.
8. Using LaTeX and Word to create project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

EXCEL

9. Excel Orientation: The mentor needs to tell the importance of MS office 2007/ equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.
10. Creating a Scheduler - Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text.

LATEX AND MS/EQUIVALENT (FOSS) TOOL POWER POINT

11. Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this Exercise includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in both LaTeX and PowerPoint. Students will be given model power point presentation which needs to be replicated (exactly how it's asked).
12. Second Exercise helps students in making their presentations interactive. Topic covered during this Exercise includes: Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts

INTERNET& WORLD WIDE WEB

13. **Internet & World Wide Web -Orientation & Connectivity Boot Camp:** Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

    Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers.

14. **Search Engines & Netiquette:** Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated by the student to the satisfaction of the instructors. Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computers to be safe on the internet. They need to first install an antivirus software, configure their personal firewall and windows update on their computer.

COURSE OUTCOMES (IT WORKSHOP):

On the successful completion of this course, the student should be able to,		POs related to COs
CO1	Acquire knowledge on computer system such as system unit, input devices, and output devices connected to the computer.	**PO1**
CO2	Demonstrate the booting process that includes switching on the system, execution of POST routine, then bootstrap loader, and loading of the operating system, and getting it ready for use.	**PO2**
CO3	Demonstrate the working of the internet that include the use of protocols, domains, IP addresses, URLs, web browsers, web servers, mail-servers, etc.	**PO3**
CO4	Familiarize with parts of MS Office, To create and save a document, To set page settings, create headers and footers, To use various formatting features such as bold face, italicize, underline, subscript, superscript, line spacing, etc.	**PO5**
CO5	Follow the ethical principles in implementing the programs	**PO8**
CO6	Do experiments effectively as an individual and as a team member in a group.	**PO9**
CO7	Communicate verbally and in written form, the understanding about the experiments and	**PO10**
CO8	Continue updating their skill related to MS Office, Internet and Computer in future.	**PO12**

REFERENCE BOOKS:

1. Vikas Gupta,"Comdex Information Technology course tool kit" , WILEY Dream tech, New Delhi, 2003.
2. Cheryl A Schmidt, "The Complete Computer upgrade and repair book", WILEY Dream Tech,New Delhi, 3/e, 2008.
3. Introduction to Information Technology,ITL Education Solutions limited, Pearson Education, New Delhi, ,2008
4. Kate J. Chase , "PC Hardware and A+ Handbook", Microsoft press,2004.
5. Leslie Lamport, Addison Wesley, LaTeX Companion, New Delhi, 2/e, 2002
6. David Anfinson and Ken Quamme ,"IT Essentials PC Hardware and Software Companion Guide", CISCO Press, Pearson Education, New Delhi,3/e, 2008.
7. Patrick Regan ,"IT Essentials PC Hardware and Software Labs and Study Guide", CISCO Press, Pearson Education, New Delhi, 3/e, 2008, ,
8. S.J.Bigelow , "Troubleshooting, Maintaining and Repairing PCs", TMH, New Delhi,5/e, 2008.

CO-PO MAPPING

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	3	-	-	-	-
CO7	-	-	-	-	-	-	-	-	3	-	-	-
CO8	-	-	-	-	-	-	-	-	-	3	-	-
CO9	-	-	-	-	-	-	-	-	-	-	-	3
CO*	**3**	**3**	**3**	**3**	**3**	-	**-**	**3**	**3**	**3**	-	**3**

I B.TECH. – II SEMESTER

20HSM111	**COMMUNICATIVE ENGLISH FOR ENGINEERS**	**L**	**T**	**P**	**C**
	(Common to All Branches)	**3**	**0**	**0**	**3**

PRE-REQUISITES: Nil

EDUCATIONAL OBJECTIVES:

1. To Provide Knowledge on developing Vocabulary and communicating in a verbal manner.
2. To understand in using of technology for societal aspects.
3. To recognize the importance on constructing Entrepreneurship Skills.
4. To Execute Contextual knowledge to recognize the need of ability to engage in independent and life-long learning in the broadest context of technological change.
5. To support and identify the earlier Medical Life Sciences used in India

UNIT-I: COMMUNICATION SKILLS FOR PROFESSIONALS (9)

Listening: Identifying the topic, specific pieces of information by listening by listening to short audio texts and answering a series of questions.
Speaking: Asking and answering general questions; introducing oneself and others.
Reading: Skimming to get the main idea of a text, scanning to look for specific information.
Reading for writing: Beginnings and endings of paragraphs
Grammar and Vocabulary: Articles and prepositions and word formation. Content words and function words.

UNITII: TECHNOLOGY WITH A HUMAN FACE A LECTURE BY E.F.SCHUMACHER (9)

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts.
Speaking: Discussion in pairs/small groups on specific topics.
Reading:. Identifying sequence of ideas recognizing verbal techniques.
Writing: Paragraph writing (specific topics) using suitable cohesive devices;mecahanics of writings.
Grammar and Vocabulary: Word formation (Derivtion,Borrowing-coinage-compounding)
Tenses.

UNITIII: AZIM PREMJI-AN ENTREPRENEUR (9)

Listening: Identifying the topic, specific pieces of information by listening by listening to short audio texts.
Speaking: Discussing daily routine activities.
Reading: Phrasal verbs often used in daily conversations.
Writing: Beginnings and endings of paragraphs
Grammar and Vocabulary: Letter writing (official) - voice of verbs

UNIT IV: REFLECTIONS OF FUTURE THE YEAR –BY THEODORE J.GORDON (9)

Listening: Identifying the topic, specific pieces of information by listening by listening to short audio texts and answering a series of questions.
Speaking: Asking and answering general questions; introducing oneself and others.
Reading: Skimming to get the main idea of a text, scanning to look for specific information.
Reading for writing: Beginnings and endings of paragraphs
Grammar and Vocabulary: Direct and Indirect speech-Email writing.

UNIT V: Y.SUBBA ROW **(9)**

Listening: Identifying the topic, specific pieces of information by listening by listening to short audio texts and answering a series of questions.
Speaking: Asking and answering general questions; introducing oneself and others.
Reading: Skimming to get the main idea of a text, scanning to look for specific information.
Reading for writing: Beginnings and endings of paragraphs introducing the topic summarizing the main idea and providing a transition to the next paragraph.
Grammar and Vocabulary: Subject verb agreement- Report writing**.**

Total Hours :45

COURSE OUTCOMES:

On successful completion of the course, student will be able to		**POs related to COs**
CO1	Understand the concepts on developing vocabulary and communicating in a verbal manner.	**PO1**
CO2	Understand and develop knowledge on the use of Technology for social aspects.	**PO5**
CO3	Understand Acquiring skills to become an able Entrepreneur	**PO2**
CO4	Understand contextual knowledge to recognize the need of ability to engage in independent and life-long learning in the broadest context of technological change.	**PO6**
CO5	Understand the importance of Medical advancement and its uses on Human life in India..	**PO4**

TEXT BOOKS:

1. V.N.Sudheer, S.Riyaz Ahammed, N.R Tulasi Prasad, N.Lakshmi Sailaja,"Functinal English 1" The Department of English of SITAMS ,1/e. 2016
2. V.N.Sudheer, S.Riyaz Ahammed, N.R Tulasi Prasad, N.Lakshmi Sailaja,"Functinal English 2" The Department of English of SITAMS ,1/e. 2016

REFERENCE BOOKS:

1. K.Srinivasa Krishna , B.Kuberudu , "Business communication and softskills", Excel Books ,1/e 2008.
2. K.R. Lakshminarayana , "English for Technical communication" ,Scitech Publishers, 2/e, 2009
3. R.K. Bansal ,J.B. Harrison, "Spoken English", Orient Longman, Mumbai, 2/e,2009
4. Raymond Murphy ,Murphys English Grammar, Raymond Murphy Publishers , 2/e, 2006
   Cambridge English Dictionary for advanced Learners.

5 Inspiring Lives by Dr. Jandhyala Ravindranath,Dr.M.Sarath Babu

REFERENCE WEBSITE:

1. www.english club.com
2. www.easyworldofenglish.com
3. www.languageguide.org/english/
4. www.bbc.co.uk/learningenglish
5. www.eslpod.com/index.html
6. www.myenglishpages.com

CO-PO MAPPING

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	3	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	3	-	-	-	-	-	-
CO5	-	-	-	3	-	-	-	-	-	-	-	-
CO*	**3**	**3**	**-**	**3**	**3**	**3**						

I B.TECH. – II SEMESTER

		L	T	P	C
20BSC121	**DIFFERENTIAL EQUATIONS AND TRANSFORMATION TECHNIQUES** (COMMON TO ALL BRANCHES)	**2**	**1**	**0**	**3**

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1 To learn the methods of solving the ordinary differential equations of first & higher order and applications of first order ordinary differential equations.

2 To learn partial differential equations and how they can serve as models for physical processes and also master the technique of separation of variables to solve partial differential equation.

3 To learn the concepts of Laplace Transforms and inverse Laplace Transforms and to explore the solving initial value problems by using Laplace transform method.

4 To develop skill to design Sine and Cosine waves with the help of Fourier series

5 To learn the concepts of Fourier transform and inverse Fourier Transform.

UNIT I: ORDINARY DIFFERENTIAL EQUATIONS (9)

Differential Equations of First Order and First Degree: Formation – Linear and Bernoulli's equations – Applications to L-R and C-R circuit's problems.
Linear Differential Equations of Higher Order: Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type e^{ax}, Sin ax, Cos ax, polynomials in x, e^{ax} v(x) & x^m v(x) - Method of variation of parameters.

UNIT II: PARTIAL DIFFERENTIAL EQUATIONS (9)

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions - Solution of first order linear (Lagrange's) equation and Non-Linear (standard forms) equations - Solution of PDE by the Method of separation of variables.

UNIT III: LAPLACE TRANSFORMS (9)

Definition of Laplace transform, Laplace transform of standard functions - Laplace Transform of Unit step function, Dirac's delta function and Periodic function – Properties of Laplace Transforms(without proof): Linear property, First shifting theorem, Change of Scale Property, Second shifting theorem, Multiplication & Division by t, Transform of Derivatives & Integrals - Inverse transform - Convolution theorem(without proof) – Application: Solution of ordinary differential equations of first and second order with constant coefficients.

UNIT IV: FOURIER SERIES (9)

Determination of Fourier coefficients, Euler's formulae, Dirichlet's conditions - Fourier series of periodic functions, even and odd functions - Fourier series in an arbitrary interval - Half-range Fourier sine and cosine expansions.

UNIT V: FOURIER TRANSFORM (9)

Fourier integral theorem (without proof) - Fourier sine and cosine integrals - Fourier transform – Fourier sine and cosine transforms - Properties - Inverse transforms - Finite Fourier transforms.

TOTAL HOURS: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to Cos
CO1	To identify whether the given differential equation of first order is linear or Bernoulli and to solve the higher order linear differential equations with constant coefficients.	**PO1,PO2,PO3**
CO2	Apply a range of techniques to find solutions of standard PDE's and outline the basic properties of standard PDE's	**PO1,PO2,PO3**
CO3	To understand the concepts of Laplace transform and elementary functions, general functions using its properties and special functions.	**PO1,PO2,PO3**
CO4	To understand finding Fourier series expression of the given function.	**PO1,PO2,PO3**
CO5	Understand Fourier transforms and properties of Fourier transforms	**PO1,PO2,PO3**

TEXT BOOKS:

1. K.V. Iyengar, B.Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad,"Engineering Mathematics–I", T, S. Chand and Company Ltd, New Delhi.
2. T.K.V. Iyengar, B.Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad,"Mathematical Methods", S. Chand and Company Ltd, New Delhi.
3. Dr. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, Delhi, 44/e, 2017.

REFERENCE BOOKS:

1. B.V. Ramana, "Higher Engineering Mathematics", Tata McGraw Hill Publishers, New Delhi.
2. Dr. M. K. Venkata Ramana, "Higher Engineering Mathematics", National Pub & Co, Madras.
3. N.P.Bali , "A Text Book of Engineering Mathematics", Laxmi publications (P)Ltd, New Delhi.
4. E.Rukmangadachari, E.Keshava Reddy, "Engineering Mathematics-II", Pearson Educations, Chennai.

REFERENCE WEBSITE:

1. https://nptel.ac.in/courses/111/106/111106100/
2. https://www.youtube.com/watch?v=OBhZvyhc8JQ&t=982s
3. https://nptel.ac.in/courses/111/106/111106100/
4. https://www.youtube.com/watch?v=3zCdNO2xp3s
5. https://www.youtube.com/watch?v=XU5hUrh6-18&t=948s
6. https://nptel.ac.in/courses/111/106/111106139/
7. https://www.youtube.com/watch?v=LGxE_yZYigI
8. https://www.youtube.com/watch?v=6spPyJH6dkQ
9. https://www.youtube.com/watch?v=GFKggEkKtLM

CO-PO MAPPING

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-
CO5	3	3	2	-	-	-	-	-	-	-	-	-
CO*	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

I B.TECH. – II SEMESTER

20ESC115	**PROGRAMMING WITH PYTHON** (Common to All Branches)	**L**	**T**	**P**	**C**
		2	**1**	**0**	**3**

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To impart the basics of python and its IDEs.
2. To understand the basic data structure in python.
3. To familiarize with python GUI and files.
4. To develop broad understanding of various object-oriented concepts in python.
5. To introduce the python libraries for solving real-time problems.

UNIT I: BASICS OF PYTHON (9)

Python programming language: About Python- Introduction to various IDEs- IDLE- PyCharm, Spyder- Sublime text- Jupyter Notebook.
Literals: Numeric literals - String literals- Variables and Identifiers: Variable assignment and keyboard input – Identifiers - keywords and other predefined identifiers.
Control Structures: Sequential control- Selection control- Iterative control statements.

UNIT II: LISTS, DICTIONARIES AND SETS (9)

Lists: List structures - Common list operations - List traversal - Lists in Python - Python list type –Tuples – sequences - Nested lists - Iterating over lists in python.
Dictionaries and Sets: Dictionary types in Python - Set data type- Strings and its operations.

UNIT III: FUNCTIONS AND TEXT FILES (9)

Functions: Function declaration- Category of Functions- Parameter Passing -Keyword Arguments in Python - Default Arguments in Python - Variable Scope, Lambda function.
Files: Fundamentals – opening, reading and writing text files, .csv and .xlsx files.

UNIT IV: OBJECT-ORIENTED CONCEPTS USED IN PYTHON (9)

Features of object-oriented programming-Fundamental concepts- Class- Encapsulation- Inheritance- Polymorphism. Object references - Turtle graphics - creating a Turtle Graphics Window - the "Default" Turtle - Fundamental Turtle Attributes and Behavior - Additional Turtle Attributes - Creating Multiple Turtles.

UNIT 5 INTRODUCTION TO PYTHON LIBRARIES (9)

Python Libraries- Introduction to Libraries- Creating and Exploring Packages-Numpy, SciPy, matplotlib, Pandas, Scikit-learn- seaborn.

Total hours: 45

COURSE OUTCOMES:

On successful completion of the course the student will be able to,		POs related to COs
CO1	Identify and apply the appropriate control statements for solving problems.	**PO1, PO2, PO5**
CO2	Demonstrate knowledge of basic data structures and functions.	**PO1, PO3, PO4**
CO3	Analyse and apply the appropriate file handling mechanism.	**PO1, PO2, PO5**
CO4	Identify and implement the suitable object-oriented concepts.	**PO1, PO2, PO5**
CO5	Evaluate the real-world problems using python packages.	**PO1, PO4, PO5**

TEXT BOOKS:

1. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus", Wiley India Edition, 2016.
2. John V. Guttag., "Introduction to computation and programming using python: with applications to understanding data", PHI Publisher, 2016.
3. John Hunt, "A Beginners Guide to Python 3 Programming", Springer Publisheers, 2020.

REFERENCES:

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", SecondEdition,Shroff/O'ReillyPublishers,(http://greenteapress.com/wp/thinkpython/), 2016
2. Charles Severance, "Python for everybody: exploring data in Python 3", Creative Commons Attribution-Non Commercial Share Alike 3.0 Unported License, 2016.

REFERENCE WEBSITES:

1. https://onlinecourses.swayam2.ac.in/aic20_sp33
2. https://onlinecourses.nptel.ac.in/noc22_cs32
3. https://spoken-tutorial.org
3. https://www.w3schools.com/python.
4. https://www.geeksforgeeks.org.

CO-PO MAPPING

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	2	-	-	-	-	-	-	-
CO2	3	-	3	2	-	-	-	-	-	-	-	-
CO3	3	3	-	-	2	-	-	-	-	-	-	-
CO4	3	3	-	-	2	-	-	-	-	-	-	-
CO5	3	-	-	2	2	-	-	-	-	-	-	-
CO*	**3**	**2**	**3**	**2**	**2**							

I B.TECH. – II SEMESTER

20ECE111	**ELECTRONIC DEVICES AND CIRCUITS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

PRE-REQUISITES: Nil

Course Educational Objectives:

1. To study the basic concepts and characteristics of the PN Junction diodes.
2. To understand and analyze the working principle of Rectifier & Filter circuits and their application
3. To study and analyze the working principle and characteristics of BJT
4. To study and analyze the working principle and characteristics of FET
5. To understand the working principle and characteristics of special devices.

UNIT-I: Junction Diode Characteristics (9)

Open circuited p-n junction, Biased p-n junction, p-n junction diode, current components in PN junction Diode, diode equation, V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance and its application, Zener diode – V-I Characteristics.

UNIT-2: Rectifiers and Filters (9)

Basic Rectifier setup**,** half wave rectifier, full wave rectifier, bridge rectifier, derivations of characteristics of rectifiers, rectifier circuits-operation, input and output waveforms, Filters, Inductor filter, Capacitor filter, comparison of various filter circuits in terms of ripple factors, Zener diode regulator.

UNIT-3: BJT Transistor Characteristics: (9)

Junction transistor, transistor current components, transistor configurations, Characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, punch through/ reach through.

UNIT-4: FET Transistor Characteristics: (9)

Construction and principle of operation and characteristics of JFET & MOSFET (Enhancement & Depletion mode)**.** Biasing of FET, FET act as voltage variable resistor, comparison of BJT and FET

UNIT-5: Special Semiconductor Devices (9)

Principle of operation, characteristics and applications of - Varactor diode, Tunnel diode, Uni Junction Transistors, Silicon Controlled Rectifier, Scottky diode, LED, Photo transistor.

Total hours: 45

Course Outcomes

On successful completion of the course, students will be able to		POs related to COs
CO1	Demonstrate concepts and Analyze the characteristics of the PN Junction diodes.	**PO1, PO2**
CO2	Design and Analyze of Rectifiers & Filters circuits and its application.	**PO1,PO2, PO3**
CO3	Design and investigate the working of BJT transistor and its configurations and characteristics	**PO1,PO2, PO3,PO4**
CO4	Design and analyze the working of FET, MOSFET and special diodes.	**PO1, PO2, PO3, PO4**
CO5	Demonstrate knowledge on special devices and analyze their VI characteristic.	**PO1, PO2**

TEXT BOOKS :

1. J. Millman, C. Halkias, Tata Mc-Graw Hill, "Electronic Devices and Circuits",2e
2. Jacob Millman, C. Halkies, C.D.Parikh, "Integrated Electronics", Tata Mc-Graw Hill, 2009.

REFERENCES :

1. K. Satya Prasad , "Electronic Devices and Circuits", VGS Book Links.
2. Salivahanan, Kumar,Vallavaraj , "Electronic Devices and Circuits", Tata Mc-Graw Hill, 2e.
3. David Bell ,"Electronic Devices and Circuits" ,Oxford Press.

REFERENCE WEBSITES:

1. https://nptel.ac.in/courses/117/103/117103063
2. https://nptel.ac.in/courses/108/101/108101091
3. http://www.vidyarthiplus.in/2011/11/electronic-device-and-circuits-edc.html
4. https://www.allaboutcircuits.com/video-lectures

CO-PO Mapping

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-
CO3	3	3	2	2	-	-	-	-	-	-	-	-
CO4	3	3	2	2	-	-	-	-	-	-	-	-
CO5	3	3	-	-	-	-	-	-	-	-	-	-
CO*	**3**	**2.8**	**2**	**2**	-	-	-	-	-	-	-	-

I B.Tech. – II Semester

20EEE121	**ELECTRICAL CIRCUIT ANALYSIS**	**L**	**T**	**P**	**C**
		2	**1**	**0**	**3**

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1 Impart knowledge on fundamentals of electrical circuits
2 Analyzing different factors of various periodic waveforms
3 introduce phenomenon of Magnetically coupled Circuits and Resonance Circuits
4 Inculcate skill on investigating the DC electrical circuits through different network theorems.
5 Inculcate skill on investigating the AC electrical circuits through different network theorems.

UNIT-I FUNDAMENDAL CONCEPTS OF ELECTRICAL CIRCUITS (9)

Circuit concept, RLC parameters - Voltage and Current sources, Independent and dependent sources, source transformation - Kirchoff's laws - network reduction techniques, series, parallel, series parallel, star-to-delta transformation - Nodal and Mesh analysis.

UNIT-II SINGLE PHASE AC CIRCUITS (9)

R.M.S, Average values and form factor for different periodic waveforms - phase and phase difference of sinusoidal alternating quantities - steady state analysis of R, L and C (in series, parallel and series parallel combinations) with sinusoidal excitation - concept of reactance, impedance, susceptance and admittance - Power triangle, power factor-Locus diagrams.

UNIT-III MAGNETIC CIRCUITS & RESONANCE (9)

Faraday's laws of electromagnetic induction - Concept of self and mutual inductance - dot convention-coefficient of coupling - Magnetic circuits, composite magnetic circuit-Analysis of series and parallel magnetic circuits. Resonance - series& parallel circuits, concept of bandwidth and Q-factor.

UNIT-IV NETWORK THEOREMS FOR DC EXCITATION (9)

Thevenin's, Norton's, Maximum power transfer, Millman's, Tellegen's, superposition, reciprocity and compensation theorem for DC and Simple Problems.

UNIT-V NETWORK THEOREMS FOR AC EXCITATION (9)

Thevenin's, Norton's, Maximum power transfer, Millman's, Tellegen's, superposition, reciprocity and compensation theorem for AC and Simple Problems.

Total hours: 45

Course Outcomes:

On successful completion of the course the student will be able to,		**POs related to COs**
CO1	Analyse electrical circuits	**PO1, PO2, PO3,PSO12**
CO2	Investigate different various periodic waveforms	**PO1, PO2, PO3,PSO12**
CO3	Analyse the magnetically coupled circuits and evaluate the resonance condition for series and parallel RLC network.	**PO1, PO2, PO3,PSO12**
CO4	Apply circuit theorems for DC circuits	**PO1, PO2, PO3,PO12**
CO5	Apply circuit theorems for AC circuits	**PO1, PO2, PO3,PO12**

TEXT BOOKS:

1. William H. HaytJr, Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuits Analysis", McGraw Hill publishers, edition, New Delhi, 2013.
2. Charles K. Alexander, Mathew N.O. Sadiku, "Fundamentals of Electric Circuits",Second Edition, McGraw Hill, 2013.
3. Allan H. Robbins, Wilhelm C. Miller, "Circuit Analysis Theory and Practice", Cengage Learning India, 2013.

REFERENCE BOOKS:

1. Chakrabarti A, "Circuits Theory (Analysis and synthesis), DhanpathRai& Sons, New Delhi, 1999.
2. Jegatheesan, R., "Analysis of Electric Circuits," McGraw Hill, 2015.
3. Joseph A. Edminister, MahmoodNahri, "Electric circuits", Schaum's series, McGraw-Hill, New Delhi, 2010.
4. Sudhakar A and Shyam Mohan SP, "Circuits and Network Analysis and Synthesis", McGraw Hill, 2015.

REFERENCE WEBSITE:

1. https://nptel.ac.in/courses/108/105/108105053/

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	-	-	-	-	-	2
CO2	3	3	2	-	-	-	-	-	-	-	-	2
CO3	3	2	2	-	-	-	-	-	-	-	-	2
CO4	3	3	2	-	-	-	-	-	-	-	-	2
CO5	3	3	2	-	-	-	-	-	-	-	-	2
CO*	**3**	**2.6**	**2**									**2**

I B.TECH. – II SEMESTER

		L	T	P	C
20HSM112	**COMMUNICATIVE ENGLISH LANGUAGE LAB** (Common to All Branches)	**0**	**0**	**3**	**1.5**

COURSE EDUCATIONAL OBJECTIVES:

1. To provide Knowledge on developing Soft Skills and its techniques.
2. To understand Knowledge on the use of technology for giving Presentations.
3. To apply gained information in Preparing Resume.
4. To analyze the use of body language while participating in Group Discussions.
5. To execute the complete knowledge on facing Job Interviews.

LIST OF TOPICS:

1. Introduction and importance of Soft Skills
2. Attributes of Soft Skills
3. Categories of Soft Skills- (Social, Thinking, Negotiating)
4. Exhibiting, Identifying, and Improving your Soft Skills
4. Acquiring Soft Skills (Train yourself)
5. Soft Skills practicing tips
6. Power Point presentation on Scientific/Technical Topics.
7. Designing a Resume
8. Resume Styles
9. Preparing Model Resumes
10. Group Discussion
11. Group Discussion strategies
12. Mock GDs.
13. Job Interviews
14. Interview Techniques
15. Model Interview questions – Mock Interview

COURSE OUTCOMES:

On successful completion of the course, students will able to		POs related to COs
CO1	Remembering the concepts on developing Soft Skills and its techniques. (Topics from 1 to 5)	**PO1**
CO2	Understand and Develop Knowledge on the use of technology in giving presentations. (Topic No:6)	**PO5**
CO3	Apply one's skills in Preparing a Resume before applying for a job.(Topic 7 to 9)	**PO6**
CO4	Analyze and execute body language while participating in Group Discussions. (Topics 10 to 12)	**PO2**
CO5	Evaluate by weighing one's communicative skills in facing Job Interviews through Mock Interviews. (Topics 13 to 15)	**PO10**

SOFT WARE SUGGESTED: Walden –Hyderabad**.**

REFERENCE BOOKS:

1. Dr.K.Alex,"Soft Skills- Know yourself and know the world", S. Chand Publications, NewDelhi, 2010
2. T.Vijayakumar, K.Durga Bhavani,English in Action 1st Edition, 2019, Mac millan Publications, Guntur.
3. Rout ledge, "Bailey Stephen Academic Writing – A Hand book for international students", 2014.
4. Chase, Becky Tarver," Pathways: Listening, Speaking and Critical Thinking. Heinley ELT", 2e/ , 2018.
5. Hewings, Martin, "Cambridge Academic English (B2)". CUP, 2012

CO-PO MAPPING

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-		-	-	-	-	-	-	-	-	-
CO2	-	-		-	3	-	-	-	-	-	-	-
CO3	-	-	-	-	-	3	-	-	-	-	-	-
CO4	-	3	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	3	-	-
CO*	**3**	**3**	**-**	**-**	**3**	**3**	**-**	**-**	**-**	**3**	**-**	**-**

I B.TECH. – II SEMESTER

20ECE121	ELECTRONIC DEVICES AND CIRCUITS LAB	L	T	P	C
		0	0	3	1.5

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To understand the functionality & specifications of basic electronic passive components.
2. To know the functionality & specifications of electronic active components and special devices.
3. To study the operation of Analog and digital meters which are used for practical experiments.
4. To provides soldering practice of basic electronic circuits for projects.
5. To know the practical knowledge of diodes and transistors with their input-output characteristics.

LIST OF EXPERIMENTS

PART A: Electronic Workshop Practice

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs, LEDs, LCDs, UJT.
3. Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter, Function Generator, Regulated Power Supply and CRO.

PART B: (Minimum of 5 Experiments)

1. Verification of Ohm's law
2. Verification of KCL and KVL.
3. Mesh & Nodal Analysis
4. Verification of Thevenin's Theorem.
5. Verification of Superposition Theorem
6. Verification of Maximum Power Transfer Theorem.

PART C: (Minimum of 5 Experiments)

1. P-N Junction Diode Characteristics (Silicon and Germanium).
2. Zener Diode Characteristics and as a Voltage Regulator.
3. Rectifiers (without and with filter).
4. BJT Characteristics (CE & CB Configuration).
5. FET Characteristics (Drain and Transfer).
6. UJT Characteristics

Equipment required for Laboratory

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multimeters

5. Decade Résistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components
10. Bread Boards
11. Connecting Wires

COURSE OUTCOMES:

On successful completion of the course the student will be able to		**POs related to COs**
CO1	Demonstrate knowledge on identification & testing of passive components along with active devices.	**PO1**
CO2	Analyze the practical characteristics of diodes and transistor with different configurations	**PO2**
CO3	Design Simple electronic circuits by soldering with specifications	**PO3**
CO4	Analyze the special purpose devices with their characteristics for future applications	**PO4**
CO5	Implement the devices like LED, LDR, Photo diode etc. for society applications	**PO6**
CO6	Follow ethical principles on analysis of different electronic circuits which is used for project works.	**PO8**
CO7	Do experiments effectively as an individual and as a member in a group.	**PO9**
CO8	Communicate verbally and in written form, the understandings about the experiments.	**PO10**
CO9	Continue updating their skill related to electronic devices and their applications during their life time	**PO12**

CO-PO Mapping

PO / CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	3	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	3	-	-	-	-
CO7	-	-	-	-	-	-	-	-	3	-	-	-
CO8	-	-	-	-	-	-	-	-	-	3	-	-
CO9	-	-	-	-	-	-	-	-	-	-	-	3
CO*	**3**	**3**	**3**	**3**	-	3	-	3	3	**3**	**-**	**3**

I B.Tech. – II Semester

20ESC118	PROGRAMMING WITH PYTHON LAB (Common to All Branches)	L	T	P	C
		0	0	3	1.5

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To understand the basic IDEs in python.
2. To gain expertise for problem solving using control structures in python
3. To develop the python programs using functions.
4. To solve various engineering problems using different data structures.
5. To gain knowledge on python libraries.

RECOMMENDED SYSTEMS/SOFTWARE REQUIREMENTS:

- For Windows: IDLE/ Spyder python development environment.
- For Linux: Default python version installed/ higher version.

LIST OF TASKS:

TASK-1: BASICS

a) Develop a simple python scripts to illustrate numeric literals and string literals.

b) Write a Python Program to Convert Kilometres to Miles

TASK-2: LOOPS

a) Write a python Program to Make a Simple Calculator

b) Write a python program that reads a rating from the user and indicates whether the performance was unacceptable, acceptable or meritorious. The amount of the employee's raise should also be reported. Your program should display an appropriate error message if an invalid rating is entered. (The amount of an employee's raise is $2400.00 multiplied by their rating).

Rating	Meaning
0.0	Unacceptable performance
0.4	Acceptable performance
0.6 or more	Meritorious performance

TASK-3: LOOPS

a) Write a program containing a pair of nested while loop that displays the integer values 1–100. Ten numbers per row - with the columns aligned as shown below

1 2 3 4 5 6 7 8 9 10

11 12 13 14 15 16 17 18 19 20

21 22 23 24 25 26 27 28 29 30

.

.

91 92 93 94 95 96 97 98 99 100

b) Display the integer values 1–100 as given in question 3a) using only *one* while loop.

TASK-4: DICTIONARIES

a) Write a Python script to generate all the possible spellings of the last four digits of any given phone number – use Dictionaries.

TASK-5: STRINGS

a) Write a program to figure out if the register number format is correct or not using a Python code. (Hint: sample register number format- 20751A0500). Use string methods to solve the above problem.

TASK-6: FUNCTIONS

a) Write a function that generates a random password. The password should have a random length of between 7 and 10 characters. Each character should be randomly selected from positions 33 to 126 in the ASCII table. Your function will not take any parameters. It will return the randomly generated password as its only result. Display the randomly generated password in your file's main program. Your main program should only run when your solution has not been imported into another file.

TASK-7: PATTERN PRINTING

a) Write a python program to print half pyramid pattern with star (asterisk)

```
*
* *
* * *
* * * *
* * * * *
```

b) Write a python program to print the characters/alphabets in right-angled triangle pattern.

```
A
B C
D E F
G H IJ
K L M N O
P Q RS T U
V W X YZ
```

TASK-8: TURTLE

a) Write a python program to draw the basic shapes using turtle (Hint: Square, circle, triangle).

TASK-9: FILES

a) Write a python script to create a simple text file. Write the contents into the created file and read the contents from the file and display the same on to the console screen.
b) Write a python script to Create and write on excel file using xlsxwriter module.
c) Write a python script to write the contents into a csv file.

TASK 10: FILE HANDLING

Write a python program to perform the following tasks:

a) Copy the contents of one file into another file.
b) Count number of lines in a file.
c) Count number of characters in a file.
d) Count number of words in a file.

TASK 11: INHERITANCE

a) Write a python program to illustrate the inheritance concept.

TASK-12: MATH LIBRARIES

a) Write a python program to calculate area of a circle. Use the pi constant in the math module in your calculations. (Area of the circle $= \pi r^2$)
b) Write a python program to calculate Volume of a sphere. Use the pi constant in the math module in your calculations. (Volume of a sphere $= \frac{4}{3}\pi r^3$).

TASK-13: PANDAS

a) Write a Pandas program to create a line plot of the historical stock prices of a company between two specific dates.

TASK-14: PANDAS

a) Write a Pandas program to create a bar plot of the trading volume of a company stock between two specific dates.

COURSE OUTCOMES:

On successful completion of this course the students should be able to:		POs related to COs
CO1	Learn various problem solving approaches and ability to identify an appropriate approach to solve the problem	**PO1, PO2, PO3, PO5**
CO2	Implement conditionals and loops to design the python programming	**PO1, PO2, PO3, PO5**
CO3	Implement lists, set, tuples and dictionaries to develop python program.	**PO1, PO2, PO3, PO5**
CO4	Able to modulate the given problem using structural approach of programming	**PO1, PO2, PO3, PO5**
CO5	Build Python Programs using packages to solve real-time problems.	**PO1, PO2, PO3, PO4,PO5**
CO6	Follow the ethical principles in implementing the programs	**PO8**
CO7	Do experiments effectively as an individual and as a team member in a group.	**PO9**
CO8	Communicate verbally and in written form, the understanding about the experiments.	**PO10**
CO9	Continue updating their skill related to lists, tuples and dictionaries implementing programs in future.	**PO12**

REFERENCE BOOKS:

1. John V. Guttag., "Introduction to computation and programming using python: with applications to understanding data", PHI Publisher, 2016.
2. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus", Wiley India Edition, 2016.
3. John Hunt, "A Beginners Guide to Python 3 Programming", Springer Publisheers, 2020.

REFERENCE WEBSITES:

1. https://onlinecourses.swayam2.ac.in/aic20_sp33
2. https://onlinecourses.nptel.ac.in/noc22_cs32
3. https://spoken-tutorial.org
4. https://www.w3schools.com/python.
5. https://www.geeksforgeeks.org.

CO-PO Mapping:

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	-	2	-	-	-	-	-	-	-
CO2	3	3	3	-	2	-	-	-	-	-	-	-
CO3	3	3	3	-	2	-	-	-	-	-	-	-
CO4	3	3	3	-	2	-	-	-	-	-	-	-
CO5	3	3	3	3	2	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	3	-	-	-	-
CO7	-	-	-	-	-	-	-	-	3	-	-	-
CO8	-	-	-	-	-	-	-	-	-	3	-	-
CO9	-	-	-	-	-	-	-	-	-	-	-	3
CO*	**3**	**3**	**3**	**3**	**2**	**-**	**-**	**3**	**3**	**3**		**3**

II B.TECH.- III SEMESTER

20BSC232	**SPECIAL FUNCTIONS & COMPLEX ANALYSIS (Common to ECE,EEE)**	**L T P C**
		2 1 - 3

PRE-REQUISITES: A Course on Algebra & Calculus, Differential equations & Transform Techniques

COURSE EDUCATIONAL OBJECTIVES:

1. To learn Gamma, Beta & Bessel functions, their properties and applications
2. To analyze the functions of complex variable with a review of elementary complex Functions and to learn continuity, differentiability and analyticity of a complex function
3. To learn conformal mapping & Bilinear Transformation of complex functions
4. To understand the Taylor and Laurent expansion with their use in finding out the residue and improper integral
5. To learn complex integration and applications to real integrals

UNIT - 1: SPECIAL FUNCTIONS (9)

Beta and Gamma functions – Properties (without proof) - Evaluation of Integrals (Simple examples)

Bessel Function - Generating function (without proof) - Recurrence Relations Orthogonality.

UNIT - 2: COMPLEX FUNCTIONS (9)

Functions of a complex variable - Elementary functions: Exponential, Trigonometric, Hyperbolic and Logarithmic functions and their properties. Continuity - Differentiability - Analyticity – Properties - Cauchy-Riemann equations in Cartesian and polar coordinates - Harmonic and conjugate harmonic functions - Milne-Thompson method.

UNIT - 3: CONFORMAL MAPPING AND BILINEAR TRANSFORMATION (9)

Conformal Mapping: Definitions - Transformation by e^z, lnz, z^2, sin z, cos z - Translation - Rotation - Inversion and Bilinear transformation - Fixed point - Cross ratio - Determination of bilinear transformation.

UNIT - 4: COMPLEX INTEGRATION AND COMPLEX POWER SERIES (9)

Complex Integration: Line integral - Evaluation along curves and closed contours - Cauchy's theorem, Cauchy's integral formula & Generalized Cauchy's integral formula (withoutproof).
Complex Power Series: Taylor's and Laurent series expansions of complex functions - Singular point - Isolated singular point - Pole of order m - Essential singularity.

UNIT - 5: RESIDUE CALCULUS (9)

Residue - Evaluation of residue by formula - Residue theorem(without proof) - Evaluation of integrals using residue theorem - Evaluation of improper and real integrals of the type

(a) $\int_{-\infty}^{+\infty} f(x)dx$ **(b)** $\int_{c}^{c+2\pi} f(\cos\theta, \sin\theta)d\theta$ **(c)** $\int_{-\infty}^{\infty} e^{imx} f(x)dx$

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	Demonstrate knowledge in Gamma, Beta functions and Bessel functions and develop analytical skills in providing solutions for problems involving real integrals using Gamma ad Beta functions	**PO1,PO2, PO3**
CO2	Demonstrate knowledge in the theory of functions of one complex variable develop in continuity and differentiability of a complex function and write Cauchy-Riemann equations to describe the analyticity of complex functions	**PO1,PO2, PO3**
CO3	Demonstrate knowledge in conformal mappings and bilinear transformations and develop skills in analyzing the properties exhibited by complex functions in Argand plane	**PO1,PO2**
CO4	Demonstrate knowledge in integration of complex functions and develop analytical skills in providing solutions for problems involving integration of complex functions and develop skills in analyzing the properties of complex functions by expressing them in power series	**PO1,PO2**
CO5	Develop analytical skills in providing solutions for problems involving improper real integrals and develop skills in analyzing properties of improper integrals through residue theory	**PO1,PO2, PO3**

TEXT BOOKS:

1. T.K.V. Iyengar, B. Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad "Engineering Mathematics – III", 2013, S. Chand and Company Publishers, Delhi.
2. Dr. B. S. Grewal, Higher Engineering Mathematics, 34/e, 1999, Khanna Publishers, Delhi,

REFERENCE BOOKS:

1. B.V. Ramana,"Engineering Mathematics", 3/e, 2008, Tata McGraw Hill Publishers, New Delhi.
2. Murray R. Spiegel, Schaum's outline series, "Theory and Applications of Complex Variables", 1981, McGraw-Hill Book Company, Singapore
3. Dr. M. K. Venkata Ramana, "Higher Engineering Mathematics", National Pub , Madras.
4. N.P.Bali, "A Text Book of Engineering Mathematics", 2011, Laxmi publications(P)Ltd, New Delhi.
5. E. Rukmangadachari, E. Keshava Reddy, "Engineering Mathematics", Volume – III , 2013, Pearson Education, Chennai.

REFERENCE WEBSITE:

1. https://youtu.be/JOfnCCNj4gQ
2. https://youtu.be/b5VUnapu-qs
3. https://youtu.be/ceYSD97IILk
4. https://youtu.be/snZ6mmJ-4Ew
5. https://youtu.be/Mpmlk1H1aQo

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	2	-	-	-	-	-	-	-	-	-
CO.2	3	3	2	-	-	-	-	-	-	-	-	-
CO.3	3	3	-	-	-	-	-	-	-	-	-	-
CO.4	3	3	-	-	-	-	-	-	-	-	-	-
CO.5	3	3	2	-	-	-	-	-	-	-	-	-
CO*	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-

II B.TECH. - III SEMESTER

20ESC233 **PRINICIPLES ELECTRICAL ENGINEERING** **L T P C**
2 1 0 3

PRE-REQUISITES: A Course on Electrical Circuits

COURSE EDUCATIONAL OBJECTIVES:

1. To impart the knowledge on two port networks.
2. To attain the knowledge on D.C. machines.
3. To acquire the knowledge on transformers and single phase ac machine.
4. Impart knowledge on basic of electrical measuring instruments and measurement of energy.
5. Impart knowledge on DC and AC Bridges.

UNIT –1: TWO PORT NETWORKS **(9)**

Two port network parameters - Z, Y, ABCD and hybrid and g- parameters and their relations. Concept of transformed network-two port network parameters using transformed variables - cascaded networks).

UNIT –2: DC MACHINES **(9)**

Principle of Operation of DC Generator, Types of DC Generator, EMF Equation in DC Generator - OCC of a DC Shunt Generator - Principle of Operation of DC Motor -Types of DC Motors - Torque Equation - Losses and Efficiency Calculation in DC Motors, Speed control of DC Shunt motor - Swinburne's Test and Brake Test

UNIT –3: TRANSFORMERS AND SINGLE PHASE AC MACHINE **(9)**

Principle of Operation - Constructional Details - Losses and Efficiency - Regulation of Transformer - Testing: O.C and S.C Tests. Working principle of single phase and three phase induction machine. Applications of AC machines.

UNIT –4: MEASURING INSTRUMENTS **(9)**

Introduction, Classification of Instruments, Operating Principles, Essential Features of Measuring Instruments, Moving Coil and Moving Iron Instruments, Dynamometer Wattmeter and Energy meter

UNIT –5: DC AND AC BRIDGES **(9)**

Introduction , Method of measuring low - Medium and high resistance- Sensitivity of Whetstone's bridge – Kelvin's double bridge for measuring low resistance - Measurement of high resistance - Loss of charge method - Measurement of inductance - Maxwell's bridge - Anderson's bridge - Measurement of capacitance and loss angle - Desauty bridge - Wien's bridge - Schering Bridge.
.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs
CO1	Analyze various parameters of two-port networks.	**PO1, PO2**
CO2	Demonstrate knowledge and analyze various performance characteristics of DC machine.	**PO1, PO2**
CO3	Demonstrate knowledge on single phase transformer and Induction motors	**PO1, PO2**
CO4	Understand and evaluate the calibration of different electrical measuring instruments.	**PO1, PO2, PO3,PO12**
CO5	Demonstrate knowledge on DC and AC bridges	**PO1, PO2**

TEXT BOOKS:

1. A.Sudhakar, Shyammohan S.palli, "Principles of Electrical Engineering",TMH, 3rd edition, 2009
2. A.K.Sawhney , "Electrical Measurements", DhanpatRai& Co. Publications, 18/e –2010 New Delhi.

REFERENCE BOOKS:

1. V.K Mehtha, "Principle of Electrical Engineering", S Chand Publications
2. E.W. Golding and F.C. Widdis, Electrical Measurements and measuring Instruments, Reem Publications,5th Edition.
3. Reissland, "Electrical Measurements - Concepts – Applications", M.U New Age International (P) Limited - Publishers, 1/e 2006 New Delhi.
4. M.S Naidu and S Kamakshaiah," Basic Electrical Engineering

CO-PO MAPPING

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	-	-	-	-	-	-	-	-	-	-
CO.2	3	3	-	-	-	-	-	-	-	-	-	-
CO.3	3	3	-	-	-	-	-	-	-	-	-	-
CO.4	3	3	-	-	-	-	-	-	-	-	-	3
CO.5	3	3	-	-	-	-	-	-	-	-	-	-
CO*	3	3	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	3

20ECE231 **DIGITAL ELECTRONICS** **L T P C**
2 1 0 3

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To Provide Knowledge On
   - Fundamentals of Digital logic design, Different Types Of Number Systems
   - Conversions Of Number Systems, Arithmetic and Logical Operations, Weighted And Non Weighted Codes.
2. To develop skill to minimize switching functions in effective way by using Boolean laws and K- MAP
3. To develop skill to design combinational logic circuits and realize the design using PLD's.
4. To provide knowledge on memory elements and develop skill to design sequential circuits.
5. To develop the skill to design and analyze finite state machines of different models.

UNIT –1: NUMBER SYSTEMS AND CODES (9)

Review of Number Systems- Binary Arithmetic-Subtraction with r and (r-1)'s Complements-Weighted &Non Weighted Codes- Error Detection and Error Correction Codes- Hamming Code, Basic Logic Operations of (NOT,OR,AND), Universal Gates and EX-OR & EX-NOR Gates, Pin diagram of 74xx and 54xx series IC's

UNIT- 2: MINIMIZATION OF SWITCHING FUNCTIONS (9)

Boolean Algebra: Boolean Theorems- Complement and Dual of Logical Expressions-Minimization of Logic Functions using Demorgans Theorems .Standard SOP and POS, Minimal SOP and POS Realization, Minimization of Switching Functions using K-Map up to 5 variables- -Problem Solving using K-Map for Boolean Functions in SOP and POS Forms using gates.

UNIT -3: COMBINATIONAL LOGIC CIRCUITS& PLD (9)

Design of Half Adder - Full Adder - Half Subtractor- Full Subtractor- 4-Bit Binary Adder-4-Bit Adder Subtractor- BCD Adder-Carry Look Ahead Adder -Magnitude Comparator – Decoder-Encoder- Multiplexer – De Multiplexer.
PLDS: Realization of Switching Functions using PROM - PLA and PAL - Comparison of PROM, PLA, and PAL.

UNIT-4: SEQUENTIAL CIRCUITS-I (9)

Basic Latches & Flip Flops-SR, D, JK,T –Conversion between Flip Flops- -Design of Shift Registers-Universal Shift Register. Design of Synchronous and Asynchronous Counters

UNIT-5: SEQUENTIAL CIRCUITS –II (9)

Finite State Machine - Capabilities and Limitations- Analysis of Clocked Sequential Circuits-Design Procedures- Reduction of State Tables and State Assignment-Realization of Circuits Using Various Flip flops - Mealy and Moore State Machines, Introduction to ASM Charts with Examples.

Total Hours: 45

COURSEOUTCOMES:

On successful completion of the course students will be able to		POs
CO1	Demonstrate knowledge on types and conversion of number systems, Error Detection and Error Correction arithmetic and logical operations of different radix and applying Boolean algebra for switching functions reduction.	PO1, PO2
CO2	Identify the most efficient grouping to minimize the switching functions using k-map.	PO1,PO2
CO3	Design the combinational logic circuits and realize the PLD's for given specifications.	PO1,PO2,PO3
CO4	Understand the knowledge on latches and flip flops and design the sequential logic circuits.	PO1,PO2,PO3
CO5	Analyze and design finite state machines of different models by implementing state tables and state diagrams and Become familiarize with ASM.	PO1,PO2,PO3, PO4

TEXTBOOKS:

1. Morris Mano, ''Digital Design'', Prentice Hall of India, 3/e New Delhi, 2006.
2. Thomas L.Floyd,'' Digital Fundamentals'', Pearson/Prentice Hall, 10/e New Delhi, 2008.

REFERENCEBOOKS:

1. Charles H.Roth, ''Fundamentals of Logic Design'', Thomas Publications, 5/e New Delhi, 2004.
2. ZviKohavi,'' Switching & Finite Automata Theory'', Tata McGraw Hill, 2/e New Delhi.
3. Ronald J.Tocci Neal S.widmer, ''Digital Systems Principles and Applications'', Pearson Education, 8/e New Delhi, 2002.

REFERENCE WEBSITE:

1. https://en.wikipedia.org/wiki/

CO-PO MAPPING

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	-	-	-	-	-	-	-	-	-	-
CO.2	3	3	-	-	-	-	-	-	-	-	-	-
CO.3	3	2	2	-	-	-	-	-	-	-	-	-
CO.4	3	3	2	-	-	-	-	-	-	-	-	-
CO.5	3	2	3	2	-	-	-	-	-	-	-	-
CO*	**3**	**2.6**	**2.3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

II B.TECH. - III SEMESTER

20ECE232 **ELECTRONIC CIRCUIT ANALYSIS** **L T P C**
2 1 0 3

PRE-REQUISITES: Electronic Devices and Circuits

COURSE EDUCATIONAL OBJECTIVES:

1. To develop the basic understanding of transistor biasing and its analysis using hybrid model
2. To make students aware of amplifier operation at low and high frequency and its frequency responses.
3. To make students learn about different types of feedback amplifiers and oscillators 4.To Analyze the power efficiency calculations of power amplifiers
4. To make students learn about different types of Tuned amplifiers

UNIT –1: BIASING OF BJT TRANSISTOR (9)

Need for biasing, bias point, load line, Methods of BJT biasing - fixed bias, collector to base bias, self - bias, Stabilization against variations in V_{BE} and β, Bias compensation techniques, thermal runaway, condition for thermal stability.

UNIT –2: SMALL SIGNAL LOW FREQUENCY BJT AMPLIFIER MODELS (9)

Two port network, Transistor hybrid model, determination of h-parameters, conversion of h-parameters, generalized analysis of transistor amplifier model using h-parameters, Analysis of CB, CE and CC amplifiers using exact and approximate analysis, Comparison of transistor amplifiers.

UNIT –3: SMALL SIGNAL HIGH FREQUENCY TRANSISTOR AMPLIFIER MODELS (9)

Transistor at high frequencies, Hybrid- π common emitter transistor model, determination of high-frequency parameters in terms of low-frequency parameters, CE short circuit current gain, current gain with resistive load, cut-off frequencies, frequency response and gain bandwidth product.

UNIT –4: MULTISTAGE AMPLIFIERS AND FEEDBACK AMPLIFIERS (9)

Multistage Amplifier: Classification of amplifiers, methods of coupling, Cascaded transistor amplifier and its analysis, Darlington pair amplifier, Cascode amplifier.

Feedback Amplifiers: Feedback principle, types of feedback, feedback topologies, Characteristics of negative feedback amplifiers, generalized analysis of feedback amplifiers, Performance comparison of feedback amplifiers, Introduction to oscillator.

UNIT –5:POWER AMPLIFIERS AND TUNED AMPLIFIERS (9)

Power Amplifiers: Classification of amplifiers, Class A power Amplifiers and their analysis, Harmonic Distortions, Class B Push-pull amplifiers and their analysis, Complementary symmetry push pull amplifier, Class AB power amplifier, Class-C power amplifier, Thermal stability and Heat sinks, Distortion in amplifiers

Tuned Amplifiers : Introduction, Q-Factor, small signal tuned amplifier, single tuned amplifier, double tuned amplifiers, effect of cascading single tuned amplifiers on band width, effect of cascading double tuned amplifiers on band width, staggered tuned amplifiers, stability of tuned amplifiers.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		**POs**
CO1	Demonstrate basic concepts of BJT transistor biasing.	**PO1, PO2**
CO2	Investigate the small signal low frequency BJT Transistor Amplifier using h- parameters	**PO1, PO2, PO4**
CO3	Investigate the response of BJT at high frequency using hybrid model	**PO1, PO2, PO4**
CO4	Analyze the multistage transistor and feedback amplifiers	**PO1, PO2, PO4**
CO5	Analyze power efficiency calculations of power amplifiers and understand the different types of tuned amplifiers	**PO1, PO2**

TEXT BOOKS:

1. J. Millman and C.C. Halkias, "Integrated Electronics", McGraw-Hill, 2017.
2. Salivahanan, N.Suresh Kumar, A. Vallavaraj, "Electronic Devices and Circuits"- TATA McGraw Hill, 4th Edition, 2017.

REFERENCE BOOKS:

1. Robert T. Paynter, "Introductory Electronic Devices and Circuits", Pearson Education, 7th Edition
2. Robert L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuits Theory", Pearson/Prentice Hall, 9th Edition, 2006.
3. Sedra A.S. and K.C. Smith, "Micro Electronic Circuits", Oxford University Press, 5th Edition.
4. Donald A. Neaman, "Electronic Circuit Analysis and Design", McGraw Hill.

REFERENCE WEBSITE:

1. https://www.electronics-tutorials.ws/amplifier/transistor-biasing.html
2. https://nptel.ac.in/courses/108/102/108102095/
3. https://nptel.ac.in/courses/117/101/117101106/

CO-PO MAPPING

CO\PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO.1	3	2	-	-	-	-	-	-	-	-	-	-
CO.2	3	3	-	3	-	-	-	-	-	-	-	-
CO.3	3	3	-	3	-	-	-	-	-	-	-	-
CO.4	3	3	-	2	-	-	-	-	-	-	-	-
CO.5	3	3	-	-	-	-	-	-	-	-	-	-
CO*	**3**	**2.8**	**-**	**2.6**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-

II B.Tech. - III Semester

		L	T	P	C
20ECE233	**SIGNALS AND SYSTEMS**	**2**	**1**	**0**	**3**

PRE-REQUISITES: A Course on Engineering Mathematics I, Engineering Mathematics II

COURSE EDUCATIONAL OBJECTIVES:

1. To understand the knowledge on definitions and classifications of signals and systems.
2. To recall the concepts of Fourier series and Fourier transform and apply and analyze the same for different continuous time signals.
3. To interpret the practical relevance of sampling process and explain the effects of under sampling and to demonstrate knowledge on system parameters.
4. To apply and analyze the response of Laplace transform for solving CT systems.
5. To apply and analyze the response of Z - transform for solving DT systems.

UNIT-1:CONTINUOUS AND DISCRETE TIME SIGNALS AND SYSTEMS: (10)

Definition and classification of Signals and Systems (Continuous time and Discrete time) - Elementary signals Impulse, Step, Ramp, Sinusoidal and Exponential and operations on signals. Definition and Classification of Systems – Linear, Time In-variant & Causal. Concept of Convolution (CT & DT) & Correlation of signals.

UNIT-2:FOURIER SERIES & FOURIER TRANSFORM FOR CT SIGNALS: (9)

Fourier series: Representation of Fourier series, Continuous time periodic signals, Dirichlet's conditions, Trigonometric Fourier Series and Exponential Fourier Series with examples.
Fourier Transforms: Deriving Fourier Transform from Fourier series, Fourier Transform of standard signals, Fourier Transform of Periodic Signals, Properties of Fourier Transform.

UNIT-3: SAMPLING AND FILTERS (8)

Representation of continuous time signals by its samples - Sampling theorem – classifications, Aliasing effect - problems.
Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, Relationship between bandwidth and rise time.

UNIT-4:LAPLACE-TRANSFORM: (9)

Laplace transform, Concept of ROC & properties, Properties of Laplace Transform, Laplace transform of different signals and Inverse Laplace Transform, Solution of differential equation with initial conditions.

UNIT-5:Z–TRANSFORM: **(9)**

Z- Transform, Concept of ROC & properties, Properties of Z-Transform, Z- Transform for different signals, Inverse Z-Transform, Solution of difference equation with initial conditions.

Total Periods: 45

COURSE OUTCOMES:

On successful completion of the course the student will be able to		**POs related to COs**
CO1	Demonstrate the concepts of signals and systems, Analyze the signals and apply different operations on signals.	**PO1,PO2, PO3,PO5**
CO2	Determine Fourier series coefficient for different types of signals. Evaluate Fourier Transforms for different types of continuous time signals.	**PO1,PO2, PO3,PO4,PO5**
CO3	Analyze sampling process and sampling of discrete time signals, Analyze Signal Transmission Through Linear Systems and to describe the Ideal characteristics LPF, HPF and BPF	**PO1,PO2, PO3, PO4,PO5**
CO4	Evaluate Laplace transforms with their properties by using the concept of ROC.	**PO1, PO2, PO3, PO5**
CO5	Determine Z transforms with their properties by using the concept of ROC and Evaluate the inverse z- transform.	**PO1, PO2,PO3, PO4, PO5**

TEXT BOOKS:

1. B. P. Lathi "Linear Systems and Signals" , Second Edition, Oxford Univesity press.
2. A.V. Oppenheim "Signals and Systems", A.S.Willsky and S.H.Nawab, Pearson, 2nd Ed.,.
3. Ramakrishna Rao "Signals and Systems",2008, TMH.

REFERENCES BOOKS:

1. Simon Haykin and Van Veen, "Signals & Systems", Wiley, 2nd Edition.
2. B.P. Lathi, "Signals, Systems & Communications", 2009, BS Publications.
3. Michel J. Robert, "Fundamentals of Signals and Systems", MGH International Edition.
4. C. L. Philips, JNTU.M.Parrand Eve A.Riskin,"Signals, Systems and Transforms", Pearson education.3rd Edition.

REFERENCE WEBSITE:

1. http://www.tutorialspoint.com/signals_and_systems/
2. https://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/lecturenotes/
3. http://ieeexplore.ieee.org/xpl/mostRecentIssue.jsp?reload=true&punumber=78
4. http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=8919
5. http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=82
6. http://nptel.ac.in/courses/117104074 7. http://nptel.ac.in/courses/117101055

CO-PO MAPPING

CO\PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO.1	3	3	3	-	-	-	-	-	-	-	-	-
CO.2	3	3	3	2	-	-	-	-	-	-	-	-
CO.3	3	3	3	2	-	-	-	-	-	-	-	-
CO.4	3	3	3	-	-	-	-	-	-	-	-	-
CO.5	3	3	3	2	-	-	-	-	-	-	-	-
CO*	**3**	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-

II B.TECH - III SEMESTER

		L	T	P	C
20HSM231	**Soft Skills(SOC Course)** (Common to all branches)	**0**	**1**	**2**	**2**

PRE-REQUISITE: NIL

COURSE OBJECTIVES:

1. To encourage all round development of the students by focusing on soft skills
2. To make the students aware of critical thinking
3. To develop problem-solving skills and decision making
4. To develop Emotional Intelligence and Stress Management
5. To develop leadership skills and to function effectively with heterogeneous teams

UNIT -1: Soft Skills & Communication Skills (10)

Introduction, meaning, significance of soft skills – definition, significance, types of communication skills - Intrapersonal & Inter-personal skills - Verbal and Non-verbal Communication

Activities:

Intrapersonal Skills- Narration about self- strengths and weaknesses- clarity of thought – self-expression – articulating with felicity

(The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes and literary sources)

Interpersonal Skills- Group Discussion – Debate – Team Tasks - Book and film Reviews by groups - Group leader presenting views (non- controversial and secular) on contemporary issues or on a given topic.

Verbal Communication- Oral Presentations- Extempore- brief addresses and speeches- convincing- negotiating- agreeing and disagreeing with professional grace.

Non-verbal communication – Public speaking – Mock interviews – presentations with an objective to identify non- verbal clues and remedy the lapses on observation

UNIT – II: CRITICAL THINKING (10)

Active Listening – Observation – Curiosity – Introspection – Analytical Thinking – Open-mindedness – Creative Thinking

Activities:

Gathering information and statistics on a topic - sequencing – assorting – reasoning – critiquing issues –

placing the problem – finding the root cause - seeking viable solution – judging with rationale – evaluating the views of others - Case Study, Story Analysis

UNIT – III: PROBLEM SOLVING & DECISION MAKING (10)

Meaning & features of Problem Solving – Managing Conflict – Conflict resolution – Methods of decision making – Effective decision making in teams – Methods & Styles

Activities:

Placing a problem which involves conflict of interests, choice and views – formulating the problem – exploring solutions by proper reasoning – Discussion on important professional, career and organizational decisions and initiate debate on the appropriateness of the decision.

Case Study & Group Discussion

UNIT – IV: EMOTIONAL INTELLIGENCE & STRESS MANAGEMEN (10)

Managing Emotions – Thinking before Reacting – Empathy for Others – Self-awareness – Self-Regulation – Stress factors – Controlling Stress – Tips

Activities:

Providing situations for the participants to express emotions such as happiness, enthusiasm, gratitude, sympathy, and confidence, compassion in the form of written or oral presentations.

Providing opportunities for the participants to narrate certain crisis and stress –ridden situations caused by failure, anger, jealousy, resentment and frustration in the form of written and oral presentation, Organizing Debates

UNIT – V: LEADERSHIP SKILLS (10)

Team-Building – Decision-Making – Accountability – Planning – Public Speaking – Motivation – Risk- Taking - Team Building - Time Management

Activities:

Forming group with a consensus among the participants- choosing a leader- encouraging the group members to express views on leadership- democratic attitude- sense of sacrifice – sense of adjustment – vision – accommodating nature- eliciting views on successes and failures of leadership using the past knowledge and experience of the participants, Public Speaking, Activities on Time Management, Motivation, Decision Making, Group discussion etc.

NOTE-:

1. The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes, epics, scriptures, autobiographies and literary sources which bear true relevance to the prescribed skill.
   Case studies may be given wherever feasible for example for Decision Making- The decision of King Lear or for good Leadership – Mahendar Singh Dhoni etc.

COURSE OUTCOME:

On successful completion of the course, students will be able to		**POs**
CO1	Demonstrate knowledge effectively on Soft Skill & Communication Skills	**PO1, PO6, PO7, PO8, PO9, PO10, PO12**
CO2	Demonstrate knowledge on Critical Thinking	**PO1, PO6, PO7, PO8, PO9, PO10, PO12**
CO3	Solve problems and take appropriate decisions	**PO1, PO2, PO6, PO7, PO8, PO9, PO10, PO12**
CO4	Effectively manage Emotional Intelligence and Stress Management	**PO1, PO6, PO7, PO8, PO9, PO10, PO12**
CO5	Function effectively as a leader and with heterogeneous team	**PO1, PO6, PO7, PO8, PO9, PO10, PO11, PO12**

TEXTBOOKS:

1. Personality Development and Soft Skills (English, Paperback, Mitra Barun K.)Publisher: Oxford University Press; Pap/Cdr edition (July 22, 2012)
2. Personality Development and Soft Skills: Preparing for Tomorrow, Dr Shikha Kapoor,Publisher : I K International Publishing House; 0 edition (February 28, 2018)

REFERENCE BOOKS:

1. Soft skills: personality development for life success by Prashant Sharma, BPB publications 2018.
2. Soft Skills By Alex K. Published by S.Chand
3. Soft Skills: An Integrated Approach to Maximise Personality Gajendra Singh Chauhan, Sangeetha Sharma Published by Wiley.
4. Communication Skills and Soft Skills (Hardcover, A. Sharma) Publisher: Yking books
5. SOFT SKILLS for a BIG IMPACT (English, Paperback, RenuShorey) Publisher: Notion Press
6. Life Skills Paperback English Dr. Rajiv Kumar Jain, Dr. Usha Jain Publisher: Vayu Education of India

REFERENCE WEBSITES:

1. https://youtu.be/DUlsNJtg2L8?list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q
2. https://youtu.be/xBaLgJZ0t6A?list=PLzf4HHlsQFwJZel_j2PUy0pwjVUgj7KlJ
3. https://youtu.be/-Y-R9hDl7lU
4. https://youtu.be/gkLsn4ddmTs
5. https://youtu.be/2bf9K2rRWwo
6. https://youtu.be/FchfE3c2jzc

CO-PO Mapping

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	-	-	-	-	2	2	2	2	3	-	2
CO.2	3	-	-	-	-	2	2	2	2	2	-	2
CO.3	3	2	-	-	-	2	2	2	2	2	-	2
CO.4	3	-	-	-	-	2	2	2	2	2	-	2
CO.5	3	-	-	-	-	2	2	2	2	2	3	2
CO*	**3**	**2**	**-**	**-**	**-**	**2**	**2**	**2**	**2**	**2.2**	**3**	**2**

II B.TECH. - III SEMESTER

20ESC234	**PRINCIPLES OF ELECTRICAL ENGINEERING LAB**	**L**	**T**	**P**	**C**
		-	**-**	**3**	**1.5**

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To provide practical experience for the determination of two port network Parameters.
2. To conduct and analyze the load test on DC shunt machines.
3. To conduct various test on Transformer.
4. To provide practical experience on measurement of energy
5. To determine the resistance, inductance and capacitance parameters using DC and AC brides

LIST OF EXPERIMENTS

1. Determine Z (impedance) parameters of a given two-port network
2. Determine Y (admittance) parameters
3. Determine ABCD (transmission parameters) of a given two-port network
4. Determine the H (hybrid) parameters
5. Magnetization characteristics of D.C shunt generator determination of critical field resistance.
6. Swinburne's test of dc shunt machine.
7. Brake test on dc shunt motor. Determination of performance characteristics.
8. OC & SC tests on single- phase transformer to find the effeciency.
9. Regulation of single- phase transformer.
10. Calibration and testing of single phase energy meter
11. Measurement of unknown inductance using anderson's bridge
12. Wheatstone's bridge for measurement of medium resistance.
13. Measurement of unknown capacitance using schering bridge**.**

COURSE OUTCOMES

At the end of the course, students will able to		**POs related to COs**
CO1	Determine two port network parameters	**PO1**
CO2	Evaluate the Characteristics of D.C Shunt Generator and DC Motor through experimentation.	**PO2**
CO3	Investigate AC Machines like Induction Motor and Transformer for solving complex problems.	**PO3**
CO4	To determine the energy calculation	**PO4**
CO5	Determine the resistance, inductance and capacitance parameters using DC and AC brides	**PO4**
CO6	Follow the ethical principles in implementing the experiments.	**PO8**
CO7	Do experiments effectively as an individual and as a team member in a group.	**PO9**
CO8	Communicate verbally and in written form, the understanding about the experiments.	**PO10**
CO9	Continue updating their skill related to electrical circuits	**PO12**

CO-PO Mapping

CO-PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**-**	3	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**-**	**-**	3	-	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**-**	**-**	**-**	3	-	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	**-**	**-**	**-**	3	-	**-**	**-**	-	**-**	**-**	**-**	**-**
CO6	**-**	**-**	**-**	**-**	**-**	**-**	**-**	3	-	**-**	**-**	**-**
CO7	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	3	-	**-**	**-**
CO8	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	3	**-**	
CO9												3
CO*	**3**	**3**	**3**	**3**	**-**	**-**	**-**	**3**	**3**	**3**		**3**

II B.Tech. - III Semester

		L	T	P	C
20ECE234	**DIGITAL ELECTRONICS LAB**	**0**	**0**	**3**	**1.5**

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To provide knowledge on different logic gates for different input signals
2. To develop a design skill of logic functions of combinational circuits
3. To develop skill on different logic gates with different combinational circuits
4. To provide a design knowledge of different sequential circuits
5. To in inculcate design skill on different sequential circuits

LIST OF EXPERIMENTS:

1. Verify truth table of all gates using IC-74XX.
2. Verify the Boolean Function by using Logic Gates.
3. Verify the functions of the following circuits usinglogic gates (Digital ICs):

a. Half adder, Half Subtractor,

4. Verify the functions of the following circuits using Digital ICs.

a. Full adder, Full Subtractor.

5. Construct the following circuits; check the outputs using multiplexer IC-74X151 and Demultiplexer IC-74X155.
6. Construct the following circuits and check the logic output of 3-8 Decoder using IC-74138 and 8-3 Encoder using IC-74148.
7. Construct and verify logic output of the comparator using IC-74x85.
8. Construct and verify the functions of a D FLIP-FLOP.
9. Construct and verify functions of the shift register
10. Construct and verify functions of a counter using IC-74x90.

EQUIPMENTS REQUIRED FOR LABORATORY

1. Regulated Power Supply: 0-30V,
2. Fixed power supply 5V
3. Components and IC'S

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COURSEOUTCOMES:

On successful completion of the course the student will be able to,		POs related to COs
CO1	Demonstrate knowledge on using different circuits for different applications	**PO1**
CO2	Analyze the output waveforms for the designed circuits	**PO2**
CO3	Design and develop the different circuits based on the requirement in digital circuits	**PO3**
CO4	Investigate and test the circuits for produces required outputs	**PO4**
CO5	Select appropriate design tools to test the different circuits for different values	**PO5**
CO6	Follow the ethical values in designing the circuits.	**PO8**
CO7	Do experiments effectively as an individual and as a member in a group.	**PO9**
CO8	Communicate verbally and in written form, the understandings about the experiments.	**PO10**
CO9	Continue updating their design skill related to for various circuits based on application during their life time	**PO12**

CO-PO MAPPING

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	-	-	-	-	-	-	-	-	-	-	-
CO.2	-	3	-	-	-	-	-	-	-	-	-	-
CO.3	-	-	3	-	-	-	-	-	-	-	-	-
CO.4	-	-	-	3	-	-	-	-	-	-	-	-
CO.5	-	-	-	-	3	-	-	-	-	-	-	-
CO.6	-	-	-	-	-	-	-	3	-	-	-	-
CO.7	-	-	-	-	-	-	-	-	3	-	-	-
CO.8	-	-	-	-	-	-	-	-	-	3	-	-
CO.9	-	-	-	-	-	-	-	-	-	-	-	3
CO*	**3**	**3**	**3**	**3**	3	-	-	3	3	**3**	**-**	**3**

II B.Tech. - III Semester

20ECE235	**ELECTRONIC CIRCUIT ANALYSIS LAB**	**L T P C**
		- - 3 1.5

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To understand the biasing of BJT transistor
2. To understand the design considerations and frequency response of amplifiers
3. To understand the design of oscillators namely, RC and LC oscillators for a given Frequency of oscillations
4. To analyze the conversion efficiency of large signal amplifiers.
5. To understand the design considerations of single tuned amplifiers.

List of Experiments: (Minimum of 7 Experiments has to be performed)

Part –A: Hardware

1. Fixed and Voltage divider bias BJT configuration
2. Two Stage RC Coupled Amplifier
3. Darlington Pair Amplifier
4. Bootstrapped Emitter Follower
5. Voltage-Series Feedback Amplifier
6. Current-Shunt Feedback Amplifier
7. Class A Series-fed Power Amplifier
8. Transformer-coupled Class A Power Amplifier
9. Class B Push-Pull Power Amplifier
10. Complementary Symmetry Class B Push-Pull Power Amplifier
11. Single Tuned Voltage Amplifier

Part –B: Using MULTISIM Software Tool

1. Fixed and Voltage divider bias BJT configuration
2. Two Stage RC Coupled Amplifier
3. Darlington Pair Amplifier
4. Bootstrapped Emitter Follower
5. Voltage-Series Feedback Amplifier
6. Current-Shunt Feedback Amplifier
7. Class A Series-fed Power Amplifier
8. Transformer-coupled Class A Power Amplifier
9. Class B Push-Pull Power Amplifier
10. Complementary Symmetry Class B Push-Pull Power Amplifier
11. Single Tuned Voltage Amplifier

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs
CO1	Demonstrate knowledge on biasing, small and large signal BJT amplifier	**PO1**
CO2	Analyze the simulated results of various small and large signal amplifiers	**PO2**
CO3	Design and testing the small and large signal amplifiers and in the hardware	**PO3**
CO4	Conduct investigation and test the functionality of amplifiers and oscillators	**PO4**
CO5	Select appropriate tools as Multisim PSPICE simulation package tool and procedure to simulate and implement amplifiers and oscillators	**PO5**
CO6	Follow ethical principles in designing, simulating and implementing circuits	**PO8**
CO7	Do experiments effectively as an individual and as a member in a group	**PO9**
CO8	Communicate verbally and in written form, the understandings about the experiments	**PO10**
CO9	Continue updating their skill related to implementation for various application during their life time	**PO12**

CO-PO Mapping

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	-	-	-	-	-	-	-	-	-	-	-
CO.2	-	3	-	-	-	-	-	-	-	-	-	-
CO.3	-	-	3	-	-	-	-	-	-	-	-	-
CO.4	-	-	-	3	-	-	-	-	-	-	-	-
CO.5	-	-	-	-	3	-	-	-	-	-	-	-
CO.6	-	-	-	-	-	-	-	3	-	-	-	-
CO.7	-	-	-	-	-	-	-	-	3	-	-	-
CO.8	-	-	-	-	-	-	-	-	-	3	-	-
CO.9	-	-	-	-	-	-	-	-	-	-	-	3
CO*	**3**	**3**	**3**	**3**	**3**	**-**	**-**	**3**	**3**	**3**	**-**	**3**

II B.TECH. - III SEMESTER

20MAC231	**ENVIRONMENTAL SCIENCE** (COMMON TO ALL BRANCHES)	**L**	**T**	**P**	**C**
		2	**0**	**0**	**0**

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To recognize nature of environmental studies and various renewable and non renewable Resources.
2. To understand flow and bio-geo- chemical cycles and ecological pyramids.
3. To identify various causes of pollution and solid waste management and related Preventive measures.
4. To evaluate and interpret the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation.
5. To understand the causes of population explosion, value education and welfare programmes.

UNIT - I: INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES **(6)**

Multidisciplinary nature of environmental studies: Definition, scope and importance. Need for public awareness.

Natural Resources: Renewable and non-renewable resources: Natural resources and associated problems. a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. e) Energy resources: Growing energy needs, renewable and nonrenewable energy resources.

UNIT – II: CONCEPT OF ECOSYSTEM AND BIODIVERSITY **(6)**

Structure and function of an ecosystem: Producers, consumers and decomposers- Energy flow in the ecosystem- Ecological succession- Food chains, food webs and ecological pyramids- Introduction, types, characteristic features, structure and function of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and its conservation: Introduction – Definition: genetic, species and ecosystem diversity-Biogeographical classification of India-Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - Biodiversity at global, National and local levels- India as a mega-diversity nation-Hot-sports of biodiversity-Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. -Endangered and endemic species of India - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

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UNIT – III: ENVIRONMENTAL POLLUTION AND WASTE MANAGEMENT **(6)**

Environmental Pollution: Definition - Cause, effects and control measures of: - a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution g. nuclear hazards

Solid waste Management: Causes, effects and control measures of urban and industrial wastes-Role of an individual in prevention of pollution. Pollution case studies-Disaster management: floods, earthquake, cyclone and landslides.

UNIT – IV: SOCIAL ISSUES AND THE ENVIRONMENT (6)

From Unsustainable to Sustainable development: Urban problems related to energy Water conservation, rain water harvesting, watershed management-Resettlement and rehabilitation of people; its problems and concerns. -Environment Protection Act-Air (Prevention and Control of Pollution) Act-Water (Prevention and control of Pollution) Act-Wildlife Protection Act- Forest Conservation Act -Issues involved in enforcement of environmental legislation- Public awareness**.**

UNIT – V: HUMAN POPULATION AND THE ENVIRONMENT (6)

Population growth: 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 Case Studies.

Total hours: 30

COURSE OUTCOMES:

On successful completion of the course, students will be able to		**POs mapped with COs**
CO1	Grasp multidisciplinary nature of environmental studies and various renewable and nonrenewable resources.	**PO1, PO2, PO3 PO4, PO5, PO6,PO7**
CO2	Understand flow and bio-geo- chemical cycles and ecological pyramids.	**PO1, PO2, PO3 PO4, PO5, PO6,PO7**
CO3	Understand various causes of pollution and solid waste management and related preventive measures.	**PO1, PO2, PO3 PO4, PO5, PO6,PO7**
CO4	Understand concept of rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation.	**PO1, PO2, PO3 PO4, PO5, PO6,PO7**
CO5	Causes of population explosion, value education and welfare programmes.	**PO1, PO2, PO3 PO4, PO5, PO6,PO7**

TEXT BOOKS:

1. R. Rajagopalan," Environmental Studies", Oxford University Press.
2. Gilbert M. Masters and Wendell P. Ela.,"Environmental Engineering and science" PHI Learning Pvt.Ltd, 2008

REFERENCE BOOKS:

1. ErachBharucha "Textbook of Environmental Studies for Undergraduate Courses", University grants commission, 2/e,2013.
2. C.P.Kaushik and Anubhakaushik "Text book of environmental studies", New age International publishers, 4/e,2006.

REFERENCE WEBSITE:

1. https://nptel.ac.in/courses/127/105/127105018/
2. https://nptel.ac.in/courses/113/104/113104061/
3. https://nptel.ac.in/courses/120/108/120108005/
4. https://nptel.ac.in/courses/120/108/120108002/

CO\PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO.1	3	2	1	2	2	2	3	-	-	-	-	-
CO.2	3	2	1	2	2	2	3	-	-	-	-	-
CO.3	3	2	1	2	2	2	3	-	-	-	-	-
CO.4	3	2	1	2	2	2	3	-	-	-	-	-
CO.5	3	2	1	2	2	2	3	-	-	-	-	-
CO*	**3**	**2**	**1**	**2**	**2**	**2**	**3**	**-**	**-**	**-**	**-**	**-**

II B.TECH IV SEMESTER

20BSC231 **NUMERICAL METHODS AND PROBABILITY THEORY**
(Common to ECE,CSE,CIV,MECH & AIML)

L	T	P	C
3	1	0	4

PRE-REQUISITES: A Course on Algebra & Calculus, Differential equations & Transform Techniques

COURSE EDUCATIONAL OBJECTIVES:

1. To develop skill to analyze appropriate method to find the root of the Algebraic and Transcendental Equations and to develop skill to apply the concept of interpolation for the Prediction of required values
2. To learn the method of evaluation of numerical integration and to solve ordinary differential equations numerically using numerical methods
3. To develop skill to analyze the discrete and continuous data
4. To develop skill to analyze the discrete and continuous data using appropriate Statistical Distributions like Binomial, Poisson, Normal etc., and To inculcate skill to investigate different applications of statistical distributions and the corresponding conclusions required for the analysis of sample data.
5. To develop skill in testing of hypotheses and Tests of significance for small and large samples

UNIT – 1: SOLUTION OF ALGEBRAIC, TRANSCENDENTAL EQUATIONS & INTERPOLATION **(9)**

Solution of Algebraic and Transcendental Equations: Introduction - The Bisection method - The method of False position - The Iteration method - Newton-Raphson method (Single Variable).
Interpolation: Introduction - Finite differences - Forward differences, Backward differences - Newton's forward, Newton's backward - Lagrange's method of interpolation.

UNIT-2: NUMERICAL INTEGRATION AND NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS **(9)**

Numerical integration: Trapezoidal rule - Simpson's 1/3 Rule - Simpson's 3/8 Rule.
Numerical solution of Ordinary Differential equations: Solution by Taylor's series - Picard's method of successive approximations - Euler's method - Runge-Kutta methods.

UNIT - 3: PROBABILITY, RANDOM VARIABLES **(9)**

Probability: Sample space and events - Probability - The axioms of probability - Some elementary theorems - Conditional probability - Baye's theorem.
Random variables: Discrete and continuous distributions – Statistical Parameters (Mean, Variance and Standard Deviation) of distribution functions.

UNIT -4: PROBABILITY DISTRIBUTIONS & SAMPLING THEORY **(9)**

Binomial - Poisson and Normal distributions - Related properties.
Sampling distribution: Populations and samples - Sampling distributions of mean (known and unknown) - Proportions - Sums and differences.

UNIT - 5:TEST OF HYPOTHESIS AND TEST OF SIGNIFICANCE **(9)**

Test of Hypothesis: Means - Hypothesis concerning one and two means - Type I and Type II errors - One tail, two-tail tests.
Test of Significance: Student's t-test - F-test - Chi-square test of goodness of fit.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to COs
CO1	Demonstrate knowledge in solving algebraic and transcendental equations by various mathematical methods and Design novel mathematical methods for constructing the interpolating polynomials to the given data	**PO1,PO2**
CO2	Demonstrate knowledge in finding the numerical values to integrals through different mathematical methods and solving ordinary differential equations numerically through various methods and Design novel mathematical methods for solving the ordinary differential equations.	**PO1,PO2**
CO3	Demonstrate knowledge on use the probability and Random Variables in the field of engineering	**PO1,PO2, PO3**
CO4	Demonstrate knowledge in probability distributions and develop analytical skills for the problems involving means, probability distributions and standard deviations sampling techniques for decision making in uncertain environments	**PO1,PO2, PO3**
CO5	Demonstrate knowledge in testing of hypotheses and Tests of significance for small and large samples and Develop skills for analyzing the data with suitable tests of significance for practical situations through probability distributions	**PO1,PO2, PO3,PO4**

TEXT BOOKS:

1. S.C. Gupta, V.K. Kapoor, "Fundamentals of Mathematical Statistics", 10/e, 2001, S. Chand and Company Publishers, New Delhi.
2. T.K.V. Iyengar, B. Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad , "Probability and Statistics", 2012, S. Chand and Company Publishers, New Delhi.

REFERENCE BOOKS:

1. V. Ravindranath, T.S.R. Murthy,"Probability and Statistics, 2011, I.K. International Pvt. Ltd, New Delhi.
2. Johnson A. Richard, Miler & Fruends,"Probability and Statistics for Engineers", 6/e, 2006, Pearson Education, New Delhi.
3. Dr. B. S. Grewal, "Higher Engineering Mathematics", 34/e, 1999, Khanna Publishers, Delhi
4. Dr. J. Ravichandran, "Probability and Statistics for Engineers", 2011, Wiley-India Publishers, New Delhi.
5. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, "Probability and Statistics for Engineers and Scientists", 7/e, 2002, Pearson Education Asia, New Delhi.

REFERENCE WEBSITE:

1. https://www.youtube.com/watch?v=hizXlwJO1Ck
2. https://www.youtube.com/watch?v=5817fLmsTGE
3. https://www.youtube.com/watch?v=yv6i9plC9nk
4. https://www.youtube.com/watch?v=r1sLCDA-kNY&list=PL46B9EA2CFEB51241
5. https://www.youtube.com/watch?v=r1sLCDAkNY&list=PL46B9EA2CFEB51241&index=1
6. https://www.youtube.com/watch?v=HnvB8BCDQm0&list=PL46B9EA2CFEB51241&index=2

CO/PO MAPPING

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	-	-	-	-	-	-	-	-	-	-
CO.2	3	3	-	-	-	-	-	-	-	-	-	-
CO.3	3	3	2	-	-	-	-	-	-	-	-	-
CO.4	3	3	2	-	-	-	-	-	-	-	-	-
CO.5	3	3	2	2	-	-	-	-	-	-	-	-
CO*	**3**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-

II B.TECH. - IV SEMESTER

20ECE241	**LINEAR CONTROL SYSTEMS**	**L T P C**
		2 1 0 3

PRE-REQUISITES: A Course on Engineering Mathematics I, Engineering Mathematics II

COURSE EDUCATIONAL OBJECTIVES:

1. To demonstrate knowledge on physical systems and modelling of Electrical and Mechanical systems
2. To educate problem solving skills in block diagram reduction technique, signal flow graph Techniques and the state equations of a system
3. To analyze the stability of the system in Time and Frequency domains.
4. To introduce state variable representation of physical systems
5. To impart knowledge on compensators and evaluating controllability and observability of a system

UNIT –1: MODELING OF CONTROL SYSTEMS (9)

Control system and types - Effects of feedback - Differential equation model - Transfer Function model -Mathematical modelling of Electrical and Mechanical systems- Analogy between electrical and mechanical systems - Block diagram reduction technique – Signal flow graph.

UNIT –2: TIME DOMAIN ANALYSIS (9)

Standard test signals - Time domain specifications - Unit step response of First and second order systems - Time response specifications of second order systems - Steady state response - Steady state errors and error constants. Effects of proportional, integral, derivative Controllers, Design of P, PD, PI PID Controllers.

UNIT –3: FREQUENCY DOMAIN ANALYSIS (9)

Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Stability Analysis from Bode Plots - Polar Plots-Nyquist Plots- Phase margin and Gain margin- Design of compensation Lag, Lead, Lead-Lag Compensators.

UNIT –4: STABILITY ANALYSIS IN FREQUENCY DOMAIN (9)

Concepts of stability - Necessary conditions for Stability - Routh- stability criterion - Stability and conditional stability More on the Routh stability criterion - root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci.

UNIT –5: STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS (9)

Concepts of state, state variables and state model, derivation of state models from Schematic models, differential equations, Transfer function, block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it's Properties. Concepts of controllability and observability.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of this course, the students will be able to		**POs related to COs**
CO1	Understand control system concepts, the use of differential equation and transfer function models for analyze physical systems.	**PO1,PO2, PO3, PO4, PO5**
CO2	Analyze the time response of systems and estimate the steady state errors.	**PO1,PO2,PO3, PO4, PO5**
CO3	Examine the open loop and closed–loop frequency responses of systems.	**PO1,PO2,PO3, PO4, PO5**
CO4	Design the compensators and analyze the stability of the system in time and frequency domains.	**PO1,PO2,PO3, PO4, PO5**
CO5	Explore the state variable representation of physical systems and controllability and observability.	**PO1,PO2,PO3, PO4, PO5**

TEXT BOOKS:

1. J Nagrath and M. Gopal "Control Systems Engineering" –New Age International (P) Limited - Publishers5/e- I .
2. Katsuhiko Ogata "Modern Control Engineering" - Prentice Hall of India Pvt. Ltd, New Delhi-5 /e - 2010 .
3. Stephen J. Chapman "MATLAB programming for engineers",6E -2019 .

REFERENCE BOOKS:

1. C. Kuo and Farid Golnaraghi – "Automatic Control Systems" -John wiley and son's ,New Delhi -8 /e- 2003 reprint 2009.
2. Anand Kumar "Control Systems", Prentice Hall of India Pvt. Ltd, New Delhi–1 /e- 2007.
3. Norman S ,"Control Systems Engineering" NISE John wiley - 6 /e - 2010 .
4. Yaduvir Singh and S. Janardhan, Cengage learning"Modern Control Engineering" - 1 /e, 2011
5. Stormy Attaway "MATLAB: A Practical Introduction to Programming and Problem Solving".

REFERENCE WEBSITE:

1. https://nptel.ac.in/courses/108/106/108106098/

CO\PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO.1	3	3	2	2	3	-	-	-	-	-	-	-
CO.2	3	3	3	3	3	-	-	-	-	-	-	-
CO.3	3	3	3	3	3	-	-	-	-	-	-	-
CO.4	3	3	3	3	3	-	-	-	-	-	-	-
CO.5	3	3	2	2	3	-	-	-	-	-	-	-
CO*	**3**	**3**	**2.6**	**2.6**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	-

II B.TECH. - IV SEMESTER

20ECE242	COMPUTER ARCHITECTURE AND MICROPROCESSOR	L	T	P	C
		2	1	0	3

PRE-REQUISITES: Digital Electronics

COURSE EDUCATIONAL OBJECTIVES:

1. To Acquire Knowledge on the basic structure and operation of a digital computer.
2. To discuss in detail the operation of the arithmetic unit including the algorithms of addition, subtraction, multiplication & division.
3. To analyze and understand the architecture of 8086 Microprocessor and its pin configuration.
4. To analyze and understand the concept of Timing diagrams and Different instructions of 8086.
5. To develop assembly language programming skills on 8086 processor using different instruction sets.

UNIT –1: BASIC STRUCTURE OF COMPUTERS (9)

Computer Types, Functional Units, Basic Operational Concepts, Bus Structures, Performance, Register Transfer language, Register Transfer, Bus and memory transfer, Arithmetic Micro operations, logic micro operations, shift micro operations.

UNIT –2: COMPUTER ARITHMETIC (9)

Computer Registers, Computer instructions–Instruction cycle, Addition and subtraction, multiplication Algorithms, Division Algorithms, Decimal Arithmetic unit, Decimal Arithmetic operations.

UNIT-3: INTRODUCTION TO 8086 MICROPROCESSOR (9)

8085 Overview, 8086 Internal Architecture- Register Organization, Memory Segmentation, Flag Register, Pin Configuration, Minimum and Maximum Mode Signals, Physical Memory Organization, General Bus Operation-, Timing Diagrams - Interrupts Of 8086

UNIT-4: INSTRUCTION SET AND PROGRAMMING WITH 8086 (9)

Instruction Formats -Addressing Modes-Instruction Set, Assembler Directives-Macros, Programs Involving Logical, Branch Instructions – Sorting and Evaluating Arithmetic Expressions – String Manipulations-Simple ALPs.

UNIT –5: INTERFACING DEVICES (9)

8255 PPI- Block Diagram, Various Modes of Operation, Interface D/A and A/D interfacing, Keyboard Interfacing, 8259 Interrupt controller,8279 Keyboard and display controller, seven segment display,8251 serial communication protocol.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs
CO1	Demonstrate knowledge on fundamentals of Computer functional units and types of computers, Analyze the importance of register transfer, arithmetic, logical and shift operations.	**PO1, PO2**
CO2	Be familiar with the basic registers, instruction set and Algorithm Design for arithmetic bit level operations.	**PO1, PO2,PO3**
CO3	Understand the basic organization of 8086 Microprocessor with the knowledge of Pin Diagram, registers.	**PO1, PO2**
CO4	Analyze the timing diagrams for minimum and maximum mode and addressing modes, instructions of 8086 processor.	**PO1,PO2**
CO5	Be familiar with instruction set and assembly language programming using 8086 processor.	**PO1,PO2, PO3, PO4**

TEXT BOOKS:

1. M.Moris Mano, "computer system architecture"PHI/Pearson, IIIrd Edition.
2. A.K.Ray and K.M.Burcahndi, "Advanced microprocessor and peripheral, TMH,2nd edition, 2000.
3. Carl hamacher" Computer organization, Mc Graw hill, V edition.

REFERENCE BOOKS:

1. Doughlas U Hall, "Micro Processors &Interfacing",revised 2nd edition,TMH,New Delhi,2007.
2. Walter A,Triebel, Avtar Singh "The 8088 and 8086 microprocessors" 1st edition, PHI, New Delhi,2003.
3. William Stallings "Computer Organization and Architecture " VII edition–, PHI/Pearson.
4. John P.Hayes, "Computer architecture and organization" McGraw Hill International.

REFERENCE WEBSITE:

1. https://www.tutorialspoint.com › Microprocessor › Microprocessor - 8085 Architecture
2. http://www.cpu-world.com/CPUs/8086/
3. https://www.journals.elsevier.com/microprocessors-and-microsystems/

CO-PO MAPPING

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	-	-	-	-	-	-	-	-	-	-
CO.2	3	3	2	-	-	-	-	-	-	-	-	-
CO.3	3	2	-	-	-	-	-	-	-	-	-	-
CO.4	3	2	-	-	-	-	-	-	-	-	-	-
CO.5	3	3	2	2	-	-	-	-	-	-	-	-
CO*	**3**	**2.6**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

II B.TECH. - IV SEMESTER

20ECE243	**LINEAR & DIGITAL IC APPLICATIONS**	**L T P C**
		2 1 0 3

PRE-REQUISITES: Pulse and Digital Circuits

COURSE EDUCATIONAL OBJECTIVES:

1. To introduce the basic building blocks of linear integrated circuits and linear and non - linear applications of operational amplifiers.
2. To gain knowledge on the applications of operational amplifiers.
3. To gain knowledge of filters and oscillator circuits using integrated circuits.
4. To comprehend the working principles of data converters
5. To understand the concepts of CPLDs and FPGAs

UNIT –1: BASICS OF OPERATIONAL AMPLIFIER (9)

IC Classification, chip size and circuit complexity, Op-amp Block Diagram, ideal and practical Op-amp specifications- DC and AC characteristics- 741 op-amp & its features - Frequency Compensation technique.
Inverting, Non-inverting amplifier, Differential amplifier, Integrator and differentiator, Instrumentation amplifier, AC amplifier, V-I & I-V converters.

UNIT –2: APPLICATIONS OF OP- AMPS (9)

Non- Linear function generation- Comparators, Multivibrators, Triangular and Square wave generators, Log and Anti log amplifiers, Precision rectifiers-Half wave and full wave rectifiers, Voltage Regulators-723 voltage regulator.

Introduction to 555 timer- functional diagram- Monostable and Astable operations and Schmitt Trigger, VCO and PLL (IC565).

UNIT –3: FILTERS AND OSCILLATORS (9)

Filters: Introduction to active filters- Butter worth filters – 1st order- LPF- HPF filters, Band pass- Band reject and all pass filters.
Oscillators: Conditions for Oscillation- Types of oscillator, RC Oscillator-RC Phase shift oscillator, Wien bridge oscillator, LC Oscillator– Colpitt's and Hartley oscillator

UNIT –4: DATA CONVERTERS & CMOS LOGIC (9)

Data Converters: Introduction- basic DAC techniques- weighted resistor DAC- R-2R ladder DAC- Different types of ADCs - Flash type ADC- successive approximation ADC and dual slope ADC, DAC and ADC Specifications.
CMOS Logic: Introduction to logic families- CMOS logic- CMOS steady state electrical behavior- CMOS dynamic electrical behavior- CMOS logic families.

UNIT –5: CPLD AND FPGA (9)

CPLD: Complex Programmable Logic Devices - Xilinx XC9500 CPLD Architecture Block, I/O and Switch matrix
FPGA: Field-Programmable Gate Arrays - Xilinx XC4000 FPGA Family – CLB, I/O Block and Programmable Interconnect, Applications of FPGAs.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		**POs**
CO1	Understand the basics of operational amplifiers with linear integrated circuits along with its characteristics	**PO1, PO2**
CO2	Comprehend and analyze the applications of operational amplifiers	**PO1, PO2**
CO3	Design and analyze various active filters and oscillator circuits using Integrated circuits	**PO1, PO2, PO3**
CO4	Demonstrate the working principles of data converters and understand the steady state and electrical behavior of CMOS logic	**PO1, PO2**
CO5	Understand the architecture of CPLDs and FPGAs	**PO1, PO2**

TEXT BOOKS:

1. Ramakanth A. Gayakwad, "Op-Amps & Linear ICs", PHI,New Delhi, 4th Edition, 2009.
2. John F. Wakerly, "Digital Design Principles & Practices", PHI/ Pearson Education Asia, New Delhi, 3rd Edition, 2005.

REFERENCE BOOKS:

1. D. Roy Chowdhury &ShailBala Jain, "Linear Integrated Circuits", New Age International (p) Ltd,Mumbai, 5th Edition, 2018.
2. U.A.Bakshi and A.P.Godse, "Linear IC and Applications", Technical Publications, Pune 1st Edition, 2005.
3. Charles H. Roth Jr, "Digital System Design Using VHDL", PWS Publications, New Delhi, 2nd edition, 2008.
4. Stephen Brown and ZvonkoVramesic, "Fundamentals of Digital Logic with VHDL Design", McGraw Hill, New Delhi, 2nd Edition. 2005.

REFERENCE WEBSITE:

1. https://nptel.ac.in/courses/108/108/108108111/
2. https://nptel.ac.in/courses/117/108/117108040/
3. https://nptel.ac.in/courses/117/106/117106088/

CO/PO MAPPING

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	-	-	-	-	-	-	-	-	-	-
CO.2	3	3	-	-	-	-	-	-	-	-	-	-
CO.3	3	3	2	-	-	-	-	-	-	-	-	-
CO.4	3	2	-	-	-	-	-	-	-	-	-	-
CO.5	3	2	-	-	-	-	-	-	-	-	-	-
CO*	**3**	**2.6**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-

II B.TECH. - IV SEMESTER

20ECE244	**PULSE AND DIGITAL CIRCUITS**	**L T P C**
		2 1 0 3

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To provide knowledge on linear network responses for different signals
2. To develop knowledge on non-linear networks for different applications (operations)
3. To develop a skill on analysis and design of different switching devices and different logic families and their characteristics
4. To develop different circuits that produce non-sinusoidal waveforms (Multivibrator) and their applications
5. To provide knowledge on different time base generators and its applications

UNIT - 1: LINEAR WAVE SHAPING (9)

High pass and Low pass RC circuits- their response for sinusoidal, step, pulse, and square inputs, RC network as differentiator and integrator, Attenuators and its applications in CRO probe, RL and Ringing Circuit,. Illustrative problems

UNIT - 2: NON LINEAR WAVE SHAPING (9)

Diodeclippers- clipping at one & two independent voltage levels with Transfer characteristics, Zener diode clippers, Comparators and applications of voltage comparators, clamping operation, classification of clamping circuits, Clamping circuit theorem. illustrative problems

UNIT - 3: SWITCHING DEVICES AND DIGITAL LOGIC CIRCUITS (9)

Diode as a switch, Transistor as a switch, transistor switching times, Design of transistor Switch, Realization of Logic gates (basic gates and universal gates) using DTL, RTL and TTL, ECL, CMOS logic Circuits, Comparison of logic families, Basic operation of Sampling gates and its Applications.

UNIT - 4: MULTIVIBRATORS (9)

Astable Multivibrator: Analysis and Design of collector coupled AstableMultivibrators, Application of Astable Mulivibrator as Voltage to Frequency converter.
Monostable Multivibrator: Analysis and Design of collector coupled MonostableMultivibrators, Application of monostable Multivibrator as Voltage to time converter.
Bistable Multivibrator: Analysis and Design of collector coupled BistableMultivibrators, Commutating capacitors, triggering Methods, Emitter coupled Bistable Multivibrator (**Schmitt Trigger**).illustrative problems.

UNIT - 5:TIME BASE GENERATORS (9)

General Features of a Time Base Signal, Methods of Generating Time Base Waveform, UJT relaxation oscillator, Miller And Bootstrap Time Base Generators: Basic Principles, Transistorized Miller and Bootstrap Time Base Generators, Current Time Base Generator.

Total hours: 45

COURSEOUTCOMES:

On successful completion of the course, students will be able to		**POs**
CO1	Analyse the different linear networks for different input signals	**PO1, PO2,PO3**
CO2	Analyse the different nonlinear networks for different applications	**PO1, PO2, PO3,**
CO3	Demonstrate design knowledge on diode , transistor switching and design concept of different digital logic families	**PO1, PO2, PO3,**
CO4	Able to Identify appropriate Multivibrator circuit based on application	**PO1, PO2, PO3,**
CO5	Capable to Identify appropriate time base circuit based on the application in display devices	**PO1, PO2, PO3**

TEXTBOOKS:

1. J. Millman and H. Taub ,"Pulse, Digital and Switching Waveforms", 3/e,1991, , McGraw-Hill,NewDelhi.
2. David A. Bell ,"Solid State Pulse circuits", 4/e., 2002, , PHI, New Delhi.

REFERENCEBOOKS:

1. A. Anand Kumar , '"Pulse and Digital Circuits" , 2 /e,2009, , PHI,New Delhi.
2. R.Venkataraman , '"Pulse, Digital Circuits and Computer Fundamentals", 3/e,1997, , DhanpatRaiPublications,New Delhi
3. Prof B.N. Yoga Narasimhan , '"Pulse and Digital Circuits",3/e,2006, ,Shiva book Publishers, Bangalore.
4. Syed Amjad Ali , '"Pulse and Digital Circuits" ,3 /e,2006, , Hi-Tech Publishers,Hyderabad.
5. U.A.Bakshi, A.P.Godse," Pulse and Digital Circuits", 1/e, 2011, , Technical Publications,Pune

REFERENCE WEBSITE:

1. https://en.wikipedia.org

CO-PO MAPPING

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	2	-	-	-	-	-	-	-	-	-
CO.2	3	3	2	-	-	-	-	-	-	-	-	-
CO.3	3	3	2	-	-	-	-	-	-	-	-	-
CO.4	3	3	2	-	-	-	-	-	-	-	-	-
CO.5	3	3	2	-	-	-	-	-	-	-	-	-
CO*	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-

II B.Tech. - IV Semester

		L	T	P	C
20ECE245	**PCB Design(SOC COURSE)**	**0**	**1**	**2**	**2**

PRE-REQUISITES: NIL

COURSE OUTCOMES:

1. Understand the basic concepts of electronic components and PCBDesign.
2. Apply tools and techniques for design PCBs

UNIT I: Introduction to Electronic Components and Instruments: (6)

Study of electronic components- active & passive, Electronic Instruments: CRO, Function generator, Power Supply, Multi-meter, IC tester.

UNIT II : PCB Fundamentals: (6)

PCB Advantages, components of PCB, Classification of PCB - single, double, multilayer boards, Manufacturing of PCB, challenges in modern PCB design and manufacture, PCB standards,Terminologies in PCB Designs.

UNIT III: Layout Planning and Design: (6)

Layout Planning: General rules of Layout, Supply and Ground Conductors, general PCB design consideration – mechanical design consideration – electrical design consideration –component placement rules – fabrication and assembly consideration – environmental factors – layout design.

UNIT IV: PCB Design software's: (6)

Introduction, Types-features-specifications: EAGLE(Easily Applicable Graphical Layout Editor), Altium, Proteus, KiCAD, OrCAD, Design Spark, Protel Cadstar, Sprint-Layout, PADS PCB, Easy EDA.

UNIT V: PCB Design and Fabrication: (6)

Steps Involved in Design and Fabrication-Schematic and Simulation Procedure, PCB Layout design procedure, PCB Fabrication process steps.

Total hours: 30

TEXT BOOKS:

1. R S Khandpur - Printed Circuit Boards: Design, Fabrication, Assembly and Testing – McGraw Hill, India – 2006
2. Christopher T. Robertson - Printed Circuit Board Designer's Reference: Basics – Prentice International, U.S. – 2004

REFERENCE BOOKS:

1. Printed circuit Board – Design & Technology by Walter C. Bosshart,Tata McGraw Hill.
2. Clyde F.Coombs "Printed circuits Handbook" III Edition, McGrawHill.

LIST OF EXPERIMENTS

Design PCB (schematic and Layout) for the following

1: PCB Design – Half- wave Rectifier

2: PCB Design – Full wave Rectifier

3: PCB Design – Full wave Bridge Rectifier

4: PCB Design – Voltage Regulator circuit

5: PCB Design – CE Amplifier

6: PCB Design –Half Adder

7: PCB Design –Full Adder

8: PCB Design –Half Subtractor

9: PCB Design –Full Subtractor

10:Develop and implement a new circuit as per the student choice

Tools and materials required for PCB Design:
Open source EDA Tool.
Single/Double-sided PCB

II B.Tech. - IV Semester

20ECE246	**LINEAR IC APPLICATIONS LAB**	**L**	**T**	**P**	**C**
		-	**-**	**3**	**1.5**

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To gain practical knowledge on linear and non-linear circuits using operational amplifiers
2. Gain practical hands-on experience on 555 timer applications
3. Gain practical knowledge on positive and negative Voltage Regulator
4. To construct the data converters using Integrated Circuits
5. Gain practical knowledge on phase locked loop.

LIST OF EXPERIMENTS

Minimum 10 experiments to be conducted:

1. OP AMP Applications - Adder, Subtractor, Comparator Circuits.
2. Design of Inverting and Non Inverting amplifiers
3. Integrator and Differentiator Circuits using IC 741
4. Function Generator using OP AMPs
5. IC 555 Timer - Monostable Operation Circuit
6. IC 555 Timer - Astable Operation Circuit
7. Three Terminal Voltage Regulators - 7805, 7809, 7912
8. Active Filter Applications - LPF, HPF (first order)
9. RC Phase shift oscillator/Wien bridge oscillator
10. Hartley oscillator/ Colpitt's oscillator
11. 4 bit DAC using OP AMP
12. Dual Slope ADC
13. Instrumentation amplifier
14. IC 565 - PLL Applications

COURSE OUTCOMES:

On successful completion of the course, students will be able to		**POs**
CO1	Understand the basic principles of Integrated circuits	**PO1**
CO2	Analyze the functioning performance of linear ICs	**PO2**
CO3	Gain practical knowledge to design an electronic circuit using integrated chips	**PO3**
CO4	Conduct investigation for analyzing the integrated circuits performance in various applications	**PO4**
CO5	Follow ethical principles in analyzing and designing the circuits	**PO8**
CO6	Do experiments effectively as an individual and as a member in a group	**PO9**
CO7	Communicate verbally and in written form, the understandings about the circuits	**PO10**
CO8	Continue updating their skill and apply during their life time	**PO12**

CO-PO MAPPING

CO\PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO.1	3	-	-	-	-	-	-	-	-	-	-	-
CO.2	-	3	-	-	-	-	-	-	-	-	-	-
CO.3	-	-	3		-	-	-	-	-	-	-	-
CO.4	-	-	-	3	-	-	-	-	-	-	-	-
CO.5	-	-	-	-	-	-	-	3	-	-	-	-
CO.6	-	-	-	-	-	-	-	-	3	-	-	-
CO.7	-	-	-	-	-	-	-	-	-	3	-	-
CO.8	-	-	-	-	-	-	-	-	-	-	-	3
CO*	**3**	**3**	**3**	**3**	**-**	**-**	**-**	**3**	**3**	**3**	**-**	**3**

II B.TECH. - IV SEMESTER

		L	T	P	C
20ECE247	**MICROPROCESSOR AND INTERFACING LAB**	**0**	**0**	**3**	**1.5**

PRE-REQUISITES: Digital Electronics

COURSE EDUCATIONAL OBJECTIVES:

1. To provide knowledge on
   - Fundamentals of 8086 processor
   - Basic Arithmetic, logical operations.
   - Fundamentals of Cross Assembler
2. To become skilled in 8086 Assembly language programming
3. To develop skill to understand string based operations
4. To Understand DOS/BIOS programming
5. To develop skill to understand programmable peripheral devices and their interfacing with Processor.

LIST OF EXPERIMENTS

I. MICROPROCESSOR 8086*:*

1. Introduction to Cross Assembler /TASM
2. Arithmetic Operation(16 bit Addition, Subtraction, Multiplication and Divison)-Multibyte Addition and Subtraction, Multiplication and Division, Signed and Unsigned Arithmetic Operation, ASCII-Arithmetic Operations.
3. Logic Operations-Shift Rotate-Converting Packed BCD to Unpacked BCD, BCD to ASCII Conversion.
4. By using string operation and instruction prefix: move block, reverse string, Sorting, string comparison.
5. DOS/BIOS programming: Display Characters, Strings

II.INTERFACING

1. 8279-Keyboard display: write a small program to display a string of characters.
2. Interfacing with stepper motor.
3. 8255-Interfacing with DAC to generate Triangular waveform
4. 8255-Interfacing with DAC to generate Square waveform.

COURSE OUTCOMES:

On successful completion of the course the student will be able to		POs related to COs
CO1	Develop testing and experimental procedures on 8086 microprocessor and analyse the operation under different cases.	**PO1**
CO2	Setup programming strategies and select proper mnemonics and run the program on the training boards.	**PO2**
CO3	Able to understand and work with microprocessor real time interfaces including digital to analog converters, stepper motors, analog to digital converters	**PO3**
CO4	Design and implement programs on Sorting, moving block of memory	**PO4**
CO5	Design interfacing circuits with development boards and understand the concept related to I/O devices.	**PO5**
CO6	Follow ethical principles in analyzing and design the circuits	**PO8**
CO7	Do experiments effectively as an individual and as a member in a group.	**PO9**
CO8	Communicate verbally and in written form, the understandings about the circuits.	**PO10**
CO9	Continue updating their skill and apply during their life time.	**PO12**

CO-PO Mapping

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	3	-	-	-	-
CO7	-	-	-	-	-	-	-	-	3	-	-	-
CO8	-	-	-	-	-	-		-	-	3	-	-
CO9	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**

II B.TECH. - IV SEMESTER

		L	T	P	C
20ECE248	**PULSE AND DIGITAL CIRCUITS LAB**	**0**	**0**	**3**	**1.5**

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To provide knowledge on responses of different linear and non linearcircuits for various input signals
2. To develop a design skill on transistor switch
3. To develop skill on different logic gates with different logics.
4. To provide a design knowledge and analysis of different multi-vibrators and Schmitt trigger
5. To in inculcate design skill on different sweep circuits

MINIMUM TEN(10) EXPERIMENTS TO BE CONDUCT.

1. Linear wave shaping (RC Differentiator and RC Integrator)
2. Non Linear Wave Shaping – Clippers
3. Non Linear Wave Shaping – Clampers
4. Transistor as a switch
5. Verify the truth tables of basic gates and universal gates using DTL.
6. Astable Multivibrator,
7. Monostable Multivibrator
8. Bistablemultivibrator
9. Schmit Trigger
10. UJT relaxation oscillator
11. Boot strap Sweep Circuit
12. Miller Sweep Circuit

EQUIPMENTS REQUIRED FOR LABORATORY

1. Regulated Power Supply : 0-30V
2. Cathode Ray Oscilloscope: 0-20MHz
3. Function Generator: 0-1MHz
4. Multimeters.
5. Components.

COURSEOUTCOMES:

On successful completion of the course the student will be able to,		**POs related to COs**
CO1	Demostrate knowledge on using different circuits for different applications	**PO1**
CO2	Analyze the output waveforms for the designed circuits	**PO2**
CO3	Design and develop the different circuits based on the requirement in digital circuits	**PO3**
CO4	Investigate and test the circuits for produces required outputs	**PO4**
CO5	Select appropriate design tools to test the different circuits for different values	**PO5**
CO6	Follow the ethical values in designing the circuits.	**PO8**
CO7	Do experiments effectively as an individual and as a member in a group.	**PO9**
CO8	Communicate verbally and in written form, the understandings about the experiments.	**PO10**
CO9	Continue updating their design skill related to for various circuits based on application during their life time	**PO12**

CO-PO MAPPING

CO\PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO.1	3	-	-	-	-	-	-	-	-	-	-	-
CO.2	-	3	-	-	-	-	-	-	-	-	-	-
CO.3	-	-	3	-	-	-	-	-	-	-	-	-
CO.4	-	-	-	3	-	-	-	-	-	-	-	-
CO.5	-	-	-	-	3	-	-	-	-	-	-	-
CO.6	-	-	-	-	-	-	-	3	-	-	-	-
CO.7	-	-	-	-	-	-	-	-	3	-	-	-
CO.8	-	-	-	-	-	-	-	-	-	3	-	-
CO.9	-	-	-	-	-	-	-	-	-	-	-	3
CO*	**3**	**3**	**3**	**3**	3	-	-	3	3	**3**	**-**	**3**

III B.Tech. -V Semester

20ECE351	**Communication Systems**	**L T P C**
		2 1 0 3

PRE-REQUISITES: Signals and Systems

COURSE EDUCATIONAL OBJECTIVES:

1. To introduce various modulation and demodulation techniques of analog and digital communication systems.
2. To analyze different noises, to conversion analog to digital communication techniques and its generation and detection of digital communication systems
3. To understand the need for source and channel coding.
4. To understand the mathematical model of digital communication system for bit error rate analysis of different digital communication system.
5. To study various sources and channel coding techniques.

UNIT I Continuous Wave Modulation **(9)**

Introduction to communication system & its elements, Modulation and Need for modulation.

Amplitude Modulation (AM): AM and its demodulation – DSB, SSB, VSB. Frequency Division Multiplexing (FDM), Angle Modulation: Frequency Modulation (FM), Phase Modulation.

UNIT II Noise and Pulse Modulation **(9)**

Introduction to Noise: Types of Noise, Receiver Model, Noise in AM, Pre-Emphasis and De-emphasis in FM.
Introduction to Pulse Modulation: The Sampling Process, PAM, Quantization process, Encoder, Block diagram of Digital communication system, PCM, Noise considerations in PCM systems, Delta Modulation, DPCM, Adaptive Delta modulation, Comparison of PCM,DM,ADM.

UNIT III Baseband Pulse Transmission **(9)**

Introduction, Matched Filter, Properties of Matched Filter, Inter Symbol Interference (ISI), Nyquist Criterion for distortion less baseband binary transmission, Correlative level coding, Baseband M-ary PAM transmission, Equalization, Eye pattern.

UNIT IV Digital Modulation Schemes & Information Theory **(9)**

Coherent Digital Modulation Schemes – ASK, BPSK, BFSK, QPSK, Non-coherent BFSK, DPSK. M- ary Modulation Techniques, Power Spectra, Bandwidth Efficiency, Timing and Frequency synchronization. Information theory: Entropy, Mutual Information and Channel capacity theorem

UNIT V Coding techniques & **Error Control** **(9)**

Comparison of Analog and digital communication schemes, Discrete Memoryless channel, Hartley - Shannon law - Source coding theorem - Shannon - Fano & Huffman codes. Linear Block codes - Hamming codes - Cyclic codes - Convolutional codes - Viterbi Decoder.

TOTAL:45 PERIODS

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Recognize/List the basic terminology used in analog I communication techniques fortransmission of information/data	PO1, PO2,PO3, PO4.
CO2	Discussed noises in Am system and also demonstrate knowledge on difference between analog and digital communication system. Analyze the performance of baseaband digital modulation technique. Formulate SNR for pcm and dm systems	PO1, PO2, PO3
CO3	Understand the principles of multiplexing and baseband digital modulation technique. Analyse probability of error performance and design digital communication system	PO1, PO2, PO3.
CO4	Analyze and compare the bandpass digital modulation technique, design the constellation diagram and calculate the probability of error of all digital techniques	PO1, PO2, PO3,PO4
CO5	Know the difference between source coding, channel coding techniques such as block, cyclic and convolutional codes and apply their concepts in the analysis and design of digital communication systems	PO1, PO2, PO3,PO4

TEXT BOOKS:

1. Simon Haykin, "Communication Systems", JohnWiley& Sons, 4th Edition, 2004.
2. B. P. Lathi, Zhi Ding "Modern Digital and Analog Communication Systems", Oxford press, 2011

REFERENCE BOOKS:

1. Sam Shanmugam, "Digital and Analog Communication Systems",JohnWiley& Sons, 1999.
2. Bernard Sklar, F. J. harris"Digial Communications: Fundamentals andApplications", Pearson Publications, 2020.
3. Taub and Schilling, " Principles of Communication Systems", Tata McGraw Hill, 2007.

REFERENCE WEBSITE:

1. https://nptel.ac.in/courses/117/105/117105077/
2. https://www.youtube.com/watch?v=qQcpnmJNluU&list=PLF84ABD7D4EBA31C4
3. https://www.youtube.com/watch?v=oFEOryECzug&list=PLF84ABD7D4EBA31C4&index=3
4. https://www.youtube.com/watch?v=cKD03cehho&list=PLF84ABD7D4EBA31C4&index=11
5. https://www.youtube.com/watch?v=kfwSfOpaaPM&list=PLLDC70psjvq580gEiHclSERTxXauOlfvr.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2	2	2	-	-	-	-	-	-	-	-
CO.2	3	2	2	-	-	-	-	-	-	-	-	-
CO.3	3	2	2	-	-	-	-	-	-	-	-	-
CO.4	3	2	2	2	-	-	-	-	-	-	-	-
CO.5	3	2	2	2	-	-	-	-	-	-	-	-
CO*	**3**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-

III B.Tech. - V Semester

20ECE352 ELECTROMAGNETIC WAVES AND TRANSMISSION LINES L T P C

2 1 0 3

PRE-REQUISITES: -NIL-

COURSE EDUCATIONAL OBJECTIVES:

1. To understand problem solving in Electromagnetic fields using vector calculus and to study the static electric fields that varies with three dimensional spatial co-ordinates as well as with time.
2. To gain knowledge and solve the problems of magnetic fields those vary with three dimensional spatial co-ordinates as well as with time.
3. To get knowledge and ability to apply the Maxwell's Equations to various field waves and at different boundaries.
4. To understand the propagation of electromagnetic waves in different media.
5. To introduce fundamental theory of electromagnetic waves in transmission lines and their practical applications.

UNIT -1: ELECTROSTATICS (9)

Review of Vector algebra- Co-ordinate systems - Vector calculus. 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 - Maxwell's Two Equations for Electrostatic Fields - Electric dipole - Energy Density. Convection and Conduction Currents-Dielectric Constant - Isotropic and Homogeneous Dielectrics - Continuity Equation - Relaxation Time - Poisson's and Laplace's Equations – Electric Boundary Conditions: Dielectric-Dielectric and Dielectric-Conductor Interfaces . Capacitance – Parallel Plate – Coaxial Capacitors, Illustrative Problems

UNIT -2: MAGNETOSTATICS (9)

Biot-Savart Law - Ampere's Circuital Law and Applications - Magnetic Flux Density - Maxwell's Two Equations for Magnetostatic Fields. Forces due to Magnetic Fields - Magnetic torque and moment - Magnetic dipole - Inductances and Magnetic Energy - Magnetic Boundary Conditions: Dielectric-Dielectric and Dielectric-Conductor Interfaces. Inductors and Inductance- Magnetic Energy, Illustrative Problems.

UNIT -3: MAXWELLS EQUATIONS (FOR TIME VARYING FIELDS) (9)

Faraday's Law and Transformer E.M.F - Inconsistency of Ampere's Law and Displacement Current Density - Maxwell's Equations in Different Final Forms - Boundary Conditions of Electromagnetic fields: Dielectric-Dielectric and Dielectric-Conductor Interfaces, Illustrative Problems.

UNIT -4: EM WAVE CHARACTERISTICS & PROPAGATION (9)

Wave Equations for Conducting and Perfect Dielectric Media-Uniform Plane Waves – Relations between E & H - Sinusoidal Variations - Wave Propagation in Lossless and Conducting Media - Wave Propagation in Good Conductors and Good Dielectrics – Polarization - Reflection and Refraction of Plane Waves – Normal and Oblique Incidences - for both Perfect Conductor and Perfect Dielectrics - Brewster Angle - Critical Angle and Total Internal Reflection - Surface Impedance - Pointing Vector and Pointing's Theorem - Applications - Illustrative Problems

Unit -5: Transmission Lines (9)

Introduction-Transmission line parameters-Transmission line equivalent circuit-Transmission line equations and their solutions in their phasor form-input impedance-

standing wave ratio-Transmission of finite length- half wave, quarter wave transmission line-Smith chart-graphical analysis of transmission lines using Smith chart-stub matching-single and double stub matching-Illustrative Problems.

Total Hours: 45

Course Outcomes:

On successful completion of the course the student will be able to		POs related to COs
CO1	Analyze and solve the problems of electric fields that vary with three dimensional spatial co-ordinates as well as with time.	**PO1, PO2, PO4**
CO2	Analyze and solve the problems of magnetic fields that vary with three dimensional spatial co-ordinates as well as with time.	**PO1, PO2, PO4**
CO3	Get the knowledge and ability to apply the Maxwell's Equations to various field waves and at different boundaries	**PO1, PO2, PO4**
CO4	Understand and analyze the propagation of electromagnetic waves in different media	**PO1, PO2, PO4**
CO5	Describes the transmission lines with equivalent circuit and explain their characteristic with various lengths	**PO1, PO2, po4**

Text Books:

1. Matthew N.O. Sadiku" Elements of Electromagnetics", Oxford Univ. Press, 4 /e. 2008.
2. William H. Hayt Jr. and John A. Buck, Engineering Electromagnetics, TMH, 7/ e, 2006.

Reference Books:

1. E.C. Jordan and K.G. Balmain, EM Waves and Radiating Sys. 2/e, PHI, 2000.
2. John D. Krauss, Electromagnetics, McGraw- Hill publications, 3/e, 1988.
3. Schaums Outline Series Electromagnetics, TMH publications, 2/e, 2006.

REFERENCE WEBSITE:

1. https://nptel.ac.in/courses/108/104/108104087/

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	-	1	-	-	-	-	-	-	-	-
CO.2	3	3	-	1	-	-	-	-	-	-	-	-
CO.3	3	3	-	1	-	-	-	-	-	-	-	-
CO.4	3	3	-	1	-	-	-	-	-	-	-	-
CO.5	3	3	-	1	-	-	-	-	-	-	-	-
CO*	**3**	**3**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-

III B.Tech. - V Semester

20ECE353	**VLSI DESIGN**	**L T P C**
		2 1 0 3

PRE-REQUISITES: Device Physics, Digital Electronics

Course Educational Objectives:

1. To provide knowledge on VLSI Technology fundamentals
2. To develop skill to analyze electrical properties of MOS transistor
3. To develop skill to design layout diagrams for MOS circuits and testing concepts of VLSI.
4. To inculcate the skill in the verilog hardware language construct for digital design.
5. To develop skill and apply the concept of structural and procedural coding for Complex digital design.

UNIT –1: VLSI TECHNOLOGY (9)

Fabrication sequence - process flow – Oxidation - Lithography Techniques - Diffusion process - Ion implantation – Metallization – Encapsulation – Testing - Super integration concepts - Integrated Passive components - MOS Resistors and capacitors – Crossovers - NMOS - PMOS - CMOS – BICMOS fabrication processes – comparison.

UNIT –2 CMOS - ELECTRICAL PROPERTIES AND CIRCUIT DESIGN PROCESS (9)

CMOS - ELECTRICAL PROPERTIES- Drain to source current (Ids) versus Drain to source voltage (Vds) relationships - MOS transistor threshold voltage (Vt) – Pass transistor- pull-up to pull-down ratio. **CIRCUIT DESIGN PROCESS -** VLSI design flow - Stick diagram design rules with examples - Design rules for Layout diagrams of digital circuits - sheet resistance Rs - standard unit of capacitance - Inverter delays - Propagation delays - scaling of MOS circuits - limitations of scaling.

UNIT –3: VLSI PHYSICAL DESIGN, DESIGN STYLES AND TESTING (9)

VLSI PHYSICAL DESIGN - Floor Planning – Placement – Routing - Power Delay Estimation - Clock and Power Routing. **VLSI DESIGN STYLES -** Full Custom – Semi custom – Standard Cells - Gate Arrays. **VLSI TESTING -** Test Principles-BIST-Test Bench-Combinational Circuit Testing, Sequential Circuit Testing.

Case study: Automated Test Pattern Generator.

UNIT –4: VERILOG HDL AND DATA FLOW MODELING (9)

Verilog HDL - Overview of Verilog HDL, Hierarchical modeling concepts, Levels of Design Description, Programming Language Interface, Data types, modules and ports, Operands & Operator types, Types of modeling - Introduction to Data flow, Structural modeling, Behavioral modeling. **Dataflow Modeling -** Introduction, Continuous Assignment, Delays, Design Examples - 4 to 1 MUX , 4 bit adder.

UNIT –5: GATE LEVEL (STRUCTURAL) AND BEHAVIORAL MODELING (9)

Gate Level (Structural) Modeling - Gate types, Basic gates and Tri state gates, Array of instances, Design examples, Gate delays, Design of flip flops with gate primitives, Structural Design Example – 1 bit full adder, 4 bit Ripple Carry Adder. **Behavioral Modeling** - Initial Construct, Always Construct, Procedural assignments - Blocking and Non-Blocking Assignments, Timing control, Conditional statement, Case statements, loops, sequential and parallel blocks, Procedural Continuous assignments, assign – deassign, force – release. Design examples – 8x1 MUX, 1x8 De-MUX, 8 bit up/down counter, 8 bit Universal Shift Register, 32-bit ALU.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs
CO1	Identify appropriate method and design of NMOS,PMOS, CMOS AND BICMOS and demonstrate knowledge on fundamentals of fabrication process.	**PO1, PO2**
CO2	Demonstrate knowledge on obtaining the relationship of electrical properties of MOS transistor..	**PO1, PO2, PO4**
CO3	Identify appropriate layout and stick diagrams for MOS transistors ,wires and contacts. Understand the test procedure of VLSI circuit designs.	**PO1, PO2, PO3, PO5**
CO4	Understand and identify proper language elements of verilog HDL for hardware design and able to use the behavioral elements.	**PO1, PO2, PO3, PO4, PO5**
CO5	Demonstrate the acquired skills in designing logic elements using structural and behavioral design constructs.	**PO1, PO2, PO3, PO4, PO5**

TEXT BOOKS:

1. A. Pucknell, Kamran Eshraghian, "Basic VLSI Design, Douglas", Prentice Hall of India, New Delhi, 3/e, 2011.
2. Wayne Wolf, "Modern VLSI design", Pearson Education, New Delhi, 3/e, 2008.
3. Samir Palnitkar, "Verilog HDL", Pearson Education, 2/e, 2009.

REFERENCE BOOKS:

1. John .P. Uyemura, "Introduction to VLSI Circuits and Systems", John Wiley, Student Edition, New Delhi, Reprint 2006.
2. S.M. SZE, "VLSI Technology", Tata McGraw Hill - New Delhi, 2/e, 2003.
3. Jan M Rabaey, "Digital Integrated Circuits –A Design Perspective", Prentice Hall, New Delhi, 2/e, 1997.
4. N.H.E Weste, K.Eshraghian, "Principles of CMOS VLSI Design", Adisson Wesley, 2/e, New Delhi.
5. J.Bhasker, "Verilog HDL Primer", B.S.Publications, 3/e, 2008.

REFERENCE WEBSITE:

1. https://nptel.ac.in/courses/117/101/117101058/#
2. https://www.tutorialspoint.com/vlsi_design/vlsi_design_digital_system.htm
3. https://www.nielit.gov.in/aurangabad/content/certified-course-vlsi-design

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	-	-	-	-	-	-	-	-	-	-
CO.2	3	3	-	2	-	-	-	-	-	-	-	-
CO.3	3	3	2	-	3	-	-	-	-	-	-	-
CO.4	3	2	3	2	2	-	-	-	-	-	-	-
CO.5	3	2	3	2	3	-	-	-	-	-	-	-
CO*	**3**	**2.6**	**2.67**	**2**	**2.67**	**-**	**-**	**-**	**-**	**-**	**-**	-

20ECE354A **III B.Tech. - V Semester**

L	T	P	C
3	0	0	3

COMPUTER COMMUNICATION NETWORKS
(Professional Elective-1)

PRE-REQUISITES: -NIL-

COURSE EDUCATIONAL OBJECTIVES:

2. Build an understanding of the fundamental concepts on different Layer models.
3. Familiarize the student with different protocols and its services in the MAC.
4. Introduce the student to routing algorithms and internet.
5. Familiarize the student with Elements of Transport protocols.
6. Have knowledge on application layer protocols.

UNIT – 1 PHYSICAL LAYER (9)

Introduction: Network Topologies-Protocols & Standards-Layered Architecture-LAN, WAN, MAN-OSI Reference Model-TCP/IP Reference Model-ATM Protocol Reference Model-Transmission Media.

UNIT – 2 DATALINK LAYER

(10)

Data Link Layer: Design Issues-Elementary Data Link Protocols- Example of Data Link protocols.

MAC SUBLAYER: The Channel Allocation Problem-Multiple Access Protocols- IEEE 803, 4, 5 Protocols- wireless LANS- Bridges-Internet Protocols.

UNIT- 3 NETWORK LAYER (8)

Design Issues- Virtual Circuit and Datagram Networks-Routing Algorithms-Congestion Control Algorithms-Internetworking-the Network Layer in the internet.

UNIT – 4 TRANSPORT LAYER (9)

Design Issues-Transport service-Elements of Transport protocols- The internet Transport protocols- Congestion Control mechanisms- QOS- Techniques to improve QOS.

UNIT – 5 APPLICATION LAYER (9)

Domain Name System-Electronic Mail- File Transfer Protocol- WWW- FTP-HTTP-SNMP-Multi-Media.
Network Security: Cryptography-Secret and Public Key Algorithm.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		**POs**
CO1	Demonstrate knowledge on the basic computer network technology and *Enumerate* the layers of the OSI, TCP/IP and ATM reference models.	**PO1**
CO2	Demonstrate knowledge and carryout investigation on Data Link Protocols & Multiple access protocols and Wireless LANS technology.	**PO1,PO4**
CO3	Investigate and analyze the Network layer design issues, Routing algorithms and Congestion control algorithms.	**PO1, PO2,PO4**
CO4	Demonstrate knowledge on Transport layer services and various designs of the transport protocols.	**PO1, PO4**
CO5	Demonstrate knowledge on Domain Name System, World Wide Web and Multimedia & Cryptography.	**PO1**

TEXT BOOKS:

1. Tanenbaum and David J Wetherall, Computer Networks, , 5th Edition, Pearson Edu, 2010
2. Behrouz A. Forouzan, Firouz Mosharraf, Computer Networks: A Top Down Approach, McGraw Hill Education.

REFERENCE BOOKS:

1. Larry L. Peterson and Bruce S. Davie, "Computer Networks - A Systems Approach" (5th ed), Morgan Kaufmann/ Elsevier, 2011
2. William Stallings, "Data & Computer Communication", Pearson Education India, 10th Edition, 2014.
3. James F. Kurose, Keith W. Ross, "Computer Networking: A Top–Down Approach Featuring the Internet", Pearson Education,6th Edition, 2013.

REFERENCE WEBSITE:

1. https://www.tutorialspoint.com/data_communication_computer_network/index.htm
2. https://www.slideshare.net/pawan1809/computer-networks-a-tanenbaum-5th-editionee

CO\PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO.1	**3**	**-**	**-**	**-**	-	-	-	-	-	-	-	-
CO.2	**3**	**-**	**-**	**2**	-	-	-	-	-	-	-	-
CO.3	**3**	**1**	**-**	**2**	-	-	-	-	-	-	-	-
CO.4	**3**	**-**	**-**	**1**	-	-	-	-	-	-	-	-
CO.5	**3**	**-**	**-**	-	-	-	-	-	-	-	-	-
CO*	**3**	**1**	**-**	**1.66**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-

III B.Tech. - V Semester

20ECE354 B	**ELECTRONIC MEASUREMENTS AND INSTRUMENTATION (Professional Elective-1)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

PRE-REQUISITES: A Course on Electronic devices and circuits

COURSE EDUCATIONAL OBJECTIVES:

1. To demonstrate knowledge on Basic concepts of Measurement system, characteristics of instrument and different meters.
2. To Understand and analyze the different transducers
3. To illustrate and design different DC and AC bridges for measurement
4. To describe the functioning of different signal generators and analyzers
5. To Know the concepts of oscilloscope and application of special oscilloscopes

UNIT –1: MEASUREMENT AND INSTRUMENTS **(9)**

Measurement System-Calibration and Standards-Errors in Measurement - Static characteristics and Dynamic characteristics of instrument-Statistical analysis- Ammeter, DC Voltmeters and AC Voltmeters and its range extension, Ohmmeter, Multi meter.

UNIT –2: TRANSDUCERS **(9)**

Transducers- active & passive transducers: Resistance, Capacitance, inductance, Strain gauges, LVDT,RVDT Photo electric transducers-Piezo Electric transducers, Resistance Thermometers, Thermocouples, Thermistors. Digital transducers.

UNIT –3: DC AND AC BRIDGES **(9)**

DC Bridges: Wheatstone bridge, Kelvin Bridge - AC bridges: Maxwell's bridge- Anderson Bridge- Schering Bridge - Wein Bridge –Hay's Bridge errors and precautions in using bridges.

UNIT –4: SIGNAL GENERATORS AND ANALYZERS **(9)**

Signal Generators- fixed and variable, AF oscillators, Standard and AF sine and square wave signal generators, Function Generators, Square pulse, Random noise, sweep, Arbitrary waveform. **Analyzers**-Wave Analyzers, Harmonic Distortion Analyzers, Spectrum Analyzers, Digital Fourier Analyzers.

UNIT –5: OSCILLOSCOPES **(9)**

Standard specifications of CRO- CRT features- vertical and horizontal amplifiers- horizontal and vertical deflection systems- sweep trigger pulse- delay line- sync selector circuits- triggered sweep CRO- and Delayed sweep- dual trace/beam CRO- Measurement of amplitude- frequency and phase (Lissajous method only). Special oscilloscopes- sampling oscilloscope- digital storage oscilloscope

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs
CO1	Demonstrate knowledge on Selecting the instrument to be used based on the requirements.	**PO1,PO2**
CO2	Design different transducers for measurementdifferent parameters.	**PO1,PO2,PO3**
CO3	Design different bridges for measurement of different parameters.	**PO1,PO2,PO3,PO4**
CO4	Analyze different signal generators and analyzers.	**PO1,PO2**
CO5	Understand the design of oscilloscopes for different applications.	**PO1,PO2,PO3**

TEXT BOOKS:

1. H.S.Kalsi, "Electronic instrumentation", Tata McGraw Hill, 2/e, New Delhi, 2004.
2. A.D. Helfrick and W.D. Cooper "Modern Electronic Instrumentation and Measurement Techniques", Prentice Hall of India ,5/e, New Delhi. 2002.

REFERENCE BOOKS:

1. Robert .Witte, "Electronic Test Instruments (Analog & Digital Measurements)", Pearson Edcation, 2/e, New Delhi, 2006.
2. M.Janaki Rani & G.Sathiyabhama, Anuradha "Measurements and Instrumentation", Agancies, 1/e – Chennai, 2005.
3. David A. Bell "Electronic Instrumentation & Measurements", Prentice Hall of India, 2/e, New Delhi. 2003
4. A.K.Sawhney & Puneet Sawhney "A course on Electrical & Electronic Measurement and Instrumentation" Dhanpat Rai & Co, 18/e,New Delhi. 2010.

REFERENCE WEBSITE: https://nptel.ac.in/courses/108/105/108105153

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	-	-	-	-	-	-	-	-	-	-
CO.2	3	3	2	-	-	-	-	-	-	-	-	-
CO.3	3	3	2	2	-	-	-	-	-	-	-	-
CO.4	3	3	-	-	-	-	-	-	-	-	-	-
CO.5	3	3	2	-	-	-	-	-	-	-	-	-
CO*	3	3	2	2	-	-	-	-	-	-	-	-

III B.Tech-V Semester

20ECE354C	**FUNDAMENTALS OF NANO-ELECTRONICS**	**L T P C**
	(Professional Elective-1)	**3 0 0 3**

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To learn the basic understanding of nano electronics
2. The course offers a better understanding of the nano-micro fabrication.
3. Able to classify the different nanomaterials depending on the properties.
4. To Understand The phenomena using the characterization techniques
5. It provides a foundation for the device fabrication and various application in the field of sensors technology, optoelectronics, communication and nanotechnology etc.

UNIT –1: INTRODUCTION TO TUNNELING (9)

Tunnel junction and applications of tunneling, Tunneling through a Potential Barrier, Metal-Insulator, Metal-Semiconductor, and Metal-Insulator-Metal Junctions, Coulomb Blockade, Tunnel Junctions, Tunnel Junction Excited by a Current Source

UNIT-2: TUNNELING DEVICES (9)

Field Emission, Gate—Oxide Tunneling and Hot Electron Effects in nano MOSFETs, Theory of Scanning Tunneling Microscope, Double Barrier Tunneling and the Resonant Tunneling Diode.

UNIT-3: LITHOGRAPHY TECHNIQUES (9)

Introduction to lithography- Contact, proximity printing and Projection Printing, Resolution Enhancement techniques, Positive and negative photoresists, Electron Lithography, Projection Printing. Lithography based on Surface Instabilities: Wetting, De-wetting, Adhesion, Limitations, Resolution and Achievable / line widths, Lift off process, Bulk Micro machining.

UNIT-4: MEMS DEVICES (9)

Introduction to MEMS and NEMS, working principles, micro sensors, micro actuation-thermal actuation, piezoelectric actuation and electrostatic actuation–micro gripers, motors, valves, pumps, accelerometers, fluidics and capillary electrophoresis, active and passive micro fluidic devices, Piezo resistivity, Piezoelectricity and thermoelectricity.

UNIT-5: NANOELECTRONIC DEVICES

(9) Scaling of physical systems – Geometric scaling & Electrical system scaling. The Single-Electron Transistor: The Single- Electron Transistor Single-Electron Transistor Logic, Other SET and FET Structures, Carbon Nanotube Transistors (FETs and SETs), Semiconductor Nanowire FETs and SETs, Molecular SETs and Molecular Electronics, Graphenes, fullerenes- Structure and Properties.

Total Hours: 45

COURSEOUTCOMES:

On successful completion of the course, students will be able to		POs
CO1	To understand and analyze the fundamental physics of nano electronics	PO1
CO2	Discuss various Properties of electrons in nanostructures	PO1,PO2
CO3	Describe deep insight to fabrication and characterization techniques in nanostructures.	PO1,PO2
CO4	Familiarize with concepts of electronics transportation in nanostructures, understanding the working principles of MEMS and NEMS	PO1
CO5	Demonstrate the working of various nano electronics devices	PO1,PO2,PO3

TEXTBOOKS:

1. Stephen D. Senturia, "Microsystem Design, Springer Verlag", 2001.
2. Marc Madou, "Fundamentals of microfabrication & Nano Technology", Taylor and Francis, 2011.
3. T. Fukada & W.Mens, "Micro Mechanical system Principle & Technology", Elsevier, 1998.
4. Julian W.Gardnes, Vijay K. Varda, "Micro sensors MEMS & Smart Devices", 2001.

REFERENCE BOOKS:

1. Nano Terchnology and Nano Electronics – Materials, devices and measurement Techniques by WR Fahrner – Springer.
2. Nano: The Essentials – Understanding Nano Scinece and Nanotechnology by T.Pradeep; Tata Mc.Graw Hill.
3. Nanoelectronics and Nanosystems – From Transistor to Molecular and Quantum Devices by Karl Goser, Peter Glosekotter, Jan Dienstuhl
4. Quantum-Based Electronic Devices and Systems by M. Dutta and M.A. Stroscio, World Scientific.
5. Micro sensors MEMS& Smart Devices, Julian W.Gardnes, Vijay K. Varda, 2001

REFERENCE WEBSITE:

1. https://www.edx.org/course/fundamentals-of-nanoelectronics-basic-concepts
2. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-701-introduction-to-nanoelectronics-spring-2010/

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	-	-	-	-	-	-	-	-	-	-	-
CO.2	3	2	-	-	-	-	-	-	-	-	-	-
CO.3	3	3	-	-	-	-	-	-	-	-	-	-
CO.4	3	-	-	-	-	-	-	-	-	-	-	-
CO.5	3	2	2	-	-	-	-	-	-	-	-	-
CO*	**3**	**2.3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-

III B.TECH. - V SEMESTER

20OCIV351	**AIR POLLUTION AND CONTROL**	**L T P C**
	(OPEN ELECTIVE – 1)	**3 0 0 3**

PRE-REQUISITES: A Course on Environmental Studies and Engineering

COURSE OUTCOMES:

1. To provide knowledge about the various sources of Air pollution and its effects on human beings , Vegetation and Materials.
2. To Analyse The various air pollutant dispersion models
3. To provide knowledge about control methods and details of control equipments
4. To demonstrate Various sources of Noise pollution and control measures
5. To Identify the major sources of noise pollution, effects and control measures

UNIT I: SOURCES AND EFFECTS OF AIR POLLUTANTS (9)

Air Pollution – Definitions, Scope- Significance and Episodes- Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary- point and Nonpoint- Line and Areal Sources of air pollution- stationary and mobile sources. Effects of Air pollutants on man-material and vegetation- Global effects of air pollution – GreenHouse effect- Heat Islands- Acid Rains- Ozone Holes etc. Lapse Rates- Pressure Systems- Winds and moisture plume behaviour and plume Rise Models- Gaussian Model for Plume Dispersion

UNIT II: DISPERSION OF POLLUTANTS (9)

Thermodynamics and Kinetics of Air-pollution – Applications in the removal of gases like SOx; NOx; CO; HC etc., air-fuel ratio- Computation and Control of products of combustion- Meteorology and plume Dispersion- properties of atmosphere- Heat- Pressure- Wind forces- Moisture and relative Humidity- Influence of Meteorological phenomena on Air Quality wind rose diagrams.

UNIT III: AIR POLLUTION CONTROL (9)

Concepts of control – Principles and design of control measures – Particulates control by gravitational, centrifugal, filtration, scrubbing, electrostatic precipitation – Selection criteria for equipment – gaseous pollutant control by adsorption, absorption, condensation, combustion – Pollution control for specific major industries.

UNIT IV : AIR QUALITY MANAGEMENT (9)

Air quality standards – Air quality monitoring – Preventive measures – Air pollution control efforts – Zoning – Town planning regulation of new industries – Legislation and enforcement

UNIT V: NOISE POLLUTION (9)

Introduction -Sources of noise pollution – Effects – Assessment – Standards – Control methods – Prevention- Environmental Impact Assessment and Air quality.

TOTAL HOURS: 45

COURSE OUTCOMES:

On successful completion of the course the student will be able to,		POs related to COs
CO 1	Identify the major sources of air pollution and understand their effects on health and environment.	**PO1, PO7**
CO 2	Evaluate the dispersion of air pollutants in the atmosphere and to develop air quality models	**PO2, PO3**
CO 3	Design the control techniques for particulate and gaseous emissions	**PO3, PO1**
CO 4	Understand the standards of air quality and legal framework	**PO1, PO6**
CO 5	Identify the major sources of noise pollution, effects and control measures	**PO1, PO7**

TEXTBOOKS:

1. M. N. Rao and H. V. N. Rao," Air pollution",– Tata McGraw Hill Company.
2. K.V.S.G. Murali Krishna ,"Air pollution and control", Kaushal Publishers.

REFERENCE BOOKS:

1. S.Padmanabha Murthy," Environmental meteorology" , I.K.International Pvt Ltd,New Delhi.
2. BSN.Raju ,Fundamentals of air pollution, Oxford and IBH Publishers,India.

REFERENCE WEBSITES:

https://nptel.ac.in/courses/105/102/105102089/https://nptel.ac.in/courses/105/1 04/105104099/

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2			-	-	-	2	-	-	-	-	-
CO.2	-	2	2	-	-	-	-	-	-	-	-	-
CO.3	2		2	-	-	-	-	-	-	-	-	-
CO.4	1			-	-	3	-	-	-	-	-	-
CO.5	2			-	-	-	2	-	-	-	-	-
CO*	**1.75**	**2**	**2**	-	-	3	2	-	-	-	-	-

III B.Tech-V Semester

20OEEE351	**RENEWABLE ENERGY SOURSES (OPEN ELECTIVE-1)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

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

1 Understand the Analyze solar radiation data, extraterrestrial radiation, and radiation on earth's surface

2 Design solar thermal collectors, solar thermal plants.

3 Develop maximum power point techniques in solar PV and wind energy systems.

4 Know the wind energy conversion systems, wind generators, power generation.

5 Basic principle and working of hydro, tidal, biomass, fuel cell and geothermal systems.

UNIT-I INTRODUCTION (9)

Fundamentals of Energy Systems and Solar energy Energy conservation principle – Energy scenario (world and India) – various forms of renewable energy – Solar radiation: Outside earth's atmosphere – Earth surface – Analysis of solar radiation data – Geometry – Radiation on tilted surfaces – Numerical problems

UNIT–II: SOLAR POWER (9)

Solar Thermal Systems Liquid flat plate collectors: Performance analysis – Transmissivity– Absorptivity product collector efficiency factor – Collector heat removal factor – Numerical problems. Introduction to solar air heaters – Concentrating collectors, solar pond and solar still – solar thermal plants.

UNIT–III:WIND ENERGY SOURCES (9)

Wind Energy Sources of wind energy – Wind patterns – Types of turbines –Horizontal axis and vertical axis machines – Kinetic energy of wind – Betz coefficient – Tip–speed ratio – Efficiency – Power output of wind turbine – Selection of generator(synchronous, induction) – Maximum power point tracking – wind farms – Power generation for utility grids.

UNIT–IV: HYDRO AND TIDAL POWER (9)

Hydro and Tidal power systems Basic working principle – Classification of hydro systems: Large, small, micro – measurement of head and flow – Energy equation – Types of turbines – Numerical problems. Tidal power – Basics – Kinetic energy equation – Turbines for tidal power – Numerical problems – Wave power – Basics – Kinetic energy equation – Wave power devices – Linear generators.

UNIT–V: BIOMASS ENERGY AND FUEL CELL (9)

Biomass, fuel cells and geothermal systems Biomass Energy: Fuel classification – Pyrolysis – Direct combustion of heat – Different digesters and sizing. Fuel cell: Classification of fuel for fuel cells – Fuel cell voltage– Efficiency – V-I characteristics. Geothermal: Classification – Dry rock and hot acquifer – Energy analysis – Geothermal based electric power generation.

TOTAL HOURS: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs
CO1	Analyze solar radiation data, extraterrestrial radiation, and radiation on earth's surface	PO1,PO2,PO3
CO2	Design solar thermal collectors, solar thermal plants.	PO1,PO2,PO3
CO3	Develop maximum power point techniques in solar PV and wind energy systems.	PO1,PO2,PO3
CO4	Know the wind energy conversion systems, wind generators, power generation.	PO1,PO2,PO3
CO5	Basic principle and working of hydro, tidal, biomass, fuel cell and geothermal systems.	PO1,PO2,PO3

TEXT BOOKS:

1. S. P. Sukhatme and J. K. Nayak, TMH "Solar Energy: Principles of ThermalCollection and Storage", , New Delhi, 3rd Edition.
2. John Twidell and Tony Weir, Taylor and Francis "Renewable EnergyResources",– second edition,2013.

REFERENCE BOOKS:

1. Energy Science: Principles, Technologies and Impacts, John Andrews and NickJelly, Oxford University Press.
2. Renewable Energy- Edited by Godfrey Boyle-oxford university.press,3rdedition,2013.
3. Handbook of renewable technology Ahmed and Zobaa, Ramesh C Bansal, Worldscientific, Singapore.
4. Renewable Energy Technologies /Ramesh & Kumar /Narosa.
5. Renewable energy technologies – A practical guide for beginners – Chetong SinghSolanki, PHI.
6. Non conventional energy source –B.H.khan- TMH-2nd edition.

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-
CO3	3	2	2	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-
CO5	3	2	2	-	-	-	-	-	-	-	-	-
CO	**3**	**2**	**2**									

III B.Tech.-V Semester

20OMEC351	**INDUSTRIAL ROBOTICS** (OPEN ELECTIVE - 1)	**L T P C** **3 0 0 3**

PRE-REQUISITES:NIL

COURSEEDUCATIONALOBJECTIVES:

1. To know the robot drive systems and internal grippers and external grippers
2. To understand the image processing and analysis of image data
3. 3. To learn Robot motion analysis and control.
4. 4. To study the robot language structure and programming
5. 5. To explain the various applications of robots in industry

UNIT–1:FUNDAMENTALS OF ROBOTIC TECHNOLOGY AND DRIVE SYSTEM (9)

Robot anatomy, configuration and motions – Robot specifications – Pitch, yaw, roll, joint notations, speed of motion, pay load – Work volume. Robot Drive System: Pneumatic, hydraulic drives, mechanical and electrical drives – Servo motors and stepper motor. Grippers: Mechanical, pneumatic and hydraulic grippers, magnetic grippers and vacuum grippers – Two fingered and three fingered grippers – Internal and external grippers.

UNIT–2:ROBOT SENSORS AND MACHINE VISION (9)

Robot Sensors: Position of sensors – Range sensors – Proximity sensors – Touch sensors – Wrist sensors – Compliance sensors – Slip sensors. **Machine Vision:** Camera – Frame grabber – Sensing and digitizing image data – Signal conversion – Image storage and lighting techniques – Image processing and analysis – Data reduction – Edge detection – Segmentation feature extraction – Object recognition.

UNIT–3:ROBOT MOTION ANALYSIS AND CONTROL (9)

Robot Kinematics: Manipulator kinematics – Position representation – Forward and reverse transformation – Adding orientation – Homogeneous transformations – D-H notation – Forward and inverse kinematics. **Robot Dynamics:** Differential transformation – Compensating for gravity – Robot arm dynamics. **Trajectory Planning:** Trajectory planning and avoidance of obstacles – Path planning – Skew motion – Joint integrated motion – Straight line motion.

UNIT–4:ROBOT PROGRAMMING (9)

Robot Programming: Lead through programming – Robot language structure – Motion commands of move, speed control, workplace, path, frames, end effecter operation, sensor operation and react statement – Program sequence and subroutine – Teach pendant programming – VAL II programming.

UNIT–5:ROBOT APPLICATIONS AND IMPLEMENTATION PRINCIPLES (9)

Robot Applications: Material transfer and machine loading / unloading – Processing applications in spray coating – Assembly and inspection automation – Future applications of robot in mines, under water and space. **Implementation Principles:** Selection of robots in industry applications – Economic analysis of the robot.

TotalHours:45

COURSEOUTCOMES:

On successful completion of the course, students will be able to		POs
CO1	Understand the robot drive systems and internal grippers and external grippers.	**PO1,PO2**
CO2	Recognize the image data and analysis the image processing	**PO1,PO2**
CO3	Understand the basic concepts of robot motion and analysis	**PO1,PO2, PO3,PO4**
CO4	Know the robot language structure and robot programming.	**PO1,PO2,PO4, PO3, PO5**
CO5	Explain the applications of robots in industries and Safety considerations in workplace	**PO1,PO2,PO3, PO4,PO5,PO6**

TEXT BOOKS:

1. Mikell P Groover, Mitchell Weiss, Roger N. Nagel, Nicholas G Odrey and Ashish Dutta,"Industrial Robotics: Technology, Programming and Applications", Tata McGraw-Hill Education Pvt. Ltd, 2/e, 2012.
2. K.S. Fu, R.C.Gonzales and C.S.G.Lee,"Robotics: Control, Sensing, Vision and Intelligence", Tata McGraw-Hill Education Pvt. Ltd., Noida ,1/e, 2008,.

REFERENCE BOOKS:

1. Introduction to Robotics: Analysis, Control, Applications, 3/e, 2020, Saeed B.Niku,Wiley India Pvt, Ltd., New Delhi.
2. Introduction to Robotics: Mechanics and Control, John J. Craig, 3/e, 2008, PearsonEducation, New Delhi.
3. Robotics: Fundamental Concepts and Analysis, Ashitava Ghosal, 1/e, 2006, OxfordUniversity Press, New Delhi.
4. Robotics Technology and Flexible Automation, S.R.Deb and Sankha Deb, 2/e, 2010,Tata McGraw-Hill Education Pvt. Ltd., Noida.

REFERENCE WEBSITE:

1. https://nptel.ac.in/courses/107106090
2. https://nptel.ac.in/courses/112107289
3. https://nptel.ac.in/courses/112108093
4. https://nptel.ac.in/courses/112104298
5. https://nptel.ac.in/courses/112101099

CO – PO MAPPING"

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	1	-	-	-	-	-	-	-	-	-	-
CO.2	3	1	-	-	-	-	-	-	-	-	-	-
CO.3	3	1	1	1	-	-	-	-	-	-	-	-
CO.4	3	1	1	1	1	-	-	-	-	-	-	-
CO.5	3	1	1	1	1	1	-	-	-	-	-	-
CO*	**3**	**1**	**1**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	-

SREENIVASAINSTITUTEOFTECHNOLOGYANDMANAGEMENTSTUDIES
(Autonomous)
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
(Accredited by NBA)
III B.TECH-V SEMESTER

20OCSE351	**RELATIONAL DATA BASE MANAGEMENT SYSTEMS** (OPEN ELECTIVE - 1)	**L T P C** **3 0 0 3**

PRE-REQUISITES: NIL

COURS EEDUCATIONAL OBJECTIVES:

1. Discuss the basic data base concepts, applications, data models, schemes and instances and design Entity Relationship (E-R) model for a data base.
2. Demonstrate the use of integrity constraints and relational algebra operations
3. Describe the basics of SQL; construct queries using SQL, SQL functions, triggers and PL/SQL.
4. Understand reasoning about functional dependency and to make the students to identify the role of normalization in data base management systems.
5. To present the students with the knowledge of Transaction, concurrency control strategies of DBMS

UNIT1: DATA BASE SYSTEMS AND ENTITY RELATIONSHIP MODELING (9)

Database System Applications - Purpose of Database Systems - View of Data – Database Languages – Database Users and Administrators – Various Components of over all Database System Structure- Data Models-The Entity-Relationship Model - Attributes andEntitySets-RelationshipSets -Entity-Relationship Diagrams.

UNIT2: RELATIONALDATAMODEL (9)

Introduction to the Relational Model - Integrity Constraints - Relational algebra, selection and projection, set operations, renaming, joins, division, examples of algebra queries.

UNIT3: INTRODUCTIONS TO SQL (9)

Structured Query Language (SQL): Introduction to SQL, Data types, Data Definition language commands, Data Manipulation language Commands and Data control Language Commands, Candidate Key, Primary key, foreign key, Select Clause, Where Clause, Logical Connectivity's – AND, OR, Range Search, Pattern Matching, Order By, Group By,Set Operations – Union, Intersect and Minus, Join Operations, SQL Functions. PL/SQL: Control Structures and looping statements.

UNIT4: NORMALIZATION (9)

Introduction to Schema Refinement – Properties of Decompositions– Functional Dependencies – Attribute closure - Normal Forms - First - Second - Third – BCNF – Basic definitions of MVDs and Fourth normal forms.

UNIT5: TRANSACTION PROCESSING CONCEPTS AND CONCURRENCY CONTROL TECHNIQUES (9)

Transaction Concept - Transaction States - Implementation of Atomicity and Durability – Serializability – Recoverability – Concurrent Executions–Lock Based Protocols for Concurrency Control

Total Hours: 45

COURSE OUTCOME:

On successful completion of the course, students will be able to		**POs**
CO1	Demonstrate knowledge on Data models and Data base Languages and Design Entity Relationship model for a database	PO1,PO3
CO2	Analyze the relational database theory, and be able to write relational algebra and relational calculus expressions for queries.	PO1,PO2
CO3	Analyze and evaluate the databases using SQL DML/DDL Commands	PO1, PO2, PO3, PO5
CO4	Analyze databases using normal forms to provide solutions for real time applications.	PO1,PO2
CO5	Understand the properties of transactions in a database system, Analyze concurrency control techniques for handling concurrent transactions and understand recovery of data from failures	PO1,PO3,PO4

TEXTBOOKS:

1. Henry F.Korth, Silberchatz, Sudarshan, Tata McGraw-Hill, "Database System Concepts", 5/e, NewYork, 2006.
2. Raghu Rama Krishnan, " Database Management System", Tata McGraw Hill, 2/e, NewYork, 2000.

REFERENCEBOOKS:

1. Fundamentals of Database Systems, Elmasri, Navathe, Pearson Education,USA, 5/e, 2008.
2. Database Management Systems, Peter Rob, A.Ananda Rao and Carlos Coronel, Cengage Learning, USA, 5/e,2003.
3. SQL, PL/SQL Programming, Ivan Bayross, BPB Publications, New Delhi, India, 2/e,2011.
4. Introduction to Database Systems, C.J.Date, Pearson Education, USA, 8/e,2004.
5. Fundamentals of Database Management Systems, M.L.Gillenson, Wiley, New Delhi, India, 1/e,2006.

CO-POMAPPING:

CO\PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO.1	3	2	-	-	-	-	-	-	-	-	-	-
CO.2	2	-	3	3	-	-	-	-	-	-	-	-
CO.3	2	2	3	-	-	-	-	-	-	-	-	-
CO.4	2	2	-	3	-	-	-	-	-	-	-	-
CO.5	3	-	-	2	-	-	-	-	-	-	-	-
CO*	**2.4**	**2**	**3**	**2.5**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

III B.Tech-V Semester

20OHSM351	GRAPH THEORY WITH APPLICATIONS (OPEN ELECTIVE - 1)	L T P C
		3 0 0 3

PRE-REQUIEST: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To learn the representation of graphs and understanding the Graph Isomorphism, Sub graph-Vertex degrees, Walk, Paths, Cycles-graph connection, Bipartite graphs.
2. To understand the Trees concepts, digraphs, binary relations, Shortest path algorithms and to familiarize the knowledge of graph theory
3. To understand the matrix representation of graphs, designing incidence matrix, Adjacency matrix and circuit matrix
4. To explore the use of graphs in various applications in Switching and Coding Theory
5. To identify the important graph based real time applications of electrical networks such as RLC Networks with Independent sources, LOOP circuits

UNIT – 1: GRAPH THEORY INTRODUCTION (9)

Graph and simple graphs (Complete graphs, Complement of graph)- Graph isomorphism–Sub graph- Vertex degrees, walk, paths, cycles-graph connection and components-Bipartite graphs.

UNIT – 2: DIRECTED GRAPHS AND SHORTEST PATH ALGORITHMS (9)

Trees – Cut edges- Cut vertices-Blocks , Directed graphs types of directed graphs - digraphs and binary relations – directed paths and connectedness - Dijkstra's shortest path algorithm, Floyd-Warshall shortest path algorithm

UNIT – 3: MATRIX REPRESENTATION OF GRAPHS (9)

Introduction - Adjacency matrix -Applications of Adjacency matrix-sufficient condition for isomorphism of graphs-power of an adjacency matrix-Adjacency matrix of a digraph-incidence matrix-circuit matrix-cut set matrix.

UNIT - 4: GRAPHS IN SWITCHING AND CODING THEORY (9)

Contact Networks – Analysis of Contact Networks – Synthesis of Contact Networks – Sequential Switching Networks – Unit Cube and its Graph – Graphs in Coding Theory.

UNIT – 5: ELECTRICAL NETWORK ANALYSIS BY GRAPH THEORY (9)

Introduction - Kirchhoff's current and Voltage laws-Loop currents and Node Voltages- RLC Networks with Independent sources: Nodal analysis, Loop analysis.

TOTAL HOURS: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs related to Cos
CO1	Demonstrate knowledge in reading and writing rigorous mathematical proofs involving introductory aspects of graphs and develop analytical skills in solving graph theoretic problems	PO1,PO2,PO3 PO4
CO2	Demonstrate knowledge in Trees concepts, digraphs, binary relations, and Develop analytical skills in solving problems involving directed graphs and shortest path algorithm	PO1,PO2,PO3 PO4
CO3	Demonstrate knowledge in matrix representation of graphs, designing incidence matrix, Adjacency matrix and circuit matrix and explore analytical skills in solving problems involving adjacency matrix and incidence matrix	PO1,PO2,PO3 PO4
C04	Demonstrate knowledge in significant practical applications of graphs in Switching and Coding Theory; explore analytical skills in solving practical problems using graph theory concepts and Develop skills in designing Mathematical models for real time applications in coding theory.	PO1,PO2,PO3 PO4
CO5	Demonstrate knowledge in significant real time applications of electrical networks such as RLC Networks Independent sources; explore analytical skills in solving practical problems involving using graph theory concepts and Develop skills in designing Mathematical models for real time electrical networks.	PO1,PO2,PO3 PO4

TEXT BOOKS:

1. J.P.Trimblay and R.Manohar ,"Discrete mathematical structures with pplications to computer science", 27/e, Tata Mc Graw Hill Publications , 2006, New Delhi.
2. NarasinghDeo,"Graph Theory with applications to engineering and computer Science", 25/e, Printice – Hall of India Private Limited, 2003, New Delhi

REFERENCES:

1. Clark J. And Holton D.A., " A first look at Graph theory", Allied Publishers, 199
2. R.B.Bapat , Graphs and Matrices, Springer, London Dordrecht Heidelberg, New York, 2010 .
3. Gary Haggard John Schlipf, Sue Whitesides, "Discrete Mathematics for Computer Science", 4/e, 2007, Thomson Publication, 2008, New Delhi.
4. S.D Sharma , "Operation Research", KedarNath Ram Nath & Co, Meerut . 2007.
5. J.A.Bonday and U.S.R. Murthy, "Graph Theory with application" , North Holland, 1976 .

REFERENCE WEBSITE:

1. https://onlinecourses.nptel.ac.in/noc21_cs48/preview

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	3	2	-	-	-	-	-	-	-	-
CO.2	3	3	3	2	-	-	-	-	-	-	-	-
CO.3	3	3	3	2	-	-	-	-	-	-	-	-
CO.4	3	3	3	2	-	-	-	-	-	-	-	-
CO.5	3	3	3	2	-	-	-	-	-	-	-	-
CO*	**3**	**3**	**3**	2	-	-	-	-	-	-	-	-

SREENIVASAINSTITUTEOFTECHNOLOGYANDMANAGEMENTSTUDIES
(Autonomous)
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
(Accredited by NBA)

III B.Tech. - V Semester

		L	T	P	C
20ECE355	**MICROCONTROLLER & ARDUINO PROGRAMMING (SOC Course)**	**0**	**1**	**2**	**2**

PRE-REQUISITES: Computer Architecture and Microprocessor

COURSE EDUCATIONAL OBJECTIVES:

1. To understand the architecture and assembly language programming of 8051.
2. To be able to interface with 8051 microcontroller
3. To understand the basics of Arduino boards, its basic programming
4. To acquire experimental ideas in the design of Analog devices and interface Arduino.
5. To apply the concepts in implementing motors and actuators as well as advanced applications like GSM modem.

UNIT –1: INTEL 8051 MICROCONTROLLER **(6)**

Architecture of 8051,Register set of 8051, Input/Output Port Pins ,addressing modes & instruction set, Assembly language programming.

UNIT –2: MICROCONTROLLER INTERFACING **(6)**

Memory interfacing, Serial data Input/Output, Interrupt structure of 8051, interfacing with LCD, Analog to Digital converters and Digital to Analog Converters, Stepper motor interfacing.

UNIT –3: INTRODUCTION TO ARDUINO AND INTERFACE WITH IO DEVICES (6)

Introduction, what is Arduino, types of Arduino, features of Arduino, steps in programming using Arduino IDE, Basics of Input-Output devices, sensors, actuators**,** Working with pins: Digital and analog read/write**,** Arduino and Light Emitting Diodes, Liquid Crystal Devices, Arduino and Digital IO devices – push button, Passive Infrared, Alcohol Sensor.

UNIT –4: INTERFACEING ARDUINO WITH ANALOG I/O **(6)**

Interface Ultrasonic Sensor with LCD, Ultrasonic Senor – Serial Out and PWM Out, Temperature/Humidity Sensors, LDR and Light Intensity Sensors to interface with LCD interface in Analog mode.

UNIT –5: APPLICATIOS OF ARDUINO (6)

DC motor, stepper motor, AC motor with Relay. Circuit diagram, program and simulation for motors and actuators. GSM modem-Circuit diagram and program.

Total Hours: 30

List of Experiments

1. Arithmetic operations using 8051 microcontroller(addition, subtraction, multiplication, division)
2. Logical operations using 8051 microcontroller
3. Interfacing of ADC/DAC with 8051microcontroller
4. Interfacing of stepper motor with 8051microcontroller
5. Interfacing of LEDs with Arduino UNO

6. Interfacing LCD with Arduino and Display messages
7. PIR sensor interface with Arduino
8. Interfacing of Ultrasonic sensor with Arduino
9. Interfacing of Temperature/Humidity sensor with Arduino UNO
10. Interfacing of GSM modem with Arduino UNO

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs
CO1	Gain knowledge on the basic architecture of Intel 8051, Apply the programming concepts to design basic embedded system.	PO1, PO2, PO3, PO5, PO9, PO10, PO12
CO2	Implement the ideas and interface with 8051 microcontroller.	PO1, PO2, PO3, PO4, PO5, PO9, PO10, PO12
CO3	Gain knowledge on the basic principles of Arduino System. Apply the programming concepts to design basic embedded system.	PO1, PO2, PO3, PO5, PO9, PO10, PO12
CO4	Apply the concept to develop Analog devices. Distinguish the analog sensors with digital. Assess the need for analog sensors in societal and environmental issues.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO9, PO10, PO12
CO5	Design, apply and interpret to realize the advanced concepts using motors, actuators, GSM modem.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO9, PO10, PO12

TEXT BOOKS:

1. Kenneth j.Ayala ,"The 8051 Microcontroller", 3rd edition, Thomson Delmar Learning, Asia Pvt.Ltd.
2. Rajesh Singh, Anita Gehlot, Bhupendra Singh, Sushabhan Choudhury, "Ardunio Based Embedded Systems: Interfacing, Simulation and LabVIEW GUI", CRC Press, 1/e, 2017.
3. Jeff Cicolani, "Beginning Robotics with Raspberry Pi and Arduino Using Python and Open CV"', Apress, 2018.
4. Richard Blum, "Arduino Programming", Pearson Education publisher 2015.

REFERENCE BOOKS:

1. Arsheep Bahga, Vijay Madisetti, "Internet of Things-A handson approach", Orient Blackswan Publishers, 2015.
2. Simon Monk, "Programming Arduino – Getting Started with Sketches", McGraw-Hill Education, 2/e, 2016.

REFERENCE WEBSITE:

1.https://www.arduino.cc/en/guide/introduction
2.https://www.elprocus.com/arduino-basics-and-design/
3.https://onlinecourses.swayam2.ac.in/aic20_sp04/preview

CO-PO MAPPING

CO\PO	PO1	PO2	PO3	2O4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2	2	-	3	-	-	-	2	2	-	2
CO.2	3	2	2	2	3	-	-	-	2	2	-	2
CO.3	3	2	2	-	3	-	-	-	2	2	-	2
CO.4	3	2	2	2	3	2	2	-	2	2	-	2
CO.5	3	2	2	2	3	2	2	-	2	2	-	2
CO*	**3**	**2**	**2**	**2**	**3**	**2**	**2**	**-**	**2**	**2**	**-**	**2**

III B.Tech. - V Semester

20ECE356	COMMUNICATION SYSTEM LAB	L T P C
		0 0 3 1.5

PRE-REQUISITES: NIL

Course Educational Objectives:

1. To understand the functionality of CRO & DSO display devices.

2. To provides the practical knowledge of Analog modulation techniques with input-output Waveforms.

3. To develop skills on working of multiplexing (analog & digital) system in communication Practically.

4. To provides the practical knowledge on pulse analog modulation systems.

5. To know the practical knowledge of Digital modulation techniques with input-output Waveforms.

LIST OF EXPERIMENTS:

PART-A: ANALOG COMMUNICATIONS

Minimum five experiments to be conducted:

1. Introduction to Digital Storage Oscilloscope (DSO)
2. AM generation and demodulation.
3. FM generation and demodulation
4. Pre-emphasis and de-emphasis
5. Balanced Modulator & Synchronous Detector.
6. SSB Generation and Detection

PART-B: DIGITAL COMMUNICATIONS

Minimum seven experiments to be conducted:

1. Time Division Multiplexing & Demultiplexing
2. Pulse Amplitude Modulation & Demodulation
3. Pulse Position Modulation & Demodulation.
4. ASK Modulator and Demodulator.
5. FSK Modulator and Demodulator.
6. PSK Modulator and Demodulator.
7. DPSK Modulator and Demodulator.
8. QPSK Modulator and Demodulator.
9. Pulse width modulation and Demodulation.

EQUIPMENTS REQUIRED FOR LABORATORY:

1. Digital Storage Oscilloscope: 0-50MHz.
2. Regulated Power Supply : 0-30V
3. Cathode Ray Oscilloscope: 0-20MHz
4. Function Generator: 0-1MHz
5. Lab Equipmental/ Trainer Kits for Analog and Digital Communication
6. Multimeters and Components.

EQUIPMENTS REQUIRED FOR LABORATORY:

1. Digital Storage Oscilloscope: 0-50MHz.
2. Regulated Power Supply : 0-30V
3. Cathode Ray Oscilloscope: 0-20MHz
4. Function Generator: 0-1MHz
5. Lab Equipmental/ Trainer Kits for Analog and Digital Communication
6. Multimeters and Components.

COURSE OUTCOMES:

On successful completion of course the students will be able to		POs related to COs
CO1	Demonstrate knowledge on study of DSO, and analog and Digital communication systems	PO1
CO2	Analyze the functionality of generation and degeneration of modulation techniques	PO2
CO3	Design the circuits which are used to improve the SNR in FM systems	PO3
CO4	Conduct investigation and test the functionality on implementation of generation and degeneration circuits.	PO4
CO5	Select appropriate trainer Kit and procedure to analyze and implement analog and Digital modulation systems	PO5
CO6	Follow ethical principles in analyzing and implementing various base band and band pass modulation techniques	PO8
CO7	Do experiments effectively as an individual and as a member in a group.	PO9
CO8	Communicate verbally and in written form, the understandings about the experiments.	PO10
CO9	Continue updating their skill related to communication for various applications during their life time.	PO12

CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	3	-	-	-	-
CO7	-	-	-	-	-	-	-	-	3	-	-	-
CO8	-	-	-	-	-	-	-	-	-	3	-	-
CO9	-	-	-	-	-	-	-	-	-	-	-	3
CO*	3	3	3	3	3	-	-	3	3	3	-	3

III B.Tech. - V Semester

20ECE357	VLSI DESIGN LAB	L T P C
		0 0 3 1.5

PRE-REQUISITES: Digital Electronics, VLSI Design

Course Educational Objectives:

1. Gain the practical hands-on experience on verilog HDL programming
2. To design, simulate and verify the combinational logic designs using verilog HDL.
3. To design, simulate and verify the sequential logic designs using verilog HDL.
4. To implement combinational designs on target FPGA Hardware.
5. To implement sequential designs on target FPGA Hardware.

LIST OF EXPERIMENTS

Minimum 12 experiments to be conducted:

Design of Combinational Circuits:

1. Design and simulation of basic gates and universal gates: NOT, AND, OR, NAND, NOR, XOR and XNOR using data flow modelling.
2. Design and simulation of Half Adder and 1 - bit Full Adder using data flow and structural modelling.
3. Design and simulation of Half Subtractor and Full Subtractor using data flow and structural modelling.
4. Design and simulation of 8-bit Ripple Carry Adder using structural and behavioural elements.
5. Design and simulation of 8:1 MUX and 1:8 DEMUX using **structural** and **behavioural** (**using Case Statement**) modelling.
6. Design and simulation of 3 to 8 Decoder and 8 to 3 Encoder using data flow and structural modelling.
7. Design of 16 bit ALU with addition, subtraction, multiplication, division, AND, OR, XOR and XNOR operations.
8. Binary to BCD and BCD to Gray code converters.

Design of Sequential Circuits:

9. Design and simulation of D-Latch (single-if statement) and D-flip-flop (if-else statement)
10. Design and simulation of 8 bit Up/Down counter using nested if-else-if statements.
11. Design and Simulation of 8-bit Universal Shift Register using behavioural modelling.
12. 4 bit Pseudo Random Binary Sequence (PRBS) generator.

FPGA Implementation:

13. Pin Assignment, PAR, Bit file generation and Implementation of any of the combinational designs (Anyone of experiments 1 to 8) on target FPGA hardware.

14. Pin Assignment, PAR, Bit file generation and Implementation of any of the sequential designs (Anyone of experiments 9 to 12) on target FPGA hardware.

TOOLS REQUIRED:

1. Xilinx ISE or Later version
2. Personal Computers with Core i Processors with minimum 4 GB RAM.

COURSE OUTCOMES:

On successful completion of course the students will be able to		POs related to COs
CO1	Demonstrate knowledge on programming the combinational and sequential circuit designs	PO1
CO2	Analyze the functionality of digital circuits	PO2
CO3	Design the circuits which are used for successful implementation of simple & complex systems	PO3
CO4	Conduct investigation and test the functionality on implementation of combinational and sequential elements.	PO4
CO5	Select appropriate FPGA hardware and procedure to analyze and implement Digital circuits	PO5
CO6	Follow ethical principles in analyzing and implementing functionalities of various circuits	PO8
CO7	Do experiments effectively as an individual and as a member in a group.	PO9
CO8	Communicate verbally and in written form, the understandings about the experiments.	PO10
CO9	Continue to update the skills related to the program for various applications during the life time.	PO12

CO-PO Mapping

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	2	-	-	-	-
CO7	-	-	-	-	-	-	-	-	3	--	-	-
CO8	-	-	-	-	-	-	-	-	-	3	-	-
CO9	-	-	-	-	-	-	-	-	-	-	-	3

III B.Tech. - V Semester

20MAC351	CONSTITUTION OF INDIA	L T P C 2 0 0 0

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To understand the Indian constitution, fundamental rights and duties.
2. To know the procedure of union government and its administration.
3. To know the procedure of governor role, CM and council of ministers and position.
4. To know the procedure of district and village level administration.
5. To gain the knowledge of electoral system in India.

UNIT –1: INTRODUCTION (6)

Introduction to Indian Constitution – Constitution - Meaning of the term - Indian Constitution – Sources and constitutional history - Features– Citizenship – Preamble - Fundamental Rights and Duties - Directive Principles of State Policy.

UNIT –2: UNION GOVERNMENT AND ITS ADMINISTRATION (6)

Union Government and its Administration Structure of the Indian Union - Federalism – Centre – State relationship – President's Role, power and position - PM and Council of ministers - Cabinet and Central Secretariat –Lok Sabha - Rajya Sabha - The Supreme Court and High Court - Powers and Functions

UNIT –3: STATE GOVERNMENT AND ITS ADMINISTRATION (6)

Governor Role and Position, CM and Council of ministers. State Secretariat: Organization, Structure and Functions

UNIT –4: LOCAL ADMINISTRATION (6)

District's Administration Head - Role and Importance - Municipalities - Mayor and role of Elected Representatives -CEO of Municipal Corporation Pachayati Raj - Functions– PRI – Zilla Parishath - Elected officials and their roles – CEO,Zilla Parishath - Block level Organizational Hierarchy - (Different departments) - Village level - Role of Elected and Appointed officials - Importance of grass root democracy.

UNIT –5: ELECTION COMMISSION (6)

Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women.

Total Hours: 30

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Understand historical background of the constitution making and its importance for building a democratic India.	**PO6, PO8, PO12**
CO2	Understand the functioning of three wings of the government ie., executive, legislative and judiciary.	**PO6, PO8, PO12**
CO3	Understand the value of the fundamental rights and duties for becoming good citizen of India.	**PO6, PO8, PO12**
CO4	Analyze the decentralization of power between central, state and local self-government	**PO6, PO8, PO12**
CO5	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.	**PO6, PO8, PO12**

TEXT BOOKS:

1. Durga Das Basu, "Introduction to the Constitution of India", Prentice – Hall of India Pvt. Ltd.. New Delhi
2. Subash Kashyap, "Indian Constitution", National Book Trust

REFERENCE BOOKS:

1. J.A. Siwach, "Dynamics of Indian Government & Politics".
2. H.M.Sreevai, " Constitutional Law of India", 4th edition in 3 volumes (Universal Law Publication)
3. J.C. Johari, " Indian Government and Politics", Hans India
4. M.V. Pylee, "Indian Constitution", Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi

REFERENCE WEBSITE:

1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	-	-	-	-	-	3	-	3	-	-	-	3
CO.2	-	-	-	-	-	3	-	3	-	-	-	3
CO.3	-	-	-	-	-	3	-	3	-	-	-	3
CO.4	-	-	-	-	-	3	-	3	-	-	-	3
CO.5	-	-	-	-	-	3	-	3	-	-	-	3
CO*	-	-	-	-	**-**	**3**	**-**	**3**	**-**	**-**	**-**	**3**

III B.Tech. - VI Semester

20ECE361	DIGITAL SIGNAL PROCESSING	L T P C
		2 1 0 3

PRE-REQUISITES: signals and systems

COURSE EDUCATIONAL OBJECTIVES:

1. To understand signals, systems and DFT and its computation
2. To design and analyze the IIR filter and its characteristics
3. To design and analyze the FIR filter and its characteristics
4. To understand and analyze the importance of finite word length effects.
5. To study the applications of digital signal processing.

UNIT I: DISCRETE FOURIER TRANSFORM (9)

Discrete Signals and Systems- A Review – Introduction to DTFT – DTFT for Discrete time signals- Discrete Fourier Transform – Properties of DFT – Circular Convolution - FFT Algorithms –Decimation in time Algorithms, Decimation in frequency Algorithms.

UNIT II: IIR FILTER DESIGN (9)

Analog filter design – Discrete time IIR filter from analog filter – IIR filter design by Impulse Invariance, Bilinear transformation, LPF, HPF, BPF, BRF filter design using frequency transformation – Structural realization of IIR filter

UNIT III: FIR FILTER DESIGN (9)

Linear phase FIR filter – FIR Filer design - Fourier series method - Windowing techniques (Rectangular Window, Hamming Window and Hanning Window), Frequency sampling techniques – Structural realization of FIR filter

UNIT IV::FINITE WORDLENGTH EFFECTS (9)

Fixed point and floating point number representations – ADC –Quantization- Truncation and Rounding errors - Quantization noise – coefficient quantization error – Product quantization error - Overflow error – Round off noise power - limit cycle oscillations due to product round off and overflow errors – Principle of scaling

UNIT V:DSP APPLICATIONS: (9)

Multirate signal processing – Decimation and Interpolation – Multistage implementation of sampling rate conversion, Speech processing, Subband coding, Digital processing of Audio signal, Radar Signal Processing.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs
CO1	Demonstrate knowledge on signals and systems, Discrete Fourier Transform, analyze frequency information's using DFT & FFT and Convolutions	**PO1, PO2**
CO2	Design and Analyze IIR filters for the given specification also demonstrate knowledge on realization of IIR filters	**PO1, PO2, PO3, PO4**
CO3	Design and Analyze FIR filters for the given specification also demonstrate knowledge on realization of FIR filters	**PO1, PO2, PO3, PO4**
CO4	Demonstrate knowledge and analyze the effect of finite word length in implementation of filters.	**PO1,PO2,PO4**
CO5	Demonstrate knowledge on applications of Digital signal processing	**PO1,PO2,PO5**

TEXT BOOKS:

1. John G Proakis and Manolakis, " Digital Signal Processing Principles, Algorithms and Applications", Pearson, Fourth Edition, 2007.
2. S.Salivahanan, A. Vallavaraj, C. Gnanapriya, Digital Signal Processing, TMH/McGraw Hill International, 2007

REFERENCE BOOKS:

1. A.V.Oppenheim, R.W. Schafer and J.R. Buck, "Discrete-Time Signal Processing", 8th Indian Reprint, Pearson, 2004.
2. Emmanuel C.Ifeachor, &Barrie.W.Jervis, "Digital Signal Processing", Second Edition, Pearson Education / Prentice Hall, 2002.
3. Sanjit K. Mitra, "Digital Signal Processing – A Computer Based Approach", Tata McGraw Hill, 2007.
4. Andreas Antoniou, "Digital Signal Processing", Tata McGraw Hill, 2006.

REFERENCE WEBSITE:

1. https://archive.org/details/DIGITALSIGNALPROCESSING.
2.http://freevideolectures.com/Course/2339/Digital-Signal-Processing-IITKharagpur
3. https://www.journals.elsevier.com/digital-signal-processing/
4. https://www.journals.elsevier.com/signal-processing/
5. https://www.youtube.com/watch?v=6dFnpz_AEyA
6. http://nptel.ac.in/courses/117102060/

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2	-	-	-	-	-	-	-	-	-	-
CO.2	2	2	3	2	-	-	-	-	-	-	-	-
CO.3	2	2	3	2	-	-	-	-	-	-	-	-
CO.4	3	2	-	2	-	-	-	-	-	-	-	-
CO.5	3	2	-	-	3	-	-	-	-	-	-	-
CO*	**2.6**	**2**	**3**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	-

III B.Tech. - VI Semester

20HSM241	**PRINCIPLES OF MANAGEMENT**	**L T P C**
		2 1 0 3

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVES:

1. To understand the concepts of total quality management, and Contributions of TQM
2. To learn TQM principles and impact of 5s, Kaizen, PDSA cycles in continuous process improvement.
3. To study the basic need of quality control and process control in an organization
4. To learn the traditional and modern TQM tools and techniques
5. To study the quality standard, requirements and elements in Quality management system

UNIT –1: INTRODUCTION TO MANAGEMENT (9)

Definition of management – Science or Art – Manager Vs Entrepreneur – Types of managers – Managerial roles and skills – Levels of management – Functions of management – Principles of management and Scientific Management and its approaches – Corporate Social Responsibilities – Organization culture and Environment.

UNIT –2: PLANNING AND DECISION MAKING (9)

Planning: Nature and purpose of planning – Planning process – Types of planning – Objectives – Setting objectives – Policies – Planning premises – Strategic Management – Planning Tools and Techniques **Decision Making**: Importance of decision making – – Decision making steps and process.

UNIT –3: ORGANIZING AND DIRECTING (9)

Organizing: Nature and purpose – Formal and informal organization – Organization chart and structure – Line and staff authority – Departmentalization – Delegation of authority – Centralization and decentralization – Job Design – HR planning, recruitment, selection, training and development, performance management, career planning and management. **Directing:** Principles of directing – Process of communication – Barrier in communication – Effective communication.

UNIT –4: CONTROLLING AND CO-ORDINATING (9)

System and process of controlling – Budgetary and non-budgetary control techniques – Use of computers and IT in Management control – Productivity problems and management – Control and performance – Direct and preventive control – Reporting.

UNIT –5: MODERN CONCEPTS OF MANAGEMENT (9)

Concept, features, merits and demerits of SWOT Analysis, Business Process Re-engineering, Supply Chain Management – Concepts, functions importance of marketing – Competitive analysis and advantages of E-marketing.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs
CO1	Understand the concepts of management, roles to be adopted by manager, functions of manager and inculcating the social responsibility towards different stake holders.	**PO1, PO11**
CO2	Demonstrate knowledge with regard to planning, planning process and the process of making effective decisions.	**PO1, PO11**
CO3	Demonstrate knowledge about organizational environment, the process of staffing and the application of directive principles.	**PO1, PO11**
CO4	Demonstrate knowledge about controlling and Co-ordinating	**PO1, PO11**
CO5	Demonstrate knowledge about modern concepts in management.	**PO1, PO11**

TEXT BOOKS:

1. Total Quality Management, Besterfield Dale H, Besterfield Carol, Besterfield Glen H, Besterfield Mary, Urdhwareshe Hemant and Urdhwareshe Rashmi, 5/e, 2018, Pearson Education, New Delhi.
2. Principles of Management, "M. Govindarajan and S. Natarajan", Prentice Hall of India Pvt. Ltd.

REFERENCE BOOKS:

1. Management, "Stephen P. Robbins and Mary Coulter", Prentice Hall of India, 8/e,
2. Principles of Management, "Charles W.L Hill, Steven L McShane", 2007, McGraw Hill
3. Education, Special Indian Edition.
4. Management-A Competency Based Approach, "Hellriegel, Slocum and Jackson",Thomson South Western, 10/e, 2007.
5. Management - A global and Entrepreneurial Perspective, "Harold Koontz, HeinzWeihrich and Mark V Cannice", Tata McGraw Hill, 12/e, 2007.
6. Essentials of Management, "Andrew J. Dubrin", Thomson South western. 7/e, 2007.

REFERENCE WEBSITE:

1. https://nptel.ac.in/courses/110/105/110105146/

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	-	-	-	-	-	-	-	-	-	2	-
CO.2	3	-	-	-	-	-	-	-	-	-	2	-
CO.3	3	-	-	-	-	-	-	-	-	-	2	-
CO.4	3	-	-	-	-	-	-	-	-	-	2	-
CO.5	3	-	-	-	-	-	-	-	-	-	2	-
CO*	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**

SREENIVASAINSTITUTEOFTECHNOLOGYANDMANAGEMENTSTUDIES
(Autonomous)
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
(Accredited by NBA)

III B.Tech. - VI Semester

		L	T	P	C
20ECE362	**MICROWAVE AND OPTICAL COMMUNICATIONS**	**2**	**1**	**0**	**3**

PRE-REQUISITES: Electromagnetic Waves and Transmission Lines, antenna wave propagation

COURSE EDUCATIONAL OBJECTIVES:

1. To analyze the basic types of waveguides and its components.
2. To provide the knowledge on the operation of O-type & M-type microwave tubes.
3. To provide the knowledge on Solid state devices at Microwave and Optical frequencies.
4. To provide the knowledge on optical fiber basics.
5. To inculcate skills on the Signal Degradation in Optical Fibers and the design of WDM components.

UNIT-1: WAVEGUIDES & WAVEGUIDE COMPONENTS (9)

Introduction to Waveguides – types of waveguides. TE/TM Mode Analysis - Expressions for Fields - Characteristic Equation and Cutoff Frequencies - Dominant and Degenerate Modes - Phase and Group Velocities of Rectangular Waveguides.

Waveguide Attenuators- Wave Guide Multiport Junctions : E Plane And H Plane Tees - Magic Tee - Directional Couplers, Isolators and Circulators, S-Parameters.

UNIT-2: MICROWAVE TUBES (9)

Introduction, Microwave Tubes - O Type and M Type Classifications. O Type Tubes – 2 Cavity Klystrons – Structure Reentrant Cavities - Velocity Modulation - Process and Applegate Diagram - Reflex Klystron structure - Velocity Modulation - Applegate Diagram – Mathematical Theory of Bunching - Power Output - Efficiency - Oscillating Modes and O/P Characteristics - Effect of Repeller Voltage on Power O/P. Operation of TWT Tubes, M-type Tubes-Operatio of Cylindrical Magnetrons.

UNIT-3: SOLID STATE DEVICES (9)

MICROWAVE SOLID STATE DEVICES: Introduction – Classification – Applications of Transfer Electronic Devices Gunn Diode – Principles Characteristics - Basic Modes of Operation - Gunn Oscillation Modes. LSA Mode.

OPTICAL SOLID STATE DEVICES:

Optical Sources-LED structures –Quantum efficiency and LED power, LASER Diodes-Rate equations –External Quantum efficiency – Illustrative Problems.

Optical Detectors-PIN diode and APD diodes –Photo detector noise, SNR –Comparison of optical detectors – Fundamental Receiver Operation

UNIT – 4: INTRODUCTION TO OPTICAL FIBERS (9)

Evolution of fiber optic system- Elements of an Optical Fiber Transmission link- Ray theory-Optical Fiber Modes and Configurations –Mode theory of Optical Propagation - Linearly Polarized Modes –Single Mode fibers-Graded Index fiber structure, Fiber materials- Illustrative Problems.

UNIT – 5: SIGNAL DEGRADATION IN OPTICAL FIBERS (9)

Attenuation – Absorption losses, Scattering losses, Bending Losses, Core and Cladding losses, Signal Distortion in Optical Wave guides- Dispersion - Illustrative Problems.

WDM COMPONENTS:Coupler/Splitter, Isolators and Circulator, Mach Zehnder Interferometer, Fabry Perot Filter a Optical MEMS switches.

Total Hours: 45

COURSE OUTCOMES:

	On successful completion of the course the student will be able to	POs related to COs
CO1	**Analyze** the types of waveguides & its components	**PO1, PO2,**
CO2	**Design** & **Analyze** O-type & M-type microwave tubes.	**PO1, PO2, PO3**
CO3	**Analyze** the operation of Solid state devices at Microwave and Optical frequencies.	**PO1, PO2**
CO4	**Demonstrate** & **Analyze** the basics of Optical fiber.	**PO1, PO2**
CO5	**Analyze** the signal degradation of fiber and **design** various components.	**PO1, PO2, PO3,PO**

TEXT BOOKS:

1. Samuel Y. Liao, Microwave Devices and Circuits, Pearson, India, 3rd Ed. 2003.
2. M. Kulakarni, Microwave and Radar Engineering, Umesh Publications, New Delhi. 3rd Ed, 2003.
3. Gerd Keiser, Optical Fiber Communication, MGH, New Delhi, 4th Ed. 2008.
4. John M. Senior, Optical Fiber Communications, Pearson Education, New Delhi. 3rd Impression- 2007.

REFERENCES:

1. M.L.Sisodia And G.S.Raghuvanshi, Microwave Circuits And Passive Devices, Wiley Eastern Ltd., New A International Publishers Ltd. 1995.
2. Peter A.Rizzi, Microwave engineering passive circuits, PHI, 1999.
3. Max Ming, Kang Liu, Principles and Applications of Optical Communications, TMH, 2nd Ed., 2010.
4. S.C.Gupta, Text book on optical fiber communication and its applications, PHI, New Delhi1/e Ed., 2009.
5. Satish Kumar Fundamentals of Optical Fiber communications, PHI, New Delhi2009.

REFERENCE WEBSITE:

https://nptel.ac.in/courses/117/101/117101054/
https://nptel.ac.in/courses/108/103/108103141/

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2	-	-	-	-	-	-	-	-	-	-
CO.2	3	2	1	-	-	-	-	-	-	-	-	-
CO.3	3	2	-	-	-	-	-	-	-	-	-	-
CO.4	3	2	-	-	-	-	-	-	-	-	-	-
CO.5	3	2	1	1	-	-	-	-	-	-	-	-
CO*	**3**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-

III B.Tech -VI Semester

20ECE363A **BIO-MEDICAL INSTRUMENTATION** **L T P C**
(Professional elective -2)

3 0 0 3

PRE-REQUISITES: A Course on Engineering Electronic devices and circuits

COURSE EDUCATIONAL OBJECTIVES:

1. To provide an overview of medical instrumentation system, Bio-amplifier and Characteristics of medical instruments.
2. To Describe the Cell structure, Bio-Potential and Bio-Chemical electrodes.
3. To analyze different time base generators used in cardiac instrumentation.
4. To know the functions of ECG,EEG and EMG machines.
5. To understand and analyze Pacemaker, Defibrillator etc in Respiratory Instrumentation And Advanced 3D surgical techniques.

UNIT - 1: MEDICAL INSTRUMENTATION SYSTEM (9)

Block diagram of medical instrumentation system, Bio-amplifier, Static and dynamic characteristics of medical instruments, Bio-signals and characteristics. Problems encountered with measurements from human beings.

UNIT - 2: ORGANISATION OF CELL & BIO-ELECTRODES (9)

Cell structure, Nernst equation for membrane Resting Potential , Generation and Propagation of Action Potential ,Conduction through nerve to neuro muscular junction. Bio-Electrodes: Bio- Potential electrodes, External electrodes, Internal electrodes, Bio-chemical electrodes.

UNIT - 3: MECHANICAL FUNCTION OF CARDIAC INSTRUMENTATION (9)

General features of a time base signal- methods of generating time base waveform- Miller and Bootstrap time base generators - basic principles- Transistor miller time base generator- Transistor Bootstrap time base generator- Current time base generators.

UNIT - 4: NEURO-MUSCULAR INSTRUMENTATION (9)

EEG and EMG machines, Specifications of EEG and EMG machines, Electrode placement for EEG and EMG

UNIT - 5: THERAPEUTIC EQUIPMENT & RESPIRATORY INSTRUMENTATION AND ROBOTIC DEVICES (9)

Heart-Lung Machine, Pacemaker, Defibrillator ,Shortwave diathermy, Hemadialysis machine, Mechanism of respiration,Spirometry,Pneumatotachograph,Ventillators- Nano Robots -Robotic surgery – Advanced 3D surgical techniques

Total Hours: 45

COURSE OUTCOMES:

On successful completion of this course, the students will be able to		POs related to COs
CO1	Understand medical instrumentation system, Bio-amplifier and characteristics of medical instruments.	**PO1,PO2**
CO2	Describes the Cell structure**,** Bio-Potential electrodes and Bio-Chemical electrodes.	**PO1,PO2**
CO3	Analyze the various parts in time base generators used in cardiac instrumentation.	**PO1,PO2**
CO4	Know the functions of ECG, EEG and EMG machines.	**PO1,PO2**
CO5	Understand and analyze Pacemaker, Defibrillator etc in Respiratory Instrumentation and Advanced 3D surgical techniques.	**PO1,PO2**

TEXT BOOKS:

1. Leslie Cromwell, Fred J.Weibell Erich A.Pfeiffer "Bio Medical Instrumentation and Measurements" Pearson Education 'New Delhi -2nd Edition ,2002.

2. R.S.Khandpur "Handbook of Bio Medical instrumentation"Tata McGra Hill Publishing Co Ltd , New Delhi - 3rd edition ,2003.

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REFERENCES:

1. J.Webster, "Medical Instrumentation" John Wiley & Sons London 1st edition,1995.

2. C.Rajarao and S.K. Guha "Principles of Medical Electronics and Bio medical Instrumentation" - Universities press (India) Ltd, Orient Longman ltd , India.2nd Edition , 2000.

REFERENCE WEBSITE: https://onlinecourses.nptel.ac.in/noc21_ee105

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-
CO5	3	3	-	-	-	-	-	-	-	-	-	-
CO*	3	3	-	-	-	-	-	-	-	-	-	-

20ECE363B	EMBEDDED SYSTEMS (Professional elective -2)	L T P C 3 0 0 3

PRE-REQUISITES: Microprocessor and Microcontrollers

Course Educational Objectives:

1. To understand the basics of an embedded system with developed applications
2. To design different types of devices using advanced techniques
3. Students will learn different types of programming models and knowledge in Embedded C
4. To understand the concepts of serial communication interfaces
5: To analyze the concept of Incircuit Emulators

UNIT - 1: INTRODUCTION **(9)**

Embedded System-Definition, History, Classification, application areas and purpose of embedded systems, Block diagram of embedded system, Quality attributes of an Embedded systems, Application-specific and Domain-Specific examples of an embedded system.

UNIT - 2: EMBEDDED HARDWARE DESIGN **(9)**

Review of Analog and digital electronic components, I/O types and examples, Wireless devices, Timer and counting devices, Watchdog timer, Real time clock.

UNIT - 3: EMBEDDED FIRMWARE DESIGN **(9)**

Embedded Firmware design approaches, Embedded Firmware development languages, Program Models, DFG Models, state Machine Programming Models for Event-controlled Program Flow, Device driver programming, Concepts of C versus Embedded C and Compiler versus Cross-compiler.

UNIT-4: COMMUNICATION INTERFACE- DEVICES AND COMMUNICATION BUSES FOR DEVICES NETWORK **(9)**

Communication interface- (Board level communication interfaces- Product level communication interfaces)- IO Types and Examples- Serial Communication Devices(I2C,SPI,CAN,One wire bus)- Parallel Device-Ports.

Unit-5:IN CIRCUIT EMULATORS **(9)**

In circuit emulators – Buller proof run control – Real time trace – Hardware break points – Overlay memory – Timing constraints – Usage issues – Triggers.

TOTAL HOURS:45

COURSE OUTCOMES:

On successful completion of the course the student will be able to		POs related to COs
CO1	Understand the basics of embedded systems and its quality attributes	PO1, PO2
CO2	Learn different types advanced devices and serial and parallel devices	PO1, PO2, PO3
CO3	To Understand embedded firmware design efficient approaches	PO1, PO2,PO3
CO4	Learn about different types of serial communication buses used in embedded environment	PO1, PO2
CO5	Knowledge on embedded incircuit Emulators	PO1,PO2

TEXT BOOKS:

1. ShibuKV , "Introduction to Embedded System," 2/e, Tata McGraw Hill. New Delhi. 2003.
2. Rajkamal "Embedded system architecture, programming and design",Tata McGraw Hill. New Delhi. 2005

REFERENCE BOOKS:

1. Ajay V.Deshmukh "Micro Controllers(theory and applications), 1/e, Tata McGraw Hill.New Delhi, 2005.
2. David E.Simon "An Embedded Software Primer, David E." Simon,1/e Pearson Education private limited,NewDelhi, 2007
3. Raj kamal,"Microcontrollers architecture, programming and design", 1/e, Pearson Education,NewDelhi. 2007.

REFERENCE WEBSITE:

https://www.tutorialspoint.com/embedded_systems/es_microcontroller.htm

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**3**	**3**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO*	**3**	**3**	**2.5**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

20ECE363C	**TELEVISON ENGINEERING**	**L T P C**
	(Professional elective -2)	**3 0 0 3**

PRE-REQUISITES: Basic Electronics

COURSE EDUCATIONAL OBJECTIVES:
CE01: To familiarize with the television standards and principles
CE02: To demonstrate knowledge on the concepts of signal Transmission, propagation, principles of cameras and picture tubes
CE03: To know the operation of monochrome and color Television system
CE04: To analyse the operation of color signal decoding
CE05: To summarise the concepts of digital TV engineering

UNIT I: INTRODUCTION (9)

TV transmitter and receivers - synchronization. Television Pictures: Geometric form and aspect ratio - image continuity - interlaced scanning - picture resolution - Composite video signal: Horizontal and vertical sync - scanning sequence. Colour signal generation and Encoding: Perception of brightness and colours - additive colour mixing - video signals for colours - luminance signal - colour difference signals - encoding of colour difference signals - formation of chrominance signal PAL encoder.

UNIT II: TV SIGNAL TRANSMISSION AND PROPAGATION (9)

Picture signal transmission - positive and negative modulation - VSB transmission - sound signal transmission - standard channel BW - TV transmitter - TV signal propagation - interference - TV broadcast channels.
TV Cameras : Camera tube types - Vidicon - Silicon Diode Array Vidicon - Monochrome TV camera - color camera. CCD Image Sensors.
Picture Tubes : Monochromatic Picture tube - Electrostatic focussing - Beam deflection - picture tube characteristics and specifications - colour picture tubes. 625 -line monochrome system - PAL colour system - TV standards.

UNIT III:MONOCHROME AND COLOUR TV RECEIVER (9)

RF tuner - IF subsystem - video amplifier - sound section - syncs separation and processing - deflection circuits - scanning circuits. PAL -D Colour Receiver: Electronic tuners - IF subsystem - Y -signal channel - Chroma decoder - Separation of U & V Colour Phasors - synchronous demodulators - Subcarrier generation - raster circuits.

UNIT IV: IF SUBSYSTEM and COLOUR SIGNAL DECODING (9)

TV Receiver Tuners: Tuner operation - VHF and UHF tuners - digital tuning techniques - remote control of receiver functions.
PAL – D decoder - chroma signal amplifiers - separation of U and V signals - Color burst separation - Burst phase discriminator - ACC amplifier - Indent and colour killer circuits - RO phase shift and 180° PAL–SWITCH circuitry - U & V demodulator- colour signal mixing.

UNIT V: DIGITAL TV Technology: (9)

LCD-TV ,LED TV, Smart TV and Organic LED(OLED) TV RECEIVERS -working principle, operation and applications ,HD technology, tele conference method,DTH operation.

TOTAL Hours:45

COURSEOUTCOMES:

On successful completion of the course,students will be able to		Pos
CO1	Understand the concept of television standards, transmitter and receivers	PO1, PO2,PO3
CO2	Demonstrate the knowledge on signal transmission ,cameras and picture tubes	PO1, PO2, PO3,
CO3	Analyse the differences between monochrome and colour tv receiver	PO1, PO2, PO3,
CO4	Demonstrate the knowledge on colour signal decoding and IF sub system	PO1, PO2, PO3
CO5	Acquire the knowledge on different digitally operated TV receivers	PO1, PO2, PO3

TEXTBOOKS:

1. R.R. Gulati ,''Modern Television Practice – Principles - Technology and Service'' –2nd edition , 2002, , New Age International Publication, New Delhi.
2. R.R. Gulati, ''Monochrome and Colour TV –3rd edition'' ,2002 , ,New Age Internationalpublication,NewDelhi.

REFERENCEBOOKS:

1. S.P. Bali,'' Colour Television Theory and Practice ''–6th edition , 1998 , , TMH ,New Delhi.
2. R.G.Gupta,'' Television Engineering and Video Systems'' –1st edition, 2007, , TMH,New Delhi
3. , B. Grob and C.E. Herndon,'' Basic Television and Video Systems'' – 1st edition, 1999,
McGraw Hill, New Delhi.
4. A M Dhake ,''Television and video Engineering'' –2nd edition, 1995, ,TMH,New Delhi

REFERENCE WEBSITE:

1. https://en.wikipedia.org

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	2	-	-	-	-	-	-	-	-	-
CO.2	3	2	2	-	-	-	-	-	-	-	-	-
CO.3	3	3	2	-	-	-	-	-	-	-	-	-
CO.4	3	2	2	-	-	-	-	-	-	-	-	-
CO.5	3	2	2	-	-	-	-	-	-	-	-	-
CO*	3	2.4	2	-	-	-	-	-	-	-	-	-

III B.Tech. - VI Semester

20OCIV361	BUILDING TECHNOLOGY	L T P C
	(OPEN ELECTIVE - 2)	3 0 0 3

PRE-REQUISITES: A course on building materials their manufacturing process and utilization in low-cost housing techniques

COURSE OUTCOMES:

1. To teach various types of building materials their manufacturing process and utilization in low-cost housing techniques
2. To teach the functions and manufacturing process of glass and plastic materials that are commonly used in building construction
3. To teach various types of thermal and acoustic insulation materials used in building construction
4. To teach the functions and importance of various structural components
5. To teach in detail about the materials like paints and floor finishes meant for interior works

UNIT I : BASICS TERMINOLOGY (9)

Overview of the course, basic definitions, buildings-types-components-economy, and design-principles of planning of buildings and their importance. Definitions and importance ofgrouping and circulation-lighting and ventilation-consideration of the above aspects during planning of building.

UNIT II: TERMITE PROOFING (9)

Termite proofing: Inspection-control measures and precautions-lighting protection of buildings-general principles of design of openings-various types of fire protection measures to be considered while planning a building.

UNIT III: VERTICAL TRANSPORTATION IN A BUILDING (9)

Vertical transportation in a building: Types of vertical transportation-stairs-different forms of stairs-planning of stairs-other modes of vertical transportation –lifts-ramps- escalators.

UNIT IV PREFABRICATION SYSTEMS IN RESIDENTIAL BUILDINGS (9)

Prefabrication systems in residential buildings-walls-openings-cupboards-shelves etc., planning and modules and sizes of components in prefabrication. Planning and designing of residential buildings against the earthquake forces, principles, seismic forces and their effect on buildings.

UNIT V: ACOUSTICS (9)

Acoustics –effect of noise –properties of noise and its measurements, principles of acoustics of building. Sound insulation-importance and measures

TOTAL HOURS: 45

COURSE OUTCOMES:

On successful completion of this course the student will be able to		POs related to COs
CO1	Understand the principles in planning and design the buildings	**PO1, PO2**
CO2	To get different types of buildings, principles and planning of the building	**PO1, PO2 ,**
CO3	To know the different methods of termite proofing in buildings	**PO1, PO2**
CO4	Know the different methods of vertical transportation in buildings.	**PO1, PO2 , PO3, PO4**
CO5	Know the implementation of prefabricated units in buildings and the effect of earthquakes on buildings.	**PO1, PO2 ,**

Textbooks:

1. "Building construction by Varghese", PHI Learning Private Limited 2nd Edition 2015
2. Punmia.B.C, Jain.A.K and Jain.A.K Laxmi Publications "Building construction" 11th edition 2016

Reference Books:

1. National Building Code of India, Bureau of Indian Standards
2. Building construction-Technical teachers training institute, Madras, Tata McGraw Hill.
3. Building construction by S.P.Arora and S.P.Brndra Dhanpat Rai and Sons Publications, New Delhi 2014.

REFERENCE WEBSITES:

1. https://nptel.ac.in/courses/105102206 https://nptel.ac.in/courses/105103206

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	3	-	-	-	-	-	-	-	-	-	-
CO.2	1	3	-	-	-	-	-	-	-	-	-	-
CO.3	2	3	-	-	-	-	-	-	-	-	-	-
CO.4	1	1	3	3	-	-	-	-	-	-	-	-
CO.5	2	3	-	-	-	-	-	-	-	-	-	-
CO*	**1.6**	**2.6**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

III B.Tech-VI Semester

		L	T	P	C
20OEEE361	**POWER PLANT ENIGINEERING** (Open Elective – 2)	**3**	**0**	**0**	**3**

Pre-Requisites: NIL

COURSE OBJECTIVES:

1 To provide an overview of different methods of power generation with a particular stress on thermal power generation.
2 To bring out the various measurements involved in power generation plants.
3 To provide knowledge about the different types of devices used for analysis.
4 To import knowledge about the different types of controls and control loops.
5 To familiarize the student with the methods of monitoring different parameters like speed, vibration of turbines and their control.

UNIT-1: OVERVIEW OF POWER GENERATION (9)

Brief survey of methods of power generation – Hydro, thermal, nuclear, solar and wind power – Importance of instrumentation in power generation – Thermal power plants – Block diagram – Details of boiler processes - UP&I diagram of boiler – Cogeneration.

UNIT-2: MEASUREMENTS IN POWER PLANTS (9)

Electrical measurements – Current, voltage, power, frequency, power factor etc. – Non electrical parameters – Flow of feed water, fuel, air and steam with correction factor for temperature – Steam pressure and steam temperature – Drum level measurement – Radiation detector – Smoke density measurement – Dust monitor.

UNIT-3: ANALYSERS IN POWER PLANTS (9)

Flue gas oxygen analyzer – Analysis of impurities in feed water and steam – Dissolved oxygen analyzer – Chromatography – pH meter – Fuel analyzer – Pollution monitoring instruments.

UNIT-4: CONTROL LOOPS IN BOILER (9)

Combustion control – Air/fuel ratio control – Furnace draft control – Drum level control – Main steam and reheat steam temperature control – Super heater control – Air temperature – Deaerator control – Distributed control system in power plants – Interlocks in boiler operation.

UNIT-5: TURBINE – MONITORING AND CONTROL (9)

Speed, vibration, shell temperature monitoring and control – Steam pressure control – Lubricant oil temperature control – Cooling system.

TOTAL HOURS: 45

COURSE OUTCOMES:

On successful completion of course, student will be able to		POs and COs Mapping
CO1	Understand the basics of Power plant and power generation	**PO1, PO2**
CO2	Analyze the design of Analyzers and control loops used in power plant	**PO1, PO2, PO3**
CO3	Detailed study of the P&I diagram of various power plant.	**PO1, PO2**
CO4	Acquire knowledge on Pollution monitoring instruments	**PO1, PO2, PO3**
CO5	Know the distributed control system in power plants	**PO1, PO2, PO3**

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TEXT BOOKS

1. Sam G. Dukelow, 'The Control of Boilers', Instrument Society of America, 1991.
2. P.K. Nag, 'Power Plant Engineering', Tata McGraw Hill, 2001.

REFERENCE BOOKS

1. S.M. Elonka and A.L. Kohal, 'Standard Boiler Operations', Tata McGraw Hill, New Delhi,1994.
2. R.K.Jain, 'Mechanical and Industrial Measurements', Khanna Publishers, New Delhi, 1995.
3. E.Al. Wakil, 'Power Plant Engineering', Tata McGraw Hill, 1984.

REFERENCE WEBSITE:

https://www.edx.org/search?q=POWER%20SYSTEM

CO-PO MAPPING:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO.1	3	3	-	-	-	-	-	-	-	-	-	-
CO.2	3	3	2	-	-	-	-	-	-	-	-	-
CO.3	3	3	-	-	-	-	-	-	-	-	-	-
CO.4	3	3	2	-	-	-	-	-	-	-	-	-
CO.5	3	3	2	-	-	-	-	-	-	-	-	-
CO*	3	3	2									

III B.Tech.-VI Semester

20OMEC361	**3D PRINTING CONCEPTS** (OPEN ELECTIVE - 2)	**L T P C** **3 0 0 3**

PRE-REQUISITES:NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To understand the need for additive manufacturing technology.
2. To learn the design for additive manufacturing, CAD modeling and printing process.
3. To know the parameters and process of liquid and solid based additive manufacturing processes.
4. To explain the powder based additive manufacturing process and material jetting.
5. To demonstrate the post processing techniques and applications of AM process

UNIT–1:OVERVIEW OF ADDITIVE MANUFACTURING(AM) (9)

Additive V/s Conventional Manufacturing / CNC – Rapid prototyping – RapidTooling – Rapid manufacturing – Generic AM process – Development of AM technology –Use of layers – Classification of AM process – Basic steps for AMprocess – Differentiation between photopolymer, powder based, moltenmaterial,solidsheetsandmetalsystem.

UNIT–2:CAD MODELING AND DESIGN FOR ADDITIVE MANUFACTURING (9)

CAD Modeling: Preparation of CAD models – Data processing – STL format. **DFAM:** Partorientation and structure generation – Removal supports – Hollowing out parts – Undercuts – Inter locking features – Reduction of part and identification – Model slicing – Tool path generation. **PrintingProcesses:**Dropletformationtechnologies – Continuousmode–Dropondemandmode– Bio-plotter.

UNIT–3:LIQUID AND SOLID BASED ADDITIVE MANUFACTURING PROCESSES (9)

Principle, materials, properties, process and applications of Stereo lithography (SLA), Poly Jet, Fused Deposition Modeling (FDM), Laminated Object Manufacturing (LOM) and Ultrasonic Consolidation.

UNIT–4:POWDER BASED ADDITIVE MANUFACTURING PROCESSES (9)

Principle, materials, properties, process and applications of Selective Laser Sintering (SLS), Selective Laser Melting (SLM), Electron Beam Melting (EBM), Laser Engineered Net Shaping (LENS)and Binder Jetting.

UNIT–5:POST PROCESSING TECHNIQUES AND APPLICATIONS (9)

Product Quality: Support material removal – Surface texture improvements – Accuracyimprovements – Aesthetic improvements – Preparation for use of pattern – Propertyenhancementusingthermalandnon-thermaltechniques–Inspectionandtesting– Defects and their causes. **Applications:** Additive Manufacturing application of aerospace,electronics,healthcare,defense,automotive,construction,foodprocessing,machin etool Businessopportunitiesandfuturedirections ofAM.

TotalHours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs
CO1	Understand the need and development of additive manufacturing technology	PO1,PO2
CO2	Explain the design for additive manufacturing, CAD modeling, printing process	PO1,PO2,PO3
CO3	Illustrate the process of liquid and solid based additive manufacturing processes	PO1,PO2,PO3
CO4	Explain the powder based additive manufacturing process and material jetting	PO1,PO2,PO3
CO5	Summarize the post processing techniques and applications of AM process	PO1,PO2,PO3

TEXTBOOKS:

1. IanGibson,David W.Rosen and Brent Stucker, "Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping and Direct Digital Manufacturing",Springer,2/e,2015.
2. Chee Kai Chua, Kah Fai Leong and Chu Sing Lim, "Rapid Prototyping: Principles andApplications",World ScientificPublishers,3/e,2010.

REFERENCEBOOKS:

1. T.S. Srivatsan and T.S. Sudarshan, "Additive manufacturing: Innovations, AdvancesandApplications",Taylor& FrancisGroup,LLC.
2. BandarAlMangour,"AdditiveManufacturingofEmergingMaterials",Springer,2018.
3. L. Jyothish Kumar, Pulak M. Pandey and David Ian Wimpenny, "3D Printing andAdditiveManufacturingTechnologies",Springer NatureSingaporePvtLtd,2019.
4. Rafiq Noorani, "3D Printing: Technology, Applications and Selection", CRC Press,Taylor&FrancisGroup,2018.

REFERENCEWEBSITE:

1.https://nptel.ac.in/courses/112/103/112103306/
2.https://nptel.ac.in/courses/112/104/112104162/
3.https://nptel.ac.in/courses/112/107/112107078/
4.https://nptel.ac.in/courses/112/107/112107077/

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2	-	-	-	-	-	-	-	-	-	-
CO.2	3	2	1	-	-	-	-	-	-	-	-	-
CO.3	3	2	1	-	-	-	-	-	-	-	-	-
CO.4	3	2	1	-	-	-	-	-	-	-	-	-
CO.5	3	2	1	-	-	-	-	-	-	-	-	-
CO*	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-

III B.Tech - VI Semester

20OCSE361	**DATA COMMUNICATIONS AND COMPUTER NETWORKS** (OPEN ELECTIVE – 2)	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

PRE-REQUISITES: NIL

COURSEEDUCATIONALOBJECTIVES:

1. Build an understanding of the fundamental concepts on different Layer models.
2. Familiarize the student with different protocols and its services in the MAC.
3. Introduce the student to routing algorithms and internet.
4. Familiarize the student with Elements of Transport protocols.
5. Have knowledge on application layer protocols.

UNIT– 1 PHYSICAL LAYER (9)

Introduction: Network Topologies-Protocols & Standards-Layered Architecture-LAN, WAN, MAN-OSI Reference Model - TCP/IP Reference Model – ATM Protocol Reference Model- Transmission Media.

UNIT– 2 DATA LINK LAYER (10)

Data Link Layer: Design Issues-Elementary Data Link Protocols- Example of Data Linkprotocols.

MACSUBLAYER: The Channel Allocation Problem – Multiple Access Protocols -IEEE803, 4,5 Protocols – wireless LANS – Bridges – Internet Protocols.

UNIT-3 NETWORK LAYER (8)

Design Issues- Virtual Circuit and Datagram Networks - Routing Algorithms-Congestion Control Algorithms – Internetworking – the Network Layer in the internet.

UNIT– 4 TRANSPORT LAYER (9)

Design Issues - Transport Service-Elements of Transport protocols - The internet Transport protocols – Congestion Control mechanisms – QOS – Techniques to improve QOS.

UNIT– 5 APPLICATION LAYER (9)

Domain Name System - Electronic Mai l- File Transfer Protocol – WWW – FTP – HTTP – SNMP – Multi - Media.

Network Security: Cryptography – Secret and Public Key Algorithm.

Total Hours: 45

COURSEOUTCOMES:

On successful completion of the course,students will be able to		POs
CO1	Demonstrate knowledge on the basic computer network technology and Enumerate the layers of the OSI, TCP/IP and ATM reference models.	**PO1**
CO2	Demonstrate knowledge and carryout investigation on Data Link Protocols & Multiple access protocols and Wireless LANS technology.	**PO1, PO4**
CO3	Investigate and analyze the Network layer design issues, Routing algorithms and Congestion control algorithms.	**PO1,PO2, PO4**
CO4	Demonstrate knowledge on Transport layer services and various designs of the transport protocols.	**PO1, PO4**
CO5	Demonstrate knowledge on Domain Name System, World Wide Web, and Multimedia & Cryptography.	**PO1**

TEXTBOOKS:

1. Tanenbaum and David J Wetherall, " ComputerNetworks" , 5th Edition, PearsonEdu, 2010.
2. Behrouz A.Forouzan, FirouzMosharraf, " ComputerNetworks" A Top Down Approach,McGraw Hill Education.

REFERENCEBOOKS:

1. Larry L.Peterson and Bruce S.Davie, "Computer Networks-A Systems Approach"Morgan Kaufmann /Elsevier, (5th edt.), 2011
2. William Stallings, "Data & Computer Communication", Pearson Education India,10th Edition, 2014.
3. James F.Kurose, KeithW. Ross, "Computer Networking: A Top–Down Approach Featuring the Internet", Pearson Education, 6th Edition, 2013.

REFERENCEWEBSITE:

1. https://www.tutorialspoint.com/data_communication_computer_network/index.htm
2. https://www.slideshare.net/pawan1809/computer-networks-a-tanenbaum-5th-editionee

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	-	-	-	-	-	-	-	-	-	-	-
CO.2	3	-	-	2	-	-	-	-	-	-	-	-
CO.3	3	2	-	2	-	-	-	-	-	-	-	-
CO.4	3	-	-	2	-	-	-	-	-	-	-	-
CO.5	3	-	-	-	-	-	-	-	-	-	-	-
CO*	**3**	**2**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-

III B.Tech-VI SEMESTER

20OHSM361	**LASERS AND FIBER OPTICS** (OPEN ELECTIVE - 2)	**L T P C** **3 1 0 3**

PRE-REQUISITES:NIL

COURSEEDUCATIONALOBJECTIVES:

1. To acquire knowledge on fundamentals of LASERS
2. To study the working of different types of LASERS
3. To develop knowledge on applications of LASERS in various fields
4. To gain knowledge in fundamentals of Optical fiber, construction, types, and attenuations
5. To develop knowledge on applications of Optical fibers in various fields

UNIT- I: LASER INTRODUCTION (10)

Introduction- Spontaneous and stimulated emission of radiation- Properties of lasers (monochromacity, directionality, coherence and brightness) - Conditions for laser action: population inversion- Pumping and different pumping mechanisms- Einstein coefficients and relation among the coefficients.

UNIT – II: TYPES OF LASERS (8)

Nd-YAG laser- He: Ne laser- Semiconductor laser (GaAs)- Argon Ion Laser-CO_2 Laser

UNIT – III: APPLICATIONS OF LASERS (9)

Lasers in Holography- Laser in fusion reaction- Lasers in Raman spectroscopy- Lasers in industry -Lasers in isotope separation- Lasers in medicine.

UNIT – IV: OPTICAL FIBERS (9)

Introduction- Construction of fiber – Working principle of optical fiber (total internal reflection)- Propagation of light through the fibers- Numerical aperture , Acceptance angle and Acceptance cone -Fiber types: Refractive index profile and ray propagation-Step and graded index fibers -Attenuation in fibers: Attenuation coefficient and different loss mechanisms.

UNIT – V: APPLICATIONS OF FIBERS (9)

Fiber optic communication system(block diagram)- Sensing applications of fibers: Pressure sensor, Liquid level sensor, Displacement sensor, Chemical sensor – Optical fibers in medicine (endoscopes) - Optical fibers in computer networks (block diagram).

TOTAL HOURS: 45

COURSE OUTCOMES

On successful completion of the course the student will be able to,		**POs related to COs**
CO1	Acquire the basic knowledge on LASERS	PO1, PO12
CO2	Understand different types of LASERS	PO1, PO12
CO3	Develop knowledge on different applications of LASERS	PO1, PO12
CO4	Acquire the basic knowledge on Optical Fibers	PO1,PO12
CO5	Develop knowledge on different applications of Optical Fibers	PO1,PO12

REFERENCE BOOKS:

1. K.Thyagarajan and A.K.Ghatak "Lasers Theory and Applications " Macmillan IndiaLimited, New Delhi.
2. B.BLaud "Lasers And non-Linear Opics" second edition,NewAge International(P)limited,Publishers,New Delhi.
3. John Powers,Richard D Irwin "An Introduction to Fiber Optic Systems" ,SecondEdition.
4. M.R.Srinivasan" Physics for Engineers" -, New Age International, 2009

CO-PO MAPPING:

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	-	-	-	-	-	-	-	-	-	-	1
CO2	3	-	-	-	-	-	-	-	-	-	-	1
CO3	3	-	-	-	-	-	-	-	-	-	-	1
CO4	3	-	-	-	-	-	-	-	-	-	-	1
CO5	3	-	-	-	-	-	-	-	-	-	-	1
CO	3	-	-	-	-	-	-	-	-	-	-	1

III B.Tech. - VI Semester

20ECE364	**ANTENNA SYSTEM DESIGN (SOC Course)**	**L T P C**
		0 1 2 2

PRE-REQUISITES: Electromagnetic Waves and Transmission Lines

COURSE EDUCATIONAL OBJECTIVES:

1. To provide the knowledge on antenna fundamentals
2. To provide the knowledge on different antenna arrays.
3. To study the basic concepts VHF&UHF antennas
4. To study the wave propagation over ground, through troposphere and ionosphere;
   Diversity principles.
5. To design & simulate the different antennas.

UNIT-1 ANTENNA FUNDAMENTALS **(6)**

Antenna Basics: Physical concept of radiation, basic antenna parameters: radiation patterns, beam area, radiation Intensity, beam efficiency, reciprocity, directivity and gain, antenna apertures, effective height, bandwidth, radiation efficiency, polarization, radio communication Link, and antenna field zones. Short electric dipole, fields of a short dipole, radiation resistance of dipole.

UNIT-2 ANTENNA ARRAYS **(6)**

Point Sources & their arrays: Arrays, Point source, Array of isotropic point sources-different cases, non-isotropic sources, linear arrays of n elements of equal amplitude & spacing, broad side, end fire arrays, Phased arrays, Yagi-Uda Arrays

UNIT-3 VHF- UHF AND MICROWAVE ANTENNAS **(6)**

Horn antennas. Helical antenna, Parabolic Reflectors, Lens Antenna, patch antennas.

UNIT-4 WAVE PROPAGATION **(6)**

Radio Wave Propagation: Ground wave propagation, & Skywave propagation, Parameters of wave propagation : virtual height, skip distance Critical frequency, MUF, OWF. Ionospheric abnormalities and effects of Earth's magnetic field.

UNIT-5 DESIGN & SIMULATION OF ANTENNAS USING HFSS **(6)**

Introduction to HFSS, Design & Simulation of Monopole, Dipole, Microstrip feed, Microstrip Line concepts.

Total Hours: 30

List of Demo/Experiments (Only for Skill Enhancement, Not for Exams)

1. Introduction to HFSS software
2. Design & Simulation of Monopole
3. Design & Simulation of Dipole
4. Design & Simulation of Microstrip feed
5. Design & Simulation of Microstrip Line concepts
6. Basic concepts to design Rectangular shaped patch antenna.
7. Basic concepts to design Circular shaped patch antenna.

Total Hours: 15

COURSE OUTCOMES:

On successful completion of the course the student will be able to		POs related to COs
CO1	Understand the antenna fundamentals	**PO1, PO2**
CO2	Analyze various antenna arrays.	**PO1, PO2**
CO3	Understand and analyze VHF and UHF antenna	**PO1, PO2**
CO4	Understand the different types of wave propagation	**PO1**
CO5	Design and simulation of Antennas using HFSS	**PO1,PO3**

TEXT BOOKS:

1. Samuel Y. Liao, Microwave Devices and Circuits, Pearson, India, 3rd Ed, 2003.
2. John D Kraus R J Marhefka and Ahmed S Khan "ANTENNAS For all applications", Tata McGraw Hiill India, 3rd Ed, 2006.

REFERENCE BOOKS:

1. M. Kulakarni, Microwave and Radar Engineering, Umesh Publications, New Delhi 3rd Ed, 2003,
2. Harish and Sachidananda, Antennas and Wave Propagation, Oxford Press, 2007.
3. Constantine A Balanis "ANTENNA THEORY" John Wiley & Sons, 2nd Ed 2004.

REFERENCE WEBSITE:

1. https://nptel.ac.in/courses/117/107/117107035/
2. https://www.tutorialspoint.com/antenna_theory/antenna_theory_types_of_propagation/
3. https://www.antenna-theory.com/

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2	-	-	-	-	-	-	-	-	-	-
CO.2	3	2	-	-	-	-	-	-	-	-	-	-
CO.3	3	2	-	-	-	-	-	-	-	-	-	-
CO.4	3	-	-	-	-	-	-	-	-	-	-	-
CO.5	3	-	2	-	-	-	-	-	-	-	-	-
CO*	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-

III B.Tech.-VI Semester

20ECE365	**CREATIVITY AND INNOVATION LAB**	**L**	**T**	**P**	**C**
		0	**0**	**3**	**1.5**

COURSE EDUCATIONAL OBJECTIVES:

1. Objective is to give an opportunity to the student to get hands on training in design and innovation.
2. Comparing and contrast the several existing solutions for the problem identified.
3. Formulating and propose a plan for creating a solution for the research plan identified.
4. Conducting the experiments as a team and interpret the results.
5. Reporting and presenting the findings of the work conducted.

The aim of the project skill lab is to deepen comprehension of principles by applying them to a new problem which may be the device / system / component / working mode to be created / fabricated may be decided in consultation with the supervisor and if possible with an industry. A project topic must be selected by the students in consultation with their supervisor. The students may be grouped into 3 to 5 and work under a project supervisor.

A project report to be submitted by the group and along with the model / system, which will be reviewed and evaluated for internal assessment by a Committee constituted by the Head of the Department. At the end of the semester examination the project work is evaluated based on oral presentation and the project report along with device / system / component / working model jointly by external and internal examiners constituted by the Head of the Department.

COURSE OUTCOMES:

On successful completion of course, the student will be able to		**POs**
CO1	Demonstrate in-depth knowledge on the project topic	**PO1**
CO2	Identify, analyze and formulate complex problem chosen for project work to attain substantiated conclusions.	**PO2**
CO3	Design solutions to the chosen project problem.	**PO3**
CO4	Undertake investigation of project problem to provide valid conclusions	**PO4**
CO5	Use the appropriate techniques, resources and modern engineering tools necessary for project work	**PO5**
CO6	Apply project results for sustainable development of the society.	**PO6**
CO7	Understand the impact of project results in the context of environmental sustainability.	**PO7**
CO8	Understand professional and ethical responsibilities while executing the project work.	**PO8**
CO9	Function effectively as individual and a member in the project	**PO9**
CO10	Develop communication skills, both oral and written for preparing and presenting project report.	**PO10**
CO11	Demonstrate knowledge and understanding of cost and time analysis required for carrying out the project.	**PO11**
CO12	Engage in lifelong learning to improve knowledge and competence in the chosen area of the project.	**PO12**

MANUAL: REFER PROJECT WORK MANUAL FOR EVALUATION

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	-	-	-	-	-	-	-	-	-	-	-
CO.2	-	3	-	-	-	-	-	-	-	-	-	-
CO.3	-	-	3	-	-	-	-	-	-	-	-	-
CO.4	-	-	-	3	-	-	-	-	-	-	-	-
CO.5	-	-	-	-	3	-	-	-	-	-	-	-
CO.6	-	-	-	-	-	3	-	-	-	-	-	-
CO.7	-	-	-	-	-	-	3	-	-	-	-	-
CO.8	-	-	-	-	-	-	-	3	-	-	-	-
CO.9	-	-	-	-	-	-	-	-	3	-	-	-
CO.10	-	-	-	-	-	-	-	-	-	3	-	-
CO.11	-	-	-	-	-	-	-	-	-	-	3	-
CO.12	-	-	-	-	-	-	-	-	-	-	-	3
CO*	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**

III B.Tech. - VI Semester

20ECE366	**MICROWAVE AND OPTICAL COMMUNICATION LAB**	**L**	**T**	**P**	**C**
		0	**0**	**3**	**1.5**

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To provide the knowledge on the Microwave components and sources.
2. To determine the characteristics of microwave and optical waveguides.
3. To inculcate the skills regarding the measurement of VSWR, power, attenuation, Characteristics of various components, etc.
4. To determine the characteristics of LED and LASER.
5. To Measure the losses of Analog and Digital link, and also Numerical Aperture.

Minimum twelve experiments to be conducted

Part-A

1. Study of Reflex Klystron Characteristics.
2. Study of Gunn Diode Characteristics
3. Measurement of Waveguide Parameters.
4. Study of Waveguide Attenuator.
5. Study of Circulator/Isolator.
6. Study of Directional Coupler and Extraction of S-parameter.
7. Study of E-plane, H-plane & Magic Tee. Extraction of S-Parameter.
8. Analysis of Radiation pattern of a Horn Antenna.
9. Study of VSWR Measurement.

Part-B

1. Characteristics of LED.
2. Measurement of Numerical Aperture.
3. Characteristics of LASER Diode.
4. Study of Digital optical Link.
5. Study of Analog optical Link.
6. Study of Losses in Analog optical link

Add-on Experiment

1. Study of Pulse width Modulation and demodulation.
2. stimate the bandwidth of given fiber link.

COURSE OUTCOMES:

On successful completion of the course the student will be able to		**POs related to COs**
CO1	Understand the basics of waveguides, waveguide components, microwave & optical sources, etc.	**PO1**
CO2	Demonstration of Microwave Bench.	**PO1**
CO3	Analyze different waveguide components and microwave sources.	**PO3**
CO4	Demonstrate on different waveguide components for measuring purpose.	**PO4**
CO5	Develop the measurement experiments with CW & AM modes.	**PO5**
CO6	Follow ethical principles in designing and implementing various measuring circuits.	**PO8**
CO7	Do experiments effectively as an individual and as a member in a group.	**PO9**
CO8	Communicate verbally and in written form, the understandings about the experiments.	**PO10**
CO9	Continue updating their skill related to microwave sources Optical fiber for various applications during their life time.	**PO12**

CO\PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	**-**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO6	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**
CO7	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**	**-**
CO8	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
CO9	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**

SREENIVASAINSTITUTEOFTECHNOLOGYANDMANAGEMENTSTUDIES
(Autonomous)
Electronics and Communication Engineering
(Accredited by NBA)

III B.Tech. - VI Semester

20ECE367	**DIGITAL SIGNAL PROCESSING LAB**	**L T P C**
		0 0 3 1.5

PRE-REQUISITES: signals and systems demo/experiments

COURSE EDUCATIONAL OBJECTIVES:

1. To Understand the handling of discrete/digital signals using MATLAB
2. To Understand the basic operations of Signal processing
3. To Analyse the spectral parameter of window functions
4. To Design IIR, and FIR filters for band pass, band stop, low pass and high pass filters.
5. To Design the signal processing algorithm using MATLAB & VLAB.

LIST OF EXPERIMENTS: Minimum of 12 experiments has to be conducted

1. Generation of Sinusoidal Waveform / Signal based on Recursive Difference Equations
2. To find DFT / IDFT of given DT Signal
3. To find Frequency Response of a given System given in Transfer Function/ Differential equation form.
4. Implementation of FFT of given Sequence
5. Determination of Power Spectrum of a given Signal(s).
6. Implementation of LP FIR Filter for a given Sequence/Signal.
7. Implementation of HP IIR Filter for a given Sequence/Signal
8. Linear convolution using DFT & IDFT method.
9. Circular Convolution using Matrix Method.
10. Implementation of Decimation Process
11. Implementation of Interpolation Process
12. Implementation of I/D Sampling Rate Converters
13. Impulse Response of First order and Second Order Systems.
14. Implementation of IIR Low pass & High Pass filter for a given sequence

COURSE OUTCOMES:

On successful completion of the course, students will be able to		**POs**
CO1	Use simulation tool for Signal Processing Applications	**PO1**
CO2	Apply DFT/IDFT on Signals	**PO2**
CO3	Design IIR filters on Signals	**PO3**
CO4	Design FIR Filters on Signals	**PO4**
CO5	Perform Spectrum operations on Signals	**PO5**
CO6	Follow ethical principles in designing, simulating and implementing various filter techniques	**PO8**
CO7	Do experiments effectively as an individual and as a member in a group.	**PO9**
CO8	Communicate verbally and in written form, the understandings about the experiments.	**PO10**
CO9	Continue updating their skill related to MATLAB implementation for various application during their life time	**PO12**

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3											
CO.2		3										
CO.3			3									
CO.4				3								
CO.5					3							
CO.6								3				
CO.7									3			
CO.8										3		
CO.9												3
CO*	3	3	3	3	3	-	-	3	3	3	-	3

III B.Tech.-VI Semester

20MAC352	**DESIGN THINKING FOR INNOVATION**	**L T P C** **2 0 0 0**

PRE-REQUISITES: NIL.

COURSEEDUCATIONALOBJECTIVES:

1. To Study the concepts of design thinking and innovations.
1. To know the basic research concepts in design thinking.
2. To learn the basic concepts of start-ups in design process.
3. To understand the business model design concepts.
4. To study the principles of innovations in design thinking.

UNIT–1: INTRODUCTION TO DESIGN THINKING (6)

Concept, frame work and principles of design thinking – Criteria of an inspirational design – Writing the inspirational design – Research findings about inspirational design – Pitfalls to avoid – Defining personas – Creating Personas – Importance and application of Personas – Customer experience mapping.

UNIT–2: DESIGN THINKING TO BRIDGE RESEARCH AND CONCEPT (6)

Challenges in idea generation – Need for a systematic method – Visualizing and empathizing – Applying the method – New design ideas – Design heuristics – Value of the design heuristics. **Prototypes in Design:** Product development framework – Prototypes in process – Integrating design into the front end of the innovation process and challenges – Design practice and tools – Integrate design professionals in front end innovation process.

UNIT–3: START-UPS UNDERSTAND AND APPLY DESIGN PROCESSES (6)

Emerging start-up culture – IPR to protect innovation – Path from idea to product – Impact of corporate culture and forces – Pillars of innovation– Knowledge management as intelligence and task – Designing amidst uncertainty– Selected tools for breakthrough innovation – Organizational implications – Design thinking within the firm – Role of key personnel – Organizational practices and culture – Value of design thinking.

UNIT–4: BUSINESS MODEL DESIGN AND PRINCIPLES OF INNOVATION (6)

Business model – Business model design and method – Process of designing a business model – Implementation of business model. **Principles of Innovations:** Most powerful competitors – Type of products will buy the – Best customers for products – Scope of the business right – Avoid commoditization – Disruptive growth – Strategy development process – Good money and bad money – Role of senior executives.

UNIT–5: INNOVATION MANAGEMENT (6)

Importance and overview of innovation process – Innovation in an organizational context – Development activities and design environment – Innovation and invention – Successful and unsuccessful innovation – Different types of innovation – Models of innovation – Disruptive innovations – Cyclic model of innovation with interconnected cycles.

Total Hours: 30

COURSEOUTCOMES:

On successful Completion of the course, students will be able to		Pos
CO1	Understand the concepts of design thinking and innovations.	**PO1,PO2,PO3**
CO2	Explain the basic research concepts in design thinking.	**PO1,PO2,PO3**
CO3	Describe the basic concepts of start-ups in design process.	**PO1,PO2,PO3**
CO4	Explain the business model design concepts.	**PO1,PO2,PO3**
CO5	Demonstrate the principles of innovations in design thinking.	**PO1,PO2,PO3**

TEXTBOOKS:

1. Michael G. Luchs, K. Scott Swan and Abbie Griffin., "Design Thinking - New ProductDevelopment Essentials from the PDMA", John Wiley & Sons, Inc., 2016.
2. Clayton M. Christensen and Clayton M. Christensen "The Innovator's Solution -Creating and Sustaining Successful Growth", Harvard Business School Press.

REFERENCEBOOKS:

1. Paul Trott, "Innovation Management and New Product Development" 6/e, PearsonEducation Ltd.,
2. Creativity in Product Innovation, Jacob Goldenberg and David Mazursky, 2002,Cambridge University Press.
3. The Design of Everyday Things - Revised Edition, Don Norman, 2013, PerseusBooks Group.
4. From Imagination to Innovation - New Product Development for Quality of Life, A.Coskun Samli, 2011, Springer New York Dordrecht Heidelberg London
5. Design Thinking for Strategic Innovation, Idris Mootee, 2013, John Wiley & Sons.

REFERENCEWEBSITE:

1. https://nptel.ac.in/courses/110106124
2. https://nptel.ac.in/courses/109104109
3. https://nptel.ac.in/courses/107101086
4. https://nptel.ac.in/courses/107104076

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2	3	-	-	-	-	-	-	-	-	-
CO.2	3	2	3	-	-	-	-	-	-	-	-	-
CO.3	3	2	3	-	-	-	-	-	-	-	-	-
CO.4	3	2	3	-	-	-	-	-	-	-	-	-
CO.5	3	2	3	-	-	-	-	-	-	-	-	-
CO*	3	2	3	-	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

20HSM471A **INDUSTRIAL ENGINEERING AND PSYCHOLOGY** **L T P C**
3 - - 3

PRE-REQUISITES: NIL.

COURSE EDUCATIONAL OBJECTIVES:

1. To learn the concepts and characteristics of personnel Management.
2. To understand the organizational structures and plant layout.
3. To know the basic need of work and method study and industrial psychology.
4. To learn the Forecasting and process planning concepts.
5. To study the inventory control and personnel management in an industry.

UNIT–1: CONCEPTS OF MANAGEMENT (9)

Management: Importance of administration and organization – Managerial skills, policies, and objectives – Management contribution of FW Taylor, Henry Foyaland Gilberth– Principles, types, process, levels and functions of management – Management chart– Concepts in project management and MIS–Industrial ownership – Responsibilities of supervisor/foreman – Leadership concepts. **Personnel Management:** Concepts, recruitment, selection, training, job evaluation, merit rating, wage plans, incentives, safety, housekeeping, welfare measures, promotion, lay-off, transfer and discharge.

UNIT–2: ORGANIZATIONAL STRUCTURES AND PLANT LAYOUT (9)

Organization: Concept, importance, characteristics and process of organization – Organization theory, principle, structure, chart and committees – Project, matrix and informal organization – Departmentation – Authority and delegation – Group dynamics – Organizational change, development and conflict – Leadership and communication system. **Plant Layout:** Types, flow pattern, work station, storage, layout and factory design.

UNIT–3: WORK STUDY AND INDUSTRIAL PSYCHOLOGY (9)

Work and method study – Ergonomics principles – Process chart symbols – Flow process, activity chart, flow and string diagram – Operation analysis and motion and economy– Design and layout of work place– Therbligs –SIMO chart – Time study – Standard data – Analytical estimating – Performance Rating –Allowances – PMTS. **Industrial Psychology:** Concept, individuals and group – Motivation theories – Hawthorne experiment – Morale and motivation – Environmental condition –Industrial fatigue.

UNIT–4: PRODUCTION PLANNING AND CONTROL (9)

Productivity: I/O model– Factors affecting the productivity–Productivity resources and measures. **Production Planning:** Continuous and intermittent production –Job, open and closed job shop– Large projects–Forecasting–Process planning – Batch quantity–Tool control and production–Loading, scheduling, dispatching and routing and flow control.

UNIT–5: MATERIALS MANAGEMENT AND INVENTORY CONTROL (9)

Materials Management: Concepts–Procurement–Purchase and order–Buying techniques. **Inventory Control:** Classification – Objectives – Functions – Economic order quantity (EOQ) – Inventory models– ABC analysis–Material requirements planning (MRP)– Manufacturing resource planning(MRP-II).

TOTAL HOURS: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to,		POs
CO1	Understand the concepts of management and characteristics of Administration and organization	**PO1, PO2, PO12**
CO2	Explain the organizational structures and plant layout for productivity Improvements	**PO1, PO2, PO12**
CO3	Describe the basic need of work study, method study, time study and industrial psychology	**PO1, PO2, PO12**
CO4	Explain the Forecasting, Process planning and control of manufacturing a product	**PO1,PO2, PO12**
CO5	Demonstrate the inventory control and personnel management in an industry	**PO1, PO2, PO11, PO12**

TEXT BOOKS:

1. O.P. Khanna, "Industrial Engineering and Management", Dhanpat Rai PublishingCompany(P)Ltd.,New Delhi,17/e,2010.
2. Pravin Kumar, "Industrial Engineering and Management", Pearson Education, NewDelhi,1/e,2015.

REFERENCE BOOKS:

1. S. N. Chary, "Production and Operations Management", Tata McGraw-Hill EducationPvt.Ltd.,Noida, 6/e,2019.
2. William J Stevenson, "Operations Management", Tata McGraw-Hill Education Pvt.Ltd.,Noida, 12/e,2018.
3. ShailendraKale, "Production and Operations Management", Tata McGraw-Hill Education Pvt. Ltd., Noida, 1/e, 2013.
4. Kanishka Bedi, "Production and Operations Management", Oxford University Press, India,3/e,2013.
5. Harold T A mrine, John A Ritchey, Colin L Moodie and Joseph F K mec, "Manufacturing Organization and Management", Pearson Education, New Delhi, 6/e,2004.

REFERENCE WEBSITE:

1.https://nptel.ac.in/courses/112/107/112107292/

2.https://nptel.ac.in/courses/112/107/112107142/

3.https://nptel.ac.in/courses/112/107/112107143/

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2	-	-	-	-	-	-	-	-	-	2
CO.2	3	2	-	-	-	-	-	-	-	-	-	2
CO.3	3	2	-	-	-	-	-	-	-	-	-	2
CO.4	3	2	-	-	-	-	-	-	-	-	-	2
CO.5	3	2	-	-	-	-	-	-	-	-	1	2
CO*	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**

IIIB.Tech.-VII Semester

20HSM471B INTELLECTUAL PROPERTY RIGHTS AND PATENTS

L	T	P	C
3	-	-	3

PRE-REQUISITES:NIL

COURSEEDUCATIONALOBJECTIVES:

1. To introduce the fundamental aspects of intellectual property Rights.
2. To disseminate knowledge on fundamentals of patent, transfer and infringement.
3. To introduce the fundamental aspects of copyrights and trademarks.
4. To acquire knowledge on geographical indication, industrial design and IC layout.
5. To disseminate knowledge on intellectual property management.

UNIT–1: INTRODUCTION TO INTELLECTUAL PROPERTY (9)

Definitions and importance of intellectual property – Introduction and history of WTO – Structure of WTO agreements and dispute settlements – Principles of trading system – Trade policy reviews – Agreement on TRIPS – Ministerial conferences – Emerging issues in IPR – Protection of plant varieties – Patent sharks – Open-source movement – Bio-piracy.

UNIT–2: FUNDAMENTALS OF PATENT, TRANSFER AND INFRINGEMENT (9)

Fundamentals of Patent: History of patents in India – Grant of patent – Inventions those are not patentable – Process and product patent – Specification and procedure of patent – e-filling – Temporal and spatial – Opposition to grant of patent – Rights and PCT of patents – Marketing rights – Milestones in Indian patent. **Transfer and Infringement:** Transfer and Infringement of patent rights – Surrender of patents – Challenges in patents.

UNIT–3: COPYRIGHT AND TRADE MARKS (9)

Copyright: Definition – Copyright board registration in India – Ownership of copyright – Rights of the owner – Terms of copyright – Registration of copyright – Convention and UCC – Rights of broadcasting – International copyright – Infringement of copyright – Copyright Act, Amendment and Issues. **Trademarks:** Developing a Trademark – Trademark registration – Trademark applications – Procedure for trademark registration in India – Terms, assignment, transmission, certification, infringement of trademarks.

UNIT–4: GEOGRAPHICAL INDICATION, INDUSTRIAL DESIGN AND IC LAYOUT (9)

Geographical Indications: Concept, historical perspective, potential benefit, renewal and status of Geographical Indications – Geographical Indications in India – Infringement of GI – Status of GI registration in India. **Industrial Designs and IC Layouts:** Registration of Industrial Designs – Copyrights in Industrial designs – Terms, procedure and conditions for Industrial Designs – Infringement of ID – Integrated circuit layout design – Trade secrets.

UNIT–5: INTELLECTUAL PROPERTY MANAGEMENT (9)

Creating Intellectual Property: Need for creating intellectual property – Development of IP and Knowledge – Types of innovations – Behavioral aspects**. Intellectual Property Management: s**Need and importance of IP management – IP management activities – 5Cs model of managing IP – Research and Developments in India (Case Study).

TOTAL HOURS: 45

COURSEOUTCOMES:

On successful completion of the course, students will be able to		POs
CO1	Understand fundamental aspects of intellectual property Rights.	**PO1, PO12**
CO2	Demonstrate knowledge on fundamentals of patent, transfer and infringement.	**PO1, PO3, PO12**
CO3	Understand fundamental aspects of copyrights and trademarks.	**PO1, PO3, PO12**
CO4	Demonstrate knowledge on geographical indication, industrial design and IC layout.	**PO1, PO3, PO12**
CO5	Demonstrate knowledge on intellectual property management.	**PO1, PO3, PO12**

TEXTBOOKS:

1. Intellectual Property Rights, Pandey Neeraj and DharniKhushdeep, 2014, PHI Learning Ltd., India.
2. Intellectual Property Rights and Copyrights, S.P. Satarkar, EssEss Publications, 2003.

REFERENCEBOOKS:

1. Intellectual Property in the New Technological Age, 2016: Vol. I Perspectives, Trade Secrets and Patents, Peter S. Menell, Mark A. Lemley, and Robert P. Merges. 2016
2. Intellectual Property in the New Technological Age, 2016: Vol. II Copyrights, Trademarks and State IP Protections, Peter S. Menell, Mark A. Lemley, and Robert P. Merges. 2016.
3. Intellectual Property Rights Law in India, T. Ramappa, 2/e, 2016, Asia Law House.
4. Resisting Intellectual Property, Debora J. Halbert, 2006, Taylor & Francis Ltd ,2007
5. Law Relating to Intellectual Property Rights, V K Ahuja, 3/e, 2017, Lexis Nexis.

REFERENCEWEBSITE:

1. https://onlinecourses.swayam2.ac.in/cec22_lw12/preview
2. https://onlinecourses.nptel.ac.in/noc22_mg98/preview

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	-	-	-	-	-	-	-	-	-	-	3
CO.2	3	-	1	-	-	-	-	-	-	-	-	3
CO.3	3	-	1	-	-	-	-	-	-	-	-	3
CO.4	3	-	1	-	-	-	-	-	-	-	-	3
CO.5	3	-	1	-	-	-	-	-	-	-	-	3
CO*	**3**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**

IV B.Tech.-VIISemester

20HSM471C MANAGING INNOVATION AND ENTREPRENEURSHIP L T P C
3 - - 3

PRE-REQUISITES:NIL

COURSEEDUCATIONALOBJECTIVES:

1. To the scope of innovation management principles.
2. To study the characteristics of innovation within firms.
3. To study the technological entrepreneurship and innovation practices.
4. To study the concepts in entrepreneurship for engineers.
5. To understand the financial requirements for starting new venture.

UNIT–1: IMPORTANCE OF INNOVATION AND MANAGEMENT (9)

Importance of innovation– Innovation in an organizational context – Development activities and design environment – Innovation and invention – Successful and unsuccessful innovation – Types and models of innovation– DUI mode of innovation – Disruptive innovations – Cyclic model of innovation with interconnected cycles.

UNIT–2: MANAGING INNOVATION WITHIN FIRMS (9)

Organizations and innovation – The dilemma of innovation management – Innovation dilemma in low technology sectors – Dynamic capabilities – Managing uncertainty – Managing innovation projects – Organizational characteristics that facilitate the innovation process – Industrial firms – Organizational structures and innovation – The role of the individuals in innovation – IT systems and their impact on innovation – Management tools for innovation. **Operations and Process Innovation:** Design and innovation in the context of operations – Process design and innovation – Innovation in the management of the operations process – Design of the organization and its suppliers – Lean innovation.

UNIT–3: TECHNOLOGICAL ENTREPRENEURSHIP AND INNOVATION PRACTICES (9)

Types of entrepreneurships – Sustainable entrepreneurship – Learning lifecycle and the learning strategy – Incubators – Technology management and transfer – Technology transfer mechanisms and models – Technology transfer obstacles – Success factors for technology transfer – Spin offs – Strategic alliances and commercialization metrics.

UNIT–4: ENTREPRENEURSHIP FOR ENGINEERS (9)

Industrial Evolution: Necessity of industrial viewpoints – Entrepreneurial mind. **How to Commercialize Invention:** Discovery of a new function or material – Performance improvement – Product planning creativity – Marketing creativity. **Start-Up:** The Founder and team – Entrepreneurial process – Legal procedure. **Business Plan:** Executive summary – Management and organization – Product/service – Marketing plan – Administrative policies, procedures, and controls – Growth plan – Financial plan.

UNIT–5: BUSINESS PLAN TO FUNDING VENTURE (9)

How to Find Financial Resources: Debt and equity — Internal and external funds including loans – Financial resources at the start-up stage – Government grants and Research funds – Private financing. **Financial Management:** Sales and payroll – Daily accounting – Financial statements – Demand, supply, and market equilibrium.

TotalHours:45

COURSEOUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Describe the scope of importance in innovation and management	**PO1, PO6,PO8,PO9, PO11, PO12**
CO2	Understand the concepts of managing innovation within firms.	**PO1, PO6,PO8,PO9, O11, PO12**
CO3	Illustrate the concept of technological entrepreneurship and innovation practices	**PO1, PO6,PO8,PO9, O11, PO12**
CO4	Summarize the systematic approach to entrepreneurship for engineers	**PO1, PO6,PO8,PO9, O11, PO12**
CO5	Understand the business plan to funding venture.	**PO1, PO6,PO8,PO9, O11, PO12**

TEXTBOOKS:

1. Paul Trott, -Innovation Management and New Product Development‖ 6/e, Pearson Education Ltd.,
2. Elias G. Carayannis, Elpida T. Samara & Yannis L. Bakouros-Innovation and Entrepreneurship - Theory, Policy and Practice‖ Springer International Publishing Switzerland, 2015.
3. Kenji Uchino, —Entrepreneurship for engineers‖ by Taylor and Francis Group, LLC,2010.

REFERENCEBOOKS:

1. Robert D. Hisrich, Michael P. Peters, Dean A. -Entrepreneurship‖ 10/e, McGraw-Hill, 2017.
2. Michael G. Luchs, K. Scott Swan and AbbieGriffin., —Design Thinking - New Product Development Essentials from the PDMA‖ , John Wiley & Sons, Inc., 2016.
3. Clayton M. Christensen and Clayton M. Christensen-The Innovator's Solution - Creating and SustainingSuccessful Growth‖ , Harvard Business School Press.

REFERENCEWEBSITE:

1. https://nptel.ac.in/courses/127105007
2. https://nptel.ac.in/courses/109105176
3. https://nptel.ac.in/courses/107101086

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	1	-	-	-	-	1	-	1	1	-	3	1
CO.2	1	-	-	-	-	1	-	1	1	-	3	1
CO.3	1	-	-	-	-	1	-	1	1	-	3	1
CO.4	1	-	-	-	-	1	-	1	1	-	3	1
CO.5	1	-	-	-	-	1	-	1	1	-	3	1
CO*	**1**	**-**	**-**	**-**	**-**	**1**	**-**	**1**	**1**	**-**	**3**	**1**

IV B.TECH. - VII SEMESTER

20HSM472	UNIVERSAL HUMAN VALUES AND ETHICS	L T P C
	(COMMON TO ALL)	3 0 0 3

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To develop a holistic perspective based on self-exploration about themselves (Human being), family, society and nature/existence
2. To understanding (or developing clarity) of the harmony in the human being, family, society, and nature/existence
3. To Strengthening of self-reflection.
4. To d evelop of commitment and courage to act.
5. To study the holistic understanding of harmony on professional ethics.

UNIT –1: BASIC GUIDELINES, CONTENT AND PROCESS FOR VALUE EDUCATION (9)

Purpose and motivation for the course, recapitulation from Universal Human Values – Self-exploration–what is it? - its content and process; „natural acceptance" and experiential validation- as the process for self-exploration – continuous happiness and prosperity- a look at basic human aspirations – Right understanding, relationship and physical facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority – Right understanding, relationship and physical facility-the basic requirements for fulfilment of aspirations of every human being with their correct priority – Right understanding, relationship and physical facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority.

Activities: Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking

UNIT –2: UNDERSTANDING HARMONY IN THE HUMAN BEING (9)

Understanding human being as a co-existence of the sentient „I" and the material „Body" – Understanding the needs of Self („I") and „Body" - happiness and physical facility – Understanding the Body as an instrument of „I" (I being the doer, seer and enjoyer) – Understanding the characteristics and activities of „I" and harmony in „I"– Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail – Programs to ensure Sanyam and Health.

Activities: Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one"s own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease.

UNIT –3: UNDERSTANDING HARMONY IN THE FAMILY AND SOCIETY (9)

Understanding values in human-human relationship; meaning of justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; trust and respect as the foundational values of relationship – Understanding the meaning of trust; difference between intention and competence – Understanding the meaning of respect, difference between respect and differentiation; the other salient values in relationship – Understanding the harmony in the society (society being an extension of family): resolution, prosperity, fearlessness (trust) and co-existence as comprehensive human goals – Visualizing a universal harmonious order in society-undivided society, universal order-from

family to world family.

Activities: Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students" lives.

UNIT –4: UNDERSTANDING HARMONY IN THE NATURE AND EXISTENCE (9)

Understanding the harmony in the nature – Interconnectedness and mutual fulfilment among the four orders of nature-recyclability and self-regulation in nature – Understanding existence as co-existence of mutually interacting units in all-pervasive space – Holistic perception of harmony at all levels of existence.

Activity: Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology.

UNIT –5: UNDERSTANDING OF HARMONY ON PROFESSIONAL ETHICS (9)

Natural acceptance of human values – Definitiveness of Ethical Human Conduct – Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order – Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems – Case studies of typical holistic technologies, management models and production systems – Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations – Sum up.

Activity: Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. To discuss the conduct as an engineer or scientist etc.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		**Pos**
CO1	Students are expected to become more aware of themselves, and their surroundings (family, society, nature)	**PO6, PO7, PO8, PO9, PO12**
CO2	They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.	**PO6, PO7, PO8, PO9, PO12**
CO3	They would have better critical ability.	**PO6, PO7, PO8, PO9, PO12**
CO4	They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).	**PO6, PO7, PO8, PO9, PO12**
CO5	It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.	**PO6, PO7, PO8, PO9, PO12**

TEXT BOOKS:

1. R R Gaur, R Asthana, G P Bagaria, "A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978- 93-87034-47-1
2. R R Gaur, R Asthana, G P Bagaria, "Teachers" Manual for A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

REFERENCE BOOKS:

1. A. N. Tripathi, "Human Values", New Age Intl. Publishers, New Delhi, 2004.
2. Mohandas Karamchand Gandhi "The Story of My Experiments with Truth"
3. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantak,1999.
4. Mohandas K. Gandhi, "Hind Swaraj or Indian Home Rule"
5. Vivekananda - Romain Rolland(English)
6. Gandhi - Romain Rolland (English)

REFERENCE WEBSITE:

1. https://nptel.ac.in/courses/109104068
2. https://nptel.ac.in/courses/110105097
3. https://nptel.ac.in/courses/109106117
4. https://nptel.ac.in/courses/109103142

"CO-PO MAPPING"

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	-	-	-	-	-	2	2	3	2	-	-	3
CO.2	-	-	-	-	-	2	2	3	2	-	-	3
CO.3	-	-	-	-	-	2	2	3	2	-	-	3
CO.4	-	-	-	-	-	2	2	3	2	-	-	3
CO.5	-	-	-	-	-	2	2	3	2	-	-	3
CO*	-	**-**	-	-	**-**	2	2	3	2	**-**	**-**	3

IV B.Tech. - VII Semester

20ECE471A	**SATELLITE & RADAR COMMUNICATION** **(Professional core elective-3)**	**L T P C** **2 1 0 3**

PRE-REQUISITES: Analog Communications, Digital Communications

COURSE EDUCATIONAL OBJECTIVES:

1. To provide knowledge on satellite orbits, launchers, subsystems, orbit mechanics and Placing a satellite in orbit.
2. To develop concepts of satellite links and calculation of satellite links budgets and Knowledge of different types of satellites and satellite services like VSAT, GPS etc.
3. To know the Fundamentals of Radar system.
4. To develop skill on Operation, applications, advantages of the CW Radar, FM CW Radar and Pulse Doppler radar.
5. To analyse the Concepts of Tracking Radar AND Detection of Radar signals

UNIT I: OVERVIEW OF SATELLITE, SUBSYSTEMS AND CONTROL (9)

Introduction- Basic concepts of Satellite communications- Frequency allocations for satellite systems. Advantages and applications of satellite communications over other communications

ORBITAL ASPECTS AND CONTROL:

Orbital's- Mechanics- look angle determination- orbit perturbations- Orbital determination- launches and launch vehicles- orbital effects in communication systems performance- attitude and orbit control systems- Telemetry- tracking and command.

UNIT II: SATELLITE LINK DESIGN, EARTH STATION TECHNOLOGY AND APPLICATIONS (9)

Basic transmission theory- - Design of down link and up link – Earth station design- equipment for Earth stations. INTELSAT Series- INSAT- VSAT- Non geostationary satellites- Mobile satellite services: GSM- GPS- INMARSAT.

UNIT III: BASICS OF RADAR AND RADAR EQUATION (9)

Introduction - - Radar Block Diagram and Operation - Radar Frequencies and Applications - - Simple form of Radar Equation- Maximum Unambiguous Range- Prediction of Range Performance - Minimum Detectable Signal - Receiver Noise - Modified Radar Range Equation - System Losses - Illustrative Problems.

UNIT IV FM-CW AND PULSE DOPPLER RADAR (9)

Doppler Effect - CW Radar – Block Diagram - Isolation between Transmitter and Receiver- Non-zero IF Receiver - Receiver Bandwidth Requirements - Applications of CW radar - FM-CW Radar- Range and Doppler Measurement- Block Diagram - FM-CW altimeter- MTI Radar with Power Amplifier Transmitter and Power Oscillator Transmitter - Delay Line Cancellers - MTI versus Pulse Doppler radar.

UNIT V TRACKING RADAR AND DETECTION OF RADAR SIGNALS IN NOISE (9)

Tracking with Radar - Sequential Lobing - Conical Scan - Monopulse Tracking Radar –- Comparison of Trackers. - **Detection of Radar Signals in Noise**: Introduction, Noise Figure and Noise Temperature, Matched Filter Receiver – Response Characteristics and Derivation, Correlation detection, Detection criteria, Detector Characteristics, Automatic Detection, Constant False Alarm Rate Receiver

Total Hours (45)

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs
CO1	Understand the concept of satellite orbits, launchers and subsystems	PO1, PO2,PO3
CO2	Demonstrate the design knowledge of satellites and its services	PO1, PO2, PO3,
CO3	Able to Identify the different blocks and its requirement in Radar System and develop the radar range equation	PO1, PO2, PO3,
CO4	Demonstrate the knowledge on different radars used for different applications	PO1, PO2, PO3
CO5	Acquire the design knowledge on different trackers and array antennas	PO1, PO2, PO3

TEXT BOOKS:

1. Satellite Communications, 2nd Edition, 2006, Timothy Pratt, Charles Bostian JeremyAllnutt, John willey india,New Delhi.
2. Introduction to Radar Systems, 2nd Edition, 2007, Merrill I. Skolnik, TMH Special Indian Edition.

REFERENCES:

1. Fundamentals of **Satellite** Communication, 1st Edition ,2006, K N Raja Rao, Prentice-Hall of india, New Delhi.
2. Satellite Communications, 1st Edition, 2009, V S Bagad, Technical publications, Pune.
3. Microwave and Radar Engineering, 2003, M. Kulakarni, Umesh Publications.
4. Understanding Radar Systems, 1992, Simon Kigsley, Tata Mc-Graw Hill, UK.

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1.https://nptel.ac.in/noc/courses/noc17/SEM2/noc17-ec14/
2.https://www.isro.gov.in/applications/satellite-communication
3.https://www.tutorialspoint.com/satellite_communication/index.htm
4. https://dot.gov.in/vsat-satellite-communication
5. https://www.intelsat.com/resources/tools/satellite-101/

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	3	-	-	-	-	-	-	-	-	-
CO.2	3	3	3	-	-	-	-	-	-	-	-	-
CO.3	2	2	3	-	-	-	-	-	-	-	-	-
CO.4	2	2	3	-	-	-	-	-	-	-	-	-
CO.5	3	2	3	-	-	-	-	-	-	-	-	-
CO*	**2.6**	**2.4**	**3**	-	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-

IV B.Tech. - VII Semester

20ECE471B	**SENSORS AND TRANSDUCERS (Professional core elective-3)**	**L T P C** **3 0 0 3**

PRE-REQUISITES: A Course on Electronic devices and circuits

COURSE EDUCATIONAL OBJECTIVES:

1. To demonstrate basic knowledge on measurement, errors, sensors and transducers
2. To Describe Static characteristics, Dynamic characteristics and Mathematical model of Transducer.
3. To analyze different resistive transducers and characteristics.
4. To demonstrate knowledge on various inductive and capacitive transducers.
5. To illustrate various important sensors like smart sensors, digital sensors etc

UNIT I MEASUREMENTS AND INSTRUMENTATION (9)

Measurements – Basic method of measurement – Generalized scheme for measurement systems – Units and standards – Errors – Classification of errors, error analysis – Statistical methods –Transducer – Classification of transducers – Basic requirement of transducers.

UNIT II CHARACTERISTICS OF TRANSDUCERS (9)

Static characteristics – Dynamic characteristics – Mathematical model of transducer – Zero, first order and second order transducers – Response to impulse, step, ramp and sinusoidal inputs

UNIT III RESISTIVE TRANSDUCERS (9)

Potentiometer –Loading effect – Strain gauge – Theory, types, temperature compensation – Applications – Torque measurement – Proving Ring – Load Cell – Resistance thermometer – Thermistors materials – Constructions, Characteristics – Hot wire anemometer

UNIT IV INDUCTIVE AND CAPACITIVE TRANSDUCER (9)

Self inductive transducer – Mutual inductive transducers – Linear Variable Differential Transformer – LVDT Accelerometer – RVDT – Synchros – Microsyn – Capacitive transducer – Variable Area Type – Variable Air Gap type – Variable Permittivity type – Capacitor microphone.

UNIT V MISCELLEANEOUS TRANSDUCERS (9)

Piezoelectric transducer – Hall Effect transducers – Smart sensors – Fiber optic sensors – Film sensors – MEMS – Nano sensors, Digital transducers.

Total Hours: 45

COURSE OUTCOMES:

	On successful completion of this course, the students will be able to	Pos related to COs
CO1	To demonstrate basic knowledge on measurement, errors,sensors and transducers	**PO1**
CO2	To Describe and analyze Static characteristics ,Dynamic characteristics and Mathematical model of Transducer.	**PO1,PO2**
CO3	To analyze different resistive transducers and characteristics.	**PO1,PO2**
CO4	To demonstrate knowledge on various inductive andcapacitive transducers.	**PO1,PO2**
CO5	To illustrate various important sensors like smart sensors, digital sensors etc	**PO1,PO2**

TEXT BOOKS:

1. Sawhney. A.K, "A Coursein Electrical and Electronics Measurements and Instrumentation", 18th Edition, Dhanpat Rai & Company Private Limited, 2007.
2. Renganathan. S,"Transducer Engineering", Allied Publishers, Chennai, 2003.

REFERENCES:

1. Doebelin. E.A, "Measurement Systems – Applications and Design", Tata McGraw Hill, New York, 2000.
2. Patranabis. D, "Sensors and Transducers", Prentice Hall of India, 1999.
3. John. P.Bentley, "Principles of Measurement Systems", III Edition, Pearson Education, 2000.
4. Murthy.D.V.S, "Transducers and Instrumentation", Prentice Hall of India, 2001.

REFERENCE WEBSITE:

https://nptel.ac.in/content/storage2/courses/112103174/pdf/mod2.pdf

CO-PO MAPPING

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-
CO5	3	3	-	-	-	-	-	-	-	-	-	-
CO*	3	3	-	-	-	-	-	-	-	-	-	-

IV B.Tech. - VII Semester

20ECE471C	**FPGA DESIGN**	**L T P C**
	(Professional core elective-3)	**3 0 0 3**

PRE-REQUISITES: Digital Electronics, VLSI Design

COURSE EDUCATIONAL OBJECTIVES:

1. To learn about the use of FPGAs in digital design and the full FPGA design flow.
2. To be able to design ASM, Boolean Implementation with minimal resources.
3. To acquire knowledge on timing issues, violation and analysis of issues. Designs with eliminated issues.
4. To gain the knowledge and demonstrate the architectural as well as functional aspects of FPGAs.
5. To apply the concepts of FPGA design in implementing various logic circuits.

UNIT –1: DESIGN WITH FPGA **(9)**

Digital IC design flow - The role of FPGAs in digital design – advantages and applications& different FPGA families&Hierarchical design- CAD Tools.

UNIT –2: DIGITAL SYSTEM DESIGN **(9)**

The ASM chart - design from an ASM chart for mealy and Moore machine.Boolean implementation for minimal number of Flip-Flops - design from an ASM chart: One-Hot controller implementation state table entry to a PLD.

UNIT –3: TIMING ISSUES **(9)**

Clock skew in state machines -Initialization and lockout in state machines. CLOCKING AND METASTABILITY Set up time hold time – setup time hold time violations - critical path - calculation of maximum clock frequency – meta-stability - synchronizers – design examples.

UNIT –4: FPGA ARCHITECTURES **(9)**

FPGA architectures – Configurable logic blocks - Configurable I/O blocks – Programmable interconnect – clock circuitry – Xilinx FPGA architecture – Programming Technologies: Anti-fuse, SRAM, EPROM, EEPROM.

UNIT –5: LOGIC IMPLEMENTATION FOR FPGA **(9)**

Logic synthesis - logic optimization - simulation – types of simulation – physical design for FPGAs: placement, routing - testing – need for testing, testing methods - Goals and objectives - low power techniques – Design examples Traffic light controller, score board and controller, keyboard scanner and controller.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs
CO1	Translate a software application into hardware logic for FPGA architectures.	**PO1, PO2 ,PO3, PO4**
CO2	Demonstrate knowledge and design of ASM concepts.	**PO1, PO2, PO4**
CO3	Analyze the timing issues related to sequential logic implementation.	**PO1, PO2, PO4**
CO4	Analyze and understand the concepts of FPGA Architectures.	**PO1, PO2, PO4**
CO5	Understand and apply the concept of FPGA design in various logic implementations.	**PO1, PO2, PO4**

TEXT BOOKS:

1. Morris Mano, ”Logic and computer design fundamentals”, Pearson Education, 4/e, 2008.
2. Michael D. Ciletti, “Advanced Digital design with the Verilog HDL”, Pearson Education, 2/e, 2010.
3. Samir Palnitkar, “Verilog HDL: A guide to digital design and synthesis”, Pearson Education India, 2010.

REFERENCE BOOKS:

4. Zainalabedin Navabi, “Verilog Digital System Design”, Tata McGraw Hill, New Delhi, 2010.
5. Roth and John, “Principles of digital systems design”, Cengage learning, 2010.
6. Bhasker J, “A Verilog HDL Primer”, BS Publications, 2007.

REFERENCE WEBSITE:

1.https://nptel.ac.in/courses/117/108/117108040/
2.https://www.xilinx.com/products/silicon-devices/fpga/what-is-an-fpga.html

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2	3	2	-	-	-	-	-	-	-	-
CO.2	3	2	3	2	-	-	-	-	-	-	-	-
CO.3	3	2	-	2	-	-	-	-	-	-	-	-
CO.4	3	2	3	2	-	-	-	-	-		-	-
CO.5	3	2	3	2	-	-	-	-	-	-	-	-
CO*	**3**	**2**	**3**	**2**	-	-	-	-	-	-	-	-

IV B.Tech. - VII Semester

20ECE472A	**MICRO ELECTRO MECHANICAL SYSTEMS**	**L T P C**
	(Professional core elective-4)	**3 0 0 3**

PRE-REQUISITES: Applied chemistry

COURSE EDUCATIONAL OBJECTIVES:

1.To provide knowledge on Microsystems technology and Laws of scaling.
2.To educate on the rudiments of micro sensors and micro actuation techniques.
3. To introduce various fabrication processes of MEMS.
4.To introduce different Micro manufacturing techniques in MEMS.
5. To educate on the Micro system packaging techniques & its applications of MEMS.

UNIT I: INTRODUCTION TO MICROSYSTEMS (9)

Overview of microelectronics manufacture and Microsystems technology, Definition - MEMS materials - Laws of scaling - The multi disciplinary nature of MEMS - Survey of materials central to micro engineering - Applications of MEMS in various industries.

UNIT II: MICRO SENSORS AND ACTUATORS (9)

Working principle of Microsystems - micro actuation techniques - micro sensors – types – Micro actuators – types – micro-pump – micro-motors – micro – valves – micro grippers – micro accelerometers.

UNIT III: FABRICATION PROCESS (9)

Substrates - single crystal silicon wafer formation – Photolithography – Ion implantation – Diffusion – Oxidation – CVD - Physical vapor deposition - Deposition epitaxy - etching process.

UNIT IV: MICRO SYSTEM MANUFACTURING (9)

Bulk Micro manufacturing - surface micro machining – LIGA – SLIGA - Micro system packaging materials - die level - device level - system level - packaging techniques – die preparation – surface bonding - wire bonding - sealing.

UNIT V: MICROSYSTEMS DESIGN AND PACKAGING (9)

Design considerations, Mechanical Design, Process design, Realization of MEMS components using intellisuite. Micro system packaging, Packing Technologies, Assembly of Microsystems, Reliability in MEMS.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course the student will be able to		POs related to COs
CO1	Be familiar with the important concepts applicable to Microsystems technology.	**PO1**
CO2	Be fluent with the MEMS Sensors.	**PO1, PO4**
CO3	To educate on the rudiments of Micro fabrication techniques.	**PO1, PO3, PO4**
CO4	To introduce different Micro manufacturing techniques used for MEMS.	**PO1, PO3, PO4**
CO5	Apply the MEMS for different Packing Technologies for its applications.	**PO1, PO3, PO4**

TEXT BOOKS

1. Tai-Ran Hsu "MEMS and Microsystems Design and Manufacture". Tata McGraw-Hill Publishing Company Ltd.
2. Chang Liu "Foundation of MEMS". Pearson Education.
3. Stephen D Senturia 'Microsystem Design', Springer Publication, 2000.
4. Rai - Choudhury P. "MEMS and MOEMS Technology and Applications", PHI Learning Private Limited, 2009.

REFERENCES:

1. Francis E.H. Tay and Choong .W.O, "Micro fluidics and Bio mems application", IEEE Press New York, 1997.
2. Trimmer William S., Ed., "Micromechanics and MEMS", IEEE Press New York, 1997.
3. Maluf, Nadim, "An introduction to Micro electro mechanical Systems Engineering", AR Tech house, Boston 2000.
4. Julian W.Gardner, Vijay K.Varadan, Osama O. Awadel Karim, "Micro sensors MEMS and Smart Devices", John Wiby & sons Ltd., 2001.

REFERENCE WEBSITE:

6. https://nptel.ac.in/courses/117/105/117105082/
7. https://www.lboro.ac.uk/microsites/mechman/research/ipm-ktn/pdf/Technology_review/an-introduction-to-mems.pdf

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	-	-	-	-	-	-	-	-	-	-	-
CO.2	3	-	-	2	-	-	-	-	-	-	-	-
CO.3	3	-	2	1	-	-	-	-	-	-	-	-
CO.4	3	-	2	1	-	-	-	-	-	-	-	-
CO.5	3	-	1	1	-	-	-	-	-	-	-	-
CO*	**3**	**-**	**1.66**	**1.25**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-

IV B.Tech. - VII Semester

20ECE472B	**CELLULAR AND MOBILE COMMUNICATIONS**	**L T P C**
	(Professional core elective-4)	**3 0 0 3**

PRE-REQUISITES: Analog and digital communications

Course Educational Objectives:

CEO1: To provide knowledge on
- Understanding cellular concept
- Elements of cellular system
- Frequency Reuse

CEO2: To provide the student with an understanding of Co-channel interference, Non Co-Channel Interference.

CEO3: To inculcate skill to investigate the effect of cell coverage for signal and traffic, Frequency and channel assignment.

CEO4: To develop skill to understand types of Antennas, Handoff strategies.

CE05: Analyse Architecture of GSM, channels and 3G cellular systems.

UNIT I: Introduction to Cellular Mobile Radio Systems **(9)**

Limitations of Conventional Mobile Telephone systems, Spectrum Allocation, Basic Cellular Mobile System, Operation of cellular systems, Hexagonal shaped cells.

Fundamentals of Cellular Radio system Design

Concept of Frequency Reuse, Frequency Reuse ratio, Cellular Traffic: Trunking and Blocking, Grade of Service; Improving Coverage and Capacity in cellular systems: Cell Splitting, Sectoring, Micro Cell Zone concept.

UNIT II: Interference **(9)**

Types of Interferences, Introduction to Co- Channel Interference, Real time Co-channel interference, Co- channel interference Reduction factor, Desired C/I from a normal case in a Omni Directional Antenna system, Design of Antenna system, Antenna parameters and their effects, Non-co- channel interference-different types.

UNIT III: Frequency Management and Channel Assignment **(9)**

Numbering and grouping, setup access and paging channels, channel assignment to cell sites and mobile units, channel sharing and borrowing, Non fixed channel assignment.

Cell Coverage for Signal and Traffic

Signal reflections in flat and Hilly terrain, effect of human made structures, phase difference between direct and reflected paths, constant standard deviation, straight line path loss slope, General formula for mobile propagation over water and flat open area, near and long distance propagation, point to point model.

UNIT IV: Cell Site and Mobile Antennas **(9)**

Sum and difference patterns and their synthesis, directional antennas for interference reduction, Space Diversity Antennas, Umbrella Pattern Antennas, Minimum separation of cell site Antennas, High gain Antennas.

Handoff strategies

Handoff Initiation , Delaying a Handoff, forced handoff, mobile assisted handoff, intersystem handoff

UNIT V : Digital Cellular Networks

(9)

Analog and Digital cellular systems, Comparison between Multiple access schemes; TDMA, CDMA, FDMA, GSM architecture, GSM channels, Differences between 3G, 4G & 5G Cellular communications.

Total hours:45

COURSE OUTCOMES:

On successful completion of the course the student will be able to		**POs related to COs**
CO1	Identify the Limitations of Conventional telephone systems, Understand the concepts of Cellular systems	PO1, PO2
CO2	Identify various propagation effects and understand the concept of Interference both Co channel and Adjacent channel interference .	PO1, PO2, PO3
CO3	Analyze the concept of Frequency management, Signal reflections in flat and hilly terrain.	PO1, PO2,PO3
CO4	Understand the different types of antennas for interference reduction, Handoff strategies in cellular systems.	PO1, PO2,PO4
CO5	Knowledge of GSM mobile communication standard, its architecture, logical channels, advantages and limitations	PO1,PO2

TEXT BOOKS:

1. W.C.Y.Lee,"Mobile cellular Telecommunications", 2nd edition, Tata Mc-Graw Hill, New Delhi, 2006.
2. Theodre S.Rapport ,"Wireless communications", 2nd edition, Pearson Education, 2002.

REFERENCE BOOKS:

1. Gordon L.Stuber," Principles of Mobile communications", 2nd Edition, Springer International, 2007.
2. Jon W.Mark and weihua Zhqung ,"Wireless communications and Networking", PHI

REFERENCE WEBSITE:
https://www.electronics-notes.com/articles/connectivity/cellular-mobile-phone.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-
CO3	3	2	2	-	-	-	-	-	-	-	-	-
CO4	3	2	-	2	-	-	-	-	-	-	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-
CO*	3	2	2	2	-	-	-	-	-	-	-	-

IV B.Tech. - VII Semester

20ECE472C	**ADVANCED COMPUTER ARCHITECTURE**	**L T P C**
	(Professional core elective-4)	**3 0 0 3**

PRE-REQUISITES:

Course Educational Objectives:

CEO1: To understand the basics of fundamental computer units.
CEO2: To gain the knowledge on parallel computers and instruction level parallelism.
CEO3: To acquire knowledge memory concepts, functional principles and design of memory hierarchy.
CEO4: To obtain the concepts of multiprocessors.
CEO5: To be able to define the advanced processors and functionality.

UNIT 1: FUNDAMENTALS OF COMPUTER DESIGN (9)

Introduction, The task of a Computer Designer-Technology and Computer Usage Trends, Cost and Trends in Cost, Quantitative principles of computer design, Control Units: Hardwired And Micro Programmed Design Concept, Microprogramming, Bus architectures: Uni-bus and multi-bus architectures.

UNIT 2: PARALLEL COMPUTER MODELS AND INSTRUCTION LEVEL PARALLELISM (9)

The state of computing, Classification of parallel computers, Multiprocessors and multicomputers, Multivector and SIMD computers, Instruction Level Parallelism, Overcoming Data Hazards with Dynamic Scheduling, Reducing Branch Penalties with Dynamic , Hardware Support for Extracting More Parallelism.

UNIT 3: MEMORY HIERARCHY DESIGN (9)

Introduction, The Fundamentals of Caches, Reducing Cache Misses, Reducing Cache Miss Penalty, Reducing Hit Time, Main Memory, Virtual Memory, Issues in the Design of Memory Hierarchy.

UNIT 4: MULTIPROCESSORS (9)

Introduction, Characteristics of Application Domains, Centralized Shared Memory Architectures, Distributed Shared Memory Architectures, Synchronization, Models of Memory Consistency, Crosscutting Issues.

UNIT 5: ADVANCED PROCESSORS (9)

Advanced processor technology, CISC Scalar Processors, RISC Scalar Processors, Superscalar Processors, VLIW Architectures.

Total hours:45

Course Outcomes:

On successful completion of the course the student will be able to		**POs related to COs**
CO1	Able to know the functional units, classification and difference between uni-bus and multi-bus systems.	PO1, PO2
CO2	Demonstrate and the classification of parallel computers. Analyze the complex issues related to data hazard and branch penalties.	PO1, PO2, PO4
CO3	Classification of memory. Identify cache and memory related issues inmulti-processors and design of memory hierarchy.	PO1, PO2, PO3
CO4	Demonstrate the multiprocessors architecture and its classifications.	PO1, PO2

CO5	Acquire knowledge on advanced processors and difference between RISC and CISC.	PO1, PO2

TECT BOOKS:

1. Kai Hwang, "Advanced computer architecture", Tata-Mc. Graw Hill Publishers, 2000.
2. D. A. Patterson and J. L. Hennessey, "Computer organization and design," Morgan Kaufmann, 2nd Ed., 1998.
3. J.P.Hayes, "computer Architecture and organization", Mc-Graw Hill, 1998.

REFERENCE BOOKS:

1. Harvey G.Cragon,"Memory System and Pipelined processors"; Narosa Publication, 1998.
2. R.K.Ghose, RajanMoona&Phalguni Gupta, "Foundation of Parallel Processing"; Narosa Publications, 2003.

REFERENCE WEBSITE:

https://onlinecourses.nptel.ac.in/noc21_cs95/preview
https://of.co.uk/Assembly/Advanced%20Computer%20Architecture%20and%20Parallel%20Processing.pdf
https://pdfroom.com/books/advanced-computer-architecture-parallelism-scalability-programmability/KRd6oOe9gZp

CO-PO Mapping

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	--	-
CO2	3	2	-	2	-	-	-	-	-	-	--	-
CO3	2	3	2	-	-	-	-	-	-	-	--	-
CO4	3	2	-	-	-	-	-	-	-	-	--	-
CO5	3	2	-	-	-	-	-	-	-	-	--	-
CO*	3	2.2	2	2	-	-	-	-	-	-	--	-

IV B.Tech. - VII Semester

20ECE473A	**DIGITAL IMAGE PROCESSING**	**L T P C**
	(Professional core elective-5)	**3 0 0 3**

PRE-REQUISITES: Signals and systems

Course Educational Objectives:

CEO1: To provide introduction to students the fundamentals of Digital .Image Processing system and its breadth and depth of the field ,to perform transformation o images.

CEO2: To analyze the spatial and frequency domain enhancement techniques and students to apply. Appropriate algorithms to perform image enhancement in both spatial and frequency domain

CEO3: To analyze the techniques and appropriate algorithms, to perform Image Degradation or Restoration & Image segmentation.

CEO4: To Identify need For Image Compression and to acquire the fundamental knowledge on color image Processing

CEO5: To understand the Principal Components for Description, Object Recognition in image processing.

UNIT 1: DIGITAL IMAGE FUNDAMENTALS & IMAGE TRANSFORMS

DIGITAL IMAGE FUNDAMENTALS Introduction to image processing- fundamental steps in digital image processing- components of image processing system- image sensing and acquisition- image sampling and quantization- some basic relationships between pixels .

IMAGE TRANSFORMS: 2-D DFT and Properties- Walsh transform- Hadamard Transform- Discrete cosine Transform - Haar transform- Slant transform.

UNIT 2: IMAGE ENHANCEMNT IN THE SPATIAL AND FREQUENCY DOMAIN

Image Enhancement (Spatial Domain): Introduction, Image Enhancement in Spatial Domain, Enhancement Through Point Processing, Types of Point Processing, Histogram Processing, Linear and Non – Linear Gray Level Transformation, Median Filter, Spatial Domain High-Pass Filtering,

Image Enhancement (Frequency Domain): Filtering in Frequency Domain, Low Pass (Smoothing) and High Pass (Sharpening) Filters in Frequency Domain.

UNIT 3: IMAGE DEGRADATION/RESTORATION&IMAGESEGMENTATION

Noise models- Restoration in the presence of noise only spatial filtering-mean order statistic and adaptive filters- estimating the degradation function- inverse filtering- wiener filtering- constrained least squares filtering. Point line and edge detection- thresholding- region based segmentation.

UNIT 4: IMAGE COMPRESSION & COLOR IMAGE PROCESSING

Need for image compression- classification of Redundancy in images- image compression models- classification of image compression schemes- Run length coding- arithmetic coding- block truncation coding - Color models- Color image processing.

UNIT 5: IMAGE REPRESENTATION AND OBJECT RECOGNITION

Representation, Boundary Descriptors, Regional Descriptors, Use of Principal Components for Description, Object Recognition: Patterns and Pattern Classes, Recognition Based on Decision-Theoretic Methods.

COURSE OUTCOMES:

On successful completion of the course the student will be able to		POs related to COs
CO1	Understand the concepts of image, image processing system and various operations that can perform on digital images, to perform transformations on images.	**PO1,PO2**
CO2	Analyze the images in the spatial domain and perform Enhancement in the Spatial Domain and frequency Domain	**PO1,PO2,PO3**
CO3	Select the adaptive filters for perform degradation/restoration process in the images ,Apply image segmentation on Edge Linking and Boundary Detection,	**PO1,PO2,PO3**
CO4	Identifying the Need for image compression, and discussing the concept of colour image fundamentals	**PO1,PO2,PO3**
CO5	Analyze Use of Principal Components for Description, Object Recognition	**PO1,PO2,PO3**

TEXT BOOKS:

1. Digital Image processing, 3rd Ed., 2010, R.C. Gonzalez & R.E. Woods, Addison Wesley/ Pearson Education, New Delhi.
2. Fundamentals of Digital Image processing, Eastern Economy Edition, 2007, A.K.Jain, PHI, New Delhi.

REFERENCES:

1. Digital image processing, 1st Ed., 2009, S.jayaraman, S.Esakkirajan, T.Veerakumar, Tata McGraw Hill. New Delhi.
2. Digital Image processing using MAT LAB, 2004, Rafael C. Gonzalez, Richard E Woods and Steven, PEA, New Delhi.
3. Digital Image Processing, 3rd Ed., 2004, William K. Pratt, John Wilely, PHI, New Delhi.
4. Digital image processing and analysis, 1st Ed., 2006, B.chanda, Dutta Majumder, PHI private Limited, New Delhi.

CO-PO Mapping

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-
CO4	3	3	3	-	-	-	-	-	-	-	-	-
CO5	3	3	2	-	-	-	-	-	-	-	-	-
CO*	3	2.8	2.75	-	-	-	-	-	-	-	-	-

IV B.Tech. - VII Semester

20ECE473B	**WIRELESS COMMUNICATION NETWORKS**	**L T P C**
	(Professional core elective-5)	**3 0 0 3**

PRE-REQUISITES: Analog and digital communications

COURSE EDUCATIONAL OBJECTIVES:

1. To provide knowledge on
- Understanding Basics of wireless communications.
- Generations of Wireless networks
- Packet radio protocols

2. To provide the student with an understanding of Mobile IP, GSM architecture.
3. To inculcate skill to learn about different wireless data services, Access protocols.
4. To develop skill to understand the architecture of Bluetooth and its protocols.
5. Analyse students about types of LAN and ATM Technology.

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UNIT - I: INTRODUCTION TO WIRELESS NETWORKING (9)

Introduction to Wireless Networks, Difference between wireless and fixed telephone networks, Development of wireless networks. Traffic routing in wireless networks, Overview of Multiple access, SDMA, packet radio protocols.

UNIT - II: MOBILE IP& MOBILE DATA NETWORKS (9)

Mobile IP Operation of mobile IP, Co-located address, Registration, Tunneling, , GPRS and higher data rates, Short Messaging service in GSM ,Mobile application protocol.

UNIT - III: WIRELESS DATA SERVICES (9)

CDPD, ARDIS, RMD, Common channel signalling, ISDN, BISDN, SS7, SS7 user part, signaling traffic in SS7.

WIRELESS ACCESS PROTOCOL: WAP Architecture, overview, WML scripts, WAP service,WAP session protocol, wireless transaction, Wireless datagram protocol.

UNIT -IV: BLUE TOOTH (9)

Overview, Radio specification, Base band specification, Links manager specification, Logical link control and adaptation protocol. Introduction to WLL Technology.

UNIT-V: WIRELESS ATM TECHNOLOGY (9)

Infrared LANs, Spread spectrum LANs, Narrow bank microwave LANs,IEEE802.11 architecture and services.

Wireless ATM & HIPER LAN: Introduction, Wireless ATM, HIPERLAN, Adhoc Networking and WPAN.

COURSE OUTCOMES: **Total hours:45**

On successful completion of the course the student will be able to		**POs related to COs**
CO1	To understand the Basics of wireless communications and types of Multiple access techniques.	PO1, PO2
CO2	Understand Mobile IP, collocated address & knowledge on Mobile data Networks.	PO1,PO2
CO3	Analyze the concept of Wireless data services, WML scripts.	PO1, PO2,PO3

CO4	Illustrate the architecture of Bluetooth and Wireless Local Loop technology.	PO1, PO2,PO4
CO5	Evaluate the Types of LANs and Analyze the Concept of Wireless ATM.	PO1,PO2

TEXT BOOKS:

1. Theodore S.Rappaport ,"Wireless Communications", Principles, Practice –, PHI, 2nd Ed., 2002.
2. William Stallings,"Wireless Communication and Networking" , PHI,2003.

REFERENCES:

1. Kamilo Feher ,"Wireless Digital Communications" –, PHI, 1999.
2. Kaveh Pah Laven and P. Krishna Murthy,"Principles of Wireless Networks," Pearson Education, 2002.

REFERENCE WEBSITE:

https://www.egr.msu.edu/~tongli/Introduction-WCN.pdf

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-
CO3	3	2	2	-	-	-	-	-	-	-	-	-
CO4	3	2	-	2	-	-	-	-	-		-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-
CO*	3	2	2	2	-	-	-	-	-	-	-	-

IV B.Tech. - VII Semester

20ECE473C	LOW POWER VLSI DESIGN	L T P C
	(Professional core elective-5)	2 1 0 3

PRE-REQUISITES: Device Physics, Digital Electronics, VLSI Design

COURSE EDUCATIONAL OBJECTIVES:

1. To understand and identify basics of low power design method.
2. To analyze power estimation methods.
3. To perform low power synthesis.
4. To design low voltage CMOS circuits.
5. To develop skill and apply the concept of low power in SRAM memory.

UNIT –1: PHYSICS OF LOW POWER DESIGN (9)

Introduction - Sources of power dissipation – Designing for low power – Physics of power dissipation in MOSFET devices – Power dissipation in CMOS – Low power VLSI design: Limits.

UNIT –2: POWER ESTIMATION (9)

Modeling of Signals - Probabilistic Techniques for Signal Activity Estimation - Statistical Techniques - Estimation of Glitching Power - Sensitivity Analysis - Power Estimation Using Input Vector Compaction - Power Dissipation in Domino CMOS - Circuit Reliability - Power Estimation at the Circuit Level.

UNIT –3: SYNTHESIS FOR LOW POWER (9)

Behavioral Level Transforms: Algorithm Level Transforms for Low Power , Power-Constrained Least-Squares Optimization for Adaptive and Nonadaptive Filters, Circuit Activity Driven Architectural Transformations , Architecture-Driven Voltage Scaling , Power Optimization Using Operation Reduction and substitution, Precomputation-Based Optimization for Low Power – Logic Level Optimization for Low Power - Circuit Level.

UNIT –4: DESIGN OF LOW VOLTAGE CMOS CIRCUITS (9)

Circuit Design Style - Leakage Current in Deep Submicrometer Transistors - Deep Submicrometer Device Design Issues - Key to Minimizing SCE - Low-Voltage Circuit Design Techniques - Low-Voltage Circuit Design Techniques - Multiple Supply Voltages.

UNIT –5: LOW POWER STATIC RAM (9)

Organization of a Static RAM - MOS Static RAM Memory Cell - Banked Organization of SRAMs - Reducing Voltage Swings on Bit Lines - Reducing Power in the Write Driver Circuits - Reducing Power in Sense Amplifier Circuits -Method for Achieving Low Core Voltages from a Single Supply.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs
CO1	Identify sources of power in an IC.	**PO1, PO2**
CO2	Demonstrate knowledge on power estimation in CMOS VLSI circuits.	**PO1, PO2, PO4**
CO3	Perform synthesis and optimization.	**PO1, PO2**
CO4	Design the low voltage CMOS logic.	**PO1, PO2, PO3, PO4**
CO5	Understand and apply the concept of low power in SRAM memory.	**PO1, PO2, PO4**

TEXT BOOKS:

1. Kaushik Roy, Sharat C. Prasad, "Low power CMOS VLSI circuit design", Wiley Interscience Publication, 2000.
2. A.P.Chandrasekaran and R.W.Broadersen, "Low power digital CMOS design", Kluwer Academic Publisher,1995.

REFERENCE BOOKS:

1. Gary K. Yeap, "Practical Low Power Digital VLSI Design", Kluwer Academic Publisher, 2002.
2. Abdelatif Belaouar, Mohamed.I.Elmasry, "Low power digital VLSI design", Kluwer Academic Publisher, 1995.
3. J.B.Kulo and J.H Lou, "Low voltage CMOS VLSI Circuits", Wiley Publications, 1999.

REFERENCE WEBSITE:

1.https://nptel.ac.in/courses/106/105/106105034/
2.https://www.worldscientific.com/doi/abs/10.1142/S0129156496000098?journalCode=ijhses

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2	-	-	-	-	-	-	-	-	-	-
CO.2	3	3	-	2	-	-	-	-	-	-	-	-
CO.3	3	2	-	-	-	-	-	-	-	-	-	-
CO.4	3	3	2	2	-	-	-	-	-		-	-
CO.5	3	2	-	2	-	-	-	-	-	-	-	-
CO*	**3**	**2.4**	**2**	**2**	-	-	-	-	-	-	-	-

IV B.Tech. - VII Semester

20OCIV471	DISASTER MANAGEMENT AND MITIGATION (OPEN ELECTIVE - 3)	L T P C 3 0 0 3

PRE-REQUISITES: A Course on Environmental Studies.

COURSE OUTCOMES:

1. To explain the disaster phenomenon and disaster preparedness.
2. To demonstrate the roles and responsibilities of different agencies.
3. To explain the disaster management techniques
4. To explain concept of disaster mitigation strategies
5. To demonstrate the different case studies on disaster management

UNIT I: INTRODUCTION TO DISASTER PREPAREDNESS (9)

Disaster Management- Prevention-Preparedness and Mitigation-Disaster Preparedness-Concept & Nature-Disaster Preparedness Plan-Disaster Preparedness for People and Infrastructure · Community based Disaster Preparedness Plan. Mitigation process-disaster management techniques, disaster management aspects.

UNIT II: ROLES & RESPONSIBILITIES OF DIFFERENT AGENCIES (9)

Roll of Information-Education-Communication & Training-Role and Responsibilities of Central-State-District and local administration-Role and Responsibilities of Armed Forces-Police-Paramilitary Forces-Role and Responsibilities of International Agencies-NGOs-Community Based Org. (CBO s), disaster management quality control.

UNIT III: TECHNOLOGIES FOR DISASTER MANAGEMENT (9)

Role of IT in Disaster Preparedness-Remote Sensing-GIS and GPS-Use and Application of Emerging Technologies-Application of Modern Technologies for the Emergency Communication-Application and use of ICST for different disasters

UNIT IV: DISASTER MITIGATION (9)

Meaning and concept-Disaster Mitigation Strategies-Emerging Trends in Disaster Mitigation · Mitigation Management-Role of Team and Coordination

UNIT V: DISASTER MANAGEMENT (9)

Applications and case studies and field works-Landslide Hazard Zonation-Case Studies-Earthquake Vulnerability Assessment of Buildings and Infrastructure-Case Studies-Drought Assessment-Case Studies-Coastal Flooding-Storm Surge Assessment-Floods-Fluvial and Pluvial Flooding-Case Studies-Forest Fire-Case Studies-Man Made Disasters-Case Studies-Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

TOTAL HOURS: 45

COURSE OUTCOMES:

On successful completion of the course the student will be able to,		POs related to Cos
CO1	Explain the disaster phenomenon and disaster preparedness	**PO1**
CO2	Demonstrate the roles and responsibilities of different agencies	**PO6**
CO3	Analyse the techniques for disaster management	**PO2**
CO4	Demonstrate the disaster mitigation strategies	**PO6 PO7**
CO5	Apply the knowledge gained to manage the disasters.	**PO1, PO12**

TEXTBOOKS:

1.Bryant Edwards (2005): Natural Hazards, Cambridge UniversityPress, U.K.

2.Roy, P.S "Space Technology for Disaster management" A Remote Sensing & GIS Perspective, Indian Institute of Remote Sensing(NRSA) Dehradun,. (2000)

REFERENCES:

1.Singh B.K., 2008, "Handbook of Disaster Management",Techniques & Guidelines, Rajat Publication.

2.Ghosh G.K., 2006, "Disaster Management", APH Publishing Corporation

3.Disaster Medical Systems Guidelines. Emergency Medical Services Authority, State of California, EMSA no.214, June2003

4.Inter Agency Standing Committee (IASC) (Feb. 2007). IASC Guidelines on Mental Health and Psychosocial Support in Emergency Settings. Geneva: IASC

REFERENCE BOOKS:

1. https://nptel.ac.in/courses/105/104/105104183/

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	-	-	-	-	-	-	-	-	-	-	-
CO.2	-	-	-	-	-	3	-	-	-	-	-	-
CO.3	-	3	-	-	-	-	-	-	-	-	-	-
CO.4	-	-	-	-	-	3	2	-	-	-	-	-
CO.5	2	-	-	-	-			-	-	-	-	2
CO*	**2**	**3**	-	**2**	-	**3**	**2**	**-**	**-**	**-**	**-**	**2**

20OEEE471	PLC AND APPLICATIONS (Open Elective-3)	L	T	P	C
		3	0	0	3

Pre-Requisites:A course on Digital circuit Analysis, switching theory and logic design

COURSE EDUCATIONAL OBJECTIVES:

1	Gain the Knowledge of various skills necessary for Industrial applications of Programmable logic controller (PLC).
2	Understand the basic programming concepts and various logical Instructions used in Programmable logic controller (PLC).
3	Gain the Knowledge on PLC Timers and Counters.
4	Solve the problems related to I/O module, Data Acquisition System and Communication Networks using Standard Devices.
5	provide knowledge on DLC and its applications

UNIT-1: INPUT AND OUTPUTMODULES (9)

PLC Basics: PLC system - I/O modules and interfacing - CPU processor - programming Equipment - programming formats - construction of PLC ladder diagrams - Devices connected to I/O modules.PLC Programming: Input instructions - outputs - operational procedures - programming examples using contacts and coils. Drill press operation.

UNIT-2: DESIGN AND PROGRAMMING (9)

Digital logic gates - programming in the Boolean algebra system - conversion examples. Ladder Diagrams for process control: Ladder diagrams & sequence listings - ladder diagram construction and flowchart for spray process system.

UNIT-3: PLC REGISTERS (9)

PLC Registers: Characteristics of Registers - module addressing - holding registers - Input Registers - Output Registers.PLC Functions: Timer functions & Industrial applications - counter function & industrial applications - Arithmetic functions - Number comparison functions - number conversion functions

UNIT-4: PLC APPLICATIONS (9)

Data Handling functions: SKIP - Master control Relay - Jump - Move - FIFO - FAL - ONS - CLR & Sweep functions and their applications. Bit Pattern and changing a bit shift register - sequence functions and applications - controlling of two-axis & three axis Robots with PLC - Matrix functions.

UNIT-5: DCS AND ITS APPLICATIONS (9)

Distributed Control System (DCS) – Evolution – Different Architectures – Logical Control Unit – Operator Interface – Display – Engineering Interface.DCS Applications to Power Plant – Iron and Steel Plants – Chemical Industries – Paper and Pulp Industries.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		**POs related to COs**
CO1	Have knowledge of Programmable Logic Controller domain on various Logical Operation and Various Advanced Logical Instruction, I/O Module, Sensor, Actuator, Communication and Measurement System.	**PO1,PO12**
CO2	Understand the basic programming concepts and various logical Instructions used in Programmable logic controller (PLC).	**PO1,PO2,PO3,PO4,PO5,PO11,PO12**
CO3	Understand the operation of Timers and Counters in Programmable logic controller (PLC).	**PO1, PO11,PO12**
CO4	Compute the extent and nature of electronic circuitry in	**PO1,PO2,PO3,PO**

	Programmable logic controller (PLC) and SCADA including monitoring and control circuits for Communication and Interfacing.	**4,PO5,PO12**
CO5	Provide knowledge on DLC and its applications	**PO1,PO3,PO4,PO 11,PO12**

TEXT BOOKS

1. Programmable Logic Controllers by W. Bolton - 5th Edition - Elsevier - 2010
2. Programmable Logic Controllers- Principles and Applications by John W. Webb & Ronald A. Reiss - Fifth Edition - PHI

REFERENCE BOOKS

1. Programmable Logic Controllers- Programming Method and Applications –JR. Hackworth &F.D Hackworth Jr. –Pearson - 2004.
2. Distributed Computer Control of Industrial Automation by Popovic D and Bhatkar V. P - MarcelDekkar Inc. - 1990.
3. Distributed Control Systems by Michal P. Lucas - Vann strand - Reinhold Co. - 1986.

REFERENCE WEBSITE LINK:
https://nptel.ac.in/courses/117/106/117106086/

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	-	-	-	-	-	-	-	-	-	-	2
CO.2	3	3	2	2	2	-	-	-	-	-	-	2
CO.3	3	-	-	-	-	-	-	-	-	-	2	2
CO.4	3	3	2	2	2	-	-	-	-	-	-	2
CO.5	3	-	2	2	-	-	-	-	-	-	2	2
CO*	3	-	2	2	2						2	2

IV B.TECH.-VII SEMESTER

		L	T	P	C
20OMEC471	**PRODUCT DESIGN AND INNOVATION** (Open Elective - 3)	**3**	**0**	**0**	**3**

PRE-REQUISITES: Nil.

COURSEEDUCATIONALOBJECTIVES:

1. To develop the Characteristics of successful product design and development inanorganization
2. Toevaluatetheproduct planningandproductspecificationofaproduct
3. To understand the generation, selection and testing of a concept in the productdesign.
4. To develop product architecture and design for manufacturing new product
5. To understand the prototypes and principles.

UNIT–1: INTRODUCTION TO PRODUCT DESIGN AND INNOVATION (9)

Characteristics and challenges of successful product development – Productdevelopment concept – Genericproductdevelopment– Processflowandorganization structure – Opportunity identification and process – Establish acharter – Generate many opportunities – Screening and develop of promising opportunities – Select exceptional opportunities.

UNIT–2: PRODUCT PLANNING AND PRODUCT SPECIFICATION (9)

Product planning process – Identification of opportunities – Evaluation and prioritization ofprojects – Allocation of resources and timing – Pre-project planning – Identification of customer needs – Collection andInterpretation of raw data from customers – Organization of the needs – Establishment ofrelativeimportanceofneeds–Productspecifications– Targetspecifications–Setting-up offinalspecifications.

UNIT–3: CONCEPT GENERATION, SELECTION, TESTING (9)

Concept generation – Clarification of the problem – Searching externally and internally – Systematic exploration – Concept selection – Conceptscreening and concept scoring – Concept testing – Surveypopulation and format – Measuring the customer response.

UNIT–4: PRODUCT ARCHITECTURE AND DESIGN FOR MANUFACTURE (9)

Product architecture, modularity and implications – Delayeddifferentiation– Platformplanning–System-level – Quality of industrial design – Design for environment process – Potential environmental impacts – DFEguidelines to the product design – Assessing and elimination of environmental impacts –Design for manufacturing– Estimation of manufacturingcosts – Reduction of costs of components, assembly, supporting production
– ImpactdecisionsofDFM.

UNIT–5: PRODUCT DEVELOPMENT ECONOMICS AND MANAGING PROJECTS (9)

Planning of prototypes – Robust design process –Identify the performance metrics, andnoisefactors – Objective function and experimental plan – Run the experiment – Repeat and confirm factor – Overview, formulation, strategy and utility ofpatents– Priorinventions– Refineclaims – Product development economics andanalysis – Financial model – Use of sensitivity analysis – Project success – Managing projects – Baseline project planning – Projectexecution.

Total Hours: 45

COURSEOUTCOMES:

On successful completion of the course, students will be able to		POs and COs Mapping
CO1	Describe the Characteristics of successful product development in an organization	**PO1, PO2, PO3**
CO2	Evaluate the product planning and product specification of a product	**PO1, PO2, PO3**
CO3	Understand the generation, selection and testing of a product concept	**PO1, PO2, PO3**
CO4	Develop product architecture and design for manufacturing new product	**PO1, PO2, PO3**
CO5	Understand the principles of prototypes, economics and project management	**PO1, PO2, PO3, PO11**

TEXTBOOKS:

1. UlrichK.T.andEppingerS.D.,"ProductDesignandDevelopment",McGraw-HillEducation, 6/e, 2015.
2. KevinOtto and Kristin Wood, "Product Design: Techniques in Reverse Engineering andNew Product Development", Pearson Education, 1/e, 2003.

REFERENCEBOOKS:

1. Paul Trott, "Innovation Management and New Product Development", Pearson Education, 6/e, 2016.
2. Chitale.A. KandGupta.R.C, "Product Design and Manufacturing", Prentice Hall of India,NewDelhi, 2011.
3. Mukesh Chaturvedi, Aseem Kumar and Rahul Manmohan, "Managing Innovations andNew Product Development: Concepts and Cases", PHI Learning, 2009.
4. James M. Morganand Jeffrey K.Liker, "Designing the Future", McGraw-Hill Education,1/e, 2019.
5. James M. Morgan and Jeffrey K.Liker, "Designing the Future", McGraw-Hill Education,1/e, 2019.

REFERENCEWEBSITE:

1. https://nptel.ac.in/courses/112/107/112107217/
2. https://nptel.ac.in/courses/112/104/112104230/

CO-PO MAPPING

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2	1	-	-	-	-	-	-	-	-	-
CO.2	3	2	1	-	-	-	-	-	-	-	-	-
CO.3	3	2	1	-	-	-	-	-	-	-	-	-
CO.4	3	2	1	-	-	-	-	-	-	-	-	-
CO.5	3	2	1	-	-	-	-	-	-	-	1	-
CO*	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	-

IV B.Tech - VII Semester

		L	T	P	C
20OCSM471	**FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE**	**3**	**0**	**0**	**3**
	(Open Elective - 3)				

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To study the concepts of Artificial Intelligence.
2. To understand the search strategies and Problem solving using Artificial Intelligence.
3. To gain insight information about Logical Agents and Reasoning patterns in propositional logic
4. To study the Uncertain Knowledge and Reasoning
5. To study the Application of Robotics and predictive analytics using Rapid Miner

UNIT I: INTRODUCTION TO ARTIFICIAL INTELLIGENCE, PROBLEMS, PROBLEMSPACES AND SEARCH (9)

The AI Problems - The underlying assumption - The AI technique - The levels of the model - Criteria of success - Some general references - Defining the problem as a State space search - Production systems - Problem characteristics - Production system characteristics

UNIT II: PROBLEM SOLVING, UN-INFORMED SEARCH STRATEGIES, INFORMED SEARCH AND EXPLORATION (9)

Uninformed search strategies - Avoiding repeated states - Informed (Heuristic) search strategies - Heuristic functions - Local search algorithms and optimization problems - Local search in continuous spaces - Backtracking search for CSPs.

UNIT III: KNOWLEDGE AND REASONING (9)

Logical agents – Knowledge based agents - The wumpus world – Logic - Propositional logic - a very simple logic - Reasoning patterns in propositional logic - Effective propositional inference - Agents based on propositional logic

UNIT IV: UNCERTAIN KNOWLEDGE AND REASONING, LEARNING (9)

Uncertainty - Acting under uncertainty - Baye's rule and its use - Learning from observations - Forms of learning - Inductive learning - Learning decision trees

UNIT V: ROBOTICS AND PREDICTIVE ANALYTICS (9)

Robotics: Introduction-Robot hardware - Robotic perception - Planning to move-Robotic software Architectures - Application Domains

TOTAL HOURS: 45

COURSE OUTCOMES:

On successful completion of the course the student will be		POs related to COs
CO1	Gain the basic Knowledge about AI technique and Production systems	**PO1**
CO2	Comprehend the Un informed and Informed Search Strategies.	**PO1, PO2, PO3**
CO3	Analyze and Implement Reasoning patterns in propositional logic	**PO1, PO2, PO3**
CO4	Formulate the Knowledge and Reasoning techniques in solving problems	**PO1, PO2, PO4**
CO5	Apply Robotics to Solve Real world Problems	**PO1, PO2, PO4, PO5**

TEXT BOOKS:

1. Wolfgang Ertel, "Introduction to Artificial Intelligence", 2nd Edition, Springer International Publishing, 2017.
2. David L.Poole, Alan K.Mackworth, "Artificial Intelligence , Foundations of Computational Agents", 1st Edition, Cambridge University Press, 2010

REFERENCE BOOKS:

1. Stuart J.Russell, Peter Norvig, "Artificial Intelligence A Modern Approach", 4thEdition,
Pearson Education, 2020.
2. Deepak Khemani, "A First Course in Artificial Intelligence", McGraw Hill, 2017.

REFERENCE WEBSITE:

1. http://peterindia.net/AILinks.html
2. https://nptel.ac.in/courses/106/102/106102220/

CO-PO MAPPING

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	2	2	3	-	-	-	-	-	-	-	-	-
CO3	3	2	3	-	-	-	-	-	-	-	-	-
CO4	2	3	-	2	-	-	-	-	-	-	-	-
CO5	2	2	-	2	2	-	-	-	-	-	-	-
CO*	**2.4**	**2.25**	**3**	**2**	**2**	-	-	-	-	-	-	-

IV B.Tech-VII SEMESTER

20OHSM471	**NANO SCIENCE AND TECHNOLOGY** (Open Elective - 3)	**L T P C** **3 0 0 3**

PRE-REQUISITES: NIL

COURSEEDUCATIONALOBJECTIVES:

1. To Understand the basic scientific concepts of Nanoscience, and various types of Nano materials.
2. To study various methods of synthesising Nanomaterials
3. To identify different characterisation techniques for Nanomaterials
4. To Understand the properties of Nanomaterials and the applications of Nano materials in various fields
5. To study various carbon Nanomaterials

UNIT-I: INTRODUCTION TO NANO SCIENCE AND TECHNOLOGY (9)

Definition of nano scale,-Significance of nano scale–Surface to volume ratio-Quantum confinement effect-Types of Nano materials: Zero, one and two dimensional nano materials with examples.

UNIT-II: PREPARATION OF NANOMATERIALS (9)

Top-Down and Bottom-Up approaches- Methods of preparation: Sol-gel method - Chemical vapour deposition- Plasma arching - Ball milling - Electro-chemical deposition.

UNIT-III: STRUCTURE AND SURFACE CHARACTERIZATION OF NANO MATERIALS (9)

X-Ray diffraction - Ultraviolet–Visible Spectroscopy – Fourier Transform Infrared Spectroscopy –Scanning Electron Microscopy **–** Transmission electron microscopy – Scanning Tunneling Microscope -Atomic force microscopy.

UNIT-IV: PROPERTIES AND APPLICATIONS OF NANO MATERIALS (9)

Physical Properties - Chemical Properties - Mechanical properties - Electrical properties - Thermal properties - Magnetic properties - Optical Properties - Applications in Material science, Biology and Medicine, Surface science, Energy, Environment, Industry, Sports& Consumer products.

UNIT-V : CARBON NANOTUBES (9)

Allotropes of carbon **-** Graphene- Fullerences **-** Types of Carbon Nanotubes -Single walled carbon nanotubes- Multiwalled carbon nanotubes- Fabrication of carbon nanotubes using Plasma Arching Method- Properties and Applications of Carbon nanotubes.

TOTAL HOURS: 45

COURSE OUTCOMES:

On successful completion of the course the student will be able to,		POs related to COs
CO1	**Acquire** the basic knowledge on Nanoscience, and various types of Nano materials.	PO1, PO12
CO2	**Identify** appropriate method for the preparation of Nano materials	PO1, PO12
CO3	**Develops** skill to characterize Nanomaterials by various techniques	PO1, PO4, PO12
CO4	**Analyze** the different properties of Nanomaterials and identify their applications in various fields	PO1, PO12
CO5	**Develop** Knowledge on carbon Nano materials	PO1, PO12

TEXT BOOKS:

1. M.R. Srinivasan, New Age International, "Engineering Physics", Chennai 2011
2. K. Thyagarajan, "Engineering Physics", Mc Graw Hill Publishers, First Edition, New Delhi, 2014.
3. Er. Rakesh Rathi, S. Chand, "Nanotechnology-Technology Revolution" of 21st Century Publications

REFERENCE BOOKS:

1. Nanotechnology- A Gentle Introduction to the Next Big Idea. Kindersely, India. Pvt., New Delhi, 2003,Dorling
2. Nano- The Essentials Understanding Nano Science and Nanotechnology), Tata McGraw - Hill Publication 2010,

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	1
CO2	3	-	-	-	-	-	-	-	-	-	-	1
CO3	3	-	-	2	-	-	-	-	-	-	-	1
CO4	3	-	-	-	-	-	-	-	-	-	-	1
CO5	3	-	-	-	-	-	-	-	-	-	-	1
CO*	**3**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**

IV B.Tech. - VII Semester

20OCIV472	**INDUSTRIAL WASTE TREATMENT AND DISPOSAL** (OPEN ELECTIVE - 4)	**L T P C** **3 0 0 3**

PRE-REQUISITES: A Course on Environmental Engineering

COURSE OUTCOMES:

1. To make the students understand about industrial waste characteristics and effects on sewer land and streams.
2. To provide knowledge about waste management approach through cleaner production
3. To make the students understand about pollution from major industries
4. To gain knowledge about various treatment technologies regarding industrial wastewater.
5. To provide knowledge about hazardous waste management and disposal

UNIT I:INTRODUCTION (9)

Types of industries and industrial pollution – Characteristics of industrial wastes – Population equivalent – Bioassay studies – effects of industrial effluents on streams, sewer, land, sewage treatment plants and human health – Environmental legislations related to prevention and control of industrial effluents and hazardous wastes

UNIT II:CLEANER PRODUCTION (9)

Waste management Approach – Waste Audit – Volume and strength reduction – Material and process modifications – Recycle, reuse and byproduct recovery – Applications.

UNIT III:POLLUTION FROM MAJOR INDUSTRIES (9)

Sources, Characteristics, waste treatment flow sheets for selected industries such as Textiles, Tanneries, Pharmaceuticals, Electroplating industries, Dairy, Sugar, Paper, distilleries, Steel plants, Refineries, fertiliser, thermal power plants – Wastewater reclamation concepts

UNIT IV:TREATMENT TECHNOLOGIES (9)

Equalisation – Neutralisation – Removal of suspended and dissolved organic solids - Chemical oxidation – Adsorption - Removal of dissolved inorganics – Combined treatment of industrial and municipal wastes – Residue management – Dewatering - Disposal

UNIT V:HAZARDOUS WASTE MANAGEMENT (9)

Hazardous wastes - Physico chemical treatment – solidification – incineration – Secured landfills

TOTAL HOURS: 45

COURSE OUTCOMES:

On successful completion of the course the student will be able to		POs related to COs
CO1	Understand the nature and characteristics of industrial wastewater	**PO1, PO2**
CO2	Understand the waste management approach adopting cleaner production technology	**PO1, PO2**
CO3	Analyse the pollution from major industries	**PO1, PO2, PO3**
CO4	Understand the various treatment technologies regarding industrial wastewater	**PO3, PO6**
CO5	Understand the hazardous waste management and disposal	**PO1, PO2, PO3**

TEXTBOOKS:

1. M.N.Rao&A.K.Dutta, "Wastewater Treatment", Oxford - IBH Publication, 1999.
2. W .W. Eckenfelder Jr., "Industrial Water Pollution Control", McGraw-Hill Book Company, New Delhi, 2000.

REFERENCES:

1. T.T.Shen, "Industrial Pollution Prevention", Springer, 1999.
2. R.L.Stephenson and J.B.Blackburn, Jr., "Industrial Wastewater Systems Handbook", Lewis Publisher, New Yark, 1998

REFERENCE WEBSITES:

1. https://nptel.ac.in/courses/105/106/105106056/https://nptel.ac.in/courses/105/105/105105169/

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2	-	-	-	-	-	-	-	-	-	-
CO.2	2	3	-	-	-	-	-	-	-	-	-	-
CO.3	1	2	3	-	-	-	-	-	-	-	-	-
CO.4	-	-	2	-	-	2	-	-	-	-	-	-
CO.5	1	2	3	-	-	-	-	-	-	-	-	-
CO*	**1.66**	**2.25**	**2.66**		**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**

IV B.Tech-VII Semester

		L	T	P	C
20OEEE472	**ELECTRIC VEHICLE TECHNOLOGY (Open Elective-4)**	**3**	**0**	**0**	**3**

COURSE EDUCATIONAL OBJECTIVES:

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

1. Understand Electric and Hybrid Electric Vehicles
2. Study and analyze the Energy Storage for EV and HEV
3. Study and understand the concept of Electric Propulsion
4. Analyze and design the Electric and Hybrid Electric Vehicles
5. Study operation of Power Electronic Converter for Battery Charging.

UNIT-I: ELECTRIC AND HYBRID ELECTRIC VEHICLES (9)

Configuration of Electric Vehicles, Performance of Electric Vehicles, Traction motor characteristics,TractiveeffortandTransmissionrequirement,Vehicleperformance,Tractiveeffortinnormaldriving, Energy consumption Concept of Hybrid Electric Drive Trains, Architecture of Hybrid ElectricDriveTrains,SeriesHybridElectricDriveTrains,Parallelhybridelectricdrivetrains.

UNIT-II: ENERGY STORAGE FOR EV AND HEV (9)

Energy storage requirements, Battery parameters, Types of Batteries, Modeling of Battery, Fuel Cellbasic principle and operation, Types of Fuel Cells,PEMFCanditsoperation,SuperCapacitors.

UNIT-III: ELECTRICPROPULSION (9)

EV consideration, DC motor drives and speed control, Induction motor drives, Permanent MagnetMotor Drives, Switch Reluctance Motor Drive for Electric Vehicles, Configuration and control ofDrives.

UNIT-IV: DESIGN OF ELECTRIC AND HYBRID ELECTRIC VEHICLES (9)

Series Hybrid Electric Drive Train Design: Operating patterns, control strategies, Sizing of majorcomponents,powerratingoftractionmotor,powerratingofengine/generator,anddesignofPPS. Parallel Hybrid Electric Drive Train Design: Control strategies of parallel hybrid drive train,design of engine power capacity, design of electric motor drive capacity, transmission design, andenergystoragedesign.

UNIT-V: POWER ELECTRONIC CONVERTER FOR BATTERY CHARGING (9)

Charging methods for battery, Termination methods, charging from grid, The Z-converter, Isolated bidirectional DC-DC converter, Design of Z-converter for battery charging, High-frequency transformer based isolated charger topology, Transformer less topology.

TOTAL HOURS: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs
CO1	Understand Electric and Hybrid Electric Vehicles	PO1,PO2,PO3
CO2	Study and analyze the Energy Storage for EV and HEV	PO1,PO2,PO3
CO3	Study and understand the concept of Electric Propulsion	PO1,PO2,PO3
CO4	Analyze and design the Electric and Hybrid Electric Vehicles	PO1,PO2,PO3
CO5	Study operation of Power Electronic Converter for Battery Charging.	PO1,PO2,PO3

TEXTBOOKS:

1. M.Ehsani, Y.Gao,S.Gayand AliEmadi, Modern Electric, Hybrid Electric and Fuel Cell Vehicles″Fundamentals, Theory and Design″, CRC Press, 2005
2. Iqbal Husain, Electric and Hybrid Vehicles″ Design Fundamentals″, CRC Press, 2003.

REFERENCES:

1. Sheldon S. Williamson, Energy Management Strategies for Electric and Plug-in HybridElectric Vehicles, Springer, 2013.
2. C.C.Chanand K.T. Chau, Modern Electric Vehicle Technology, OXFORD University Press,2001.ChrisMi, M.Abul Masrur, David Wenzhong Gao, Hybrid Electric Vehicles Principles and Applications With Practical Perspectives, Wiley Publication, 2011.

CO-PO MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-
CO3	3	2	2	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-
CO5	3	2	2	-	-	-	-	-	-	-	-	-
CO	**3**	**2**	**2**									

IV B.Tech.-VII Semester

		L	T	P	C
20OMEC472	**SOLAR ENERGY TECHNOLOGY** (Open Elective - 4)	**3**	**0**	**0**	**3**

PRE-REQUISITES: NIL

COURSE EDUCATIONALOBJECTIVES:

1. Describing the solar radiation and various solar collectors.
2. Explaining the various solar thermal energy technologies and their applications.
3. Analyzing the various solar PV cell materials and conversion techniques.
4. Discussing various solar SPV systems designs and their applications.
5. Applying solar passive building techniques for cooling and heating applications.

UNIT–1: SOLAR RADIATION AND COLLECTORS (9)

Introduction to the sources of energy – Solar angles – Sunpath diagrams– Radiation–extra terrestrial characteristics - measurement and estimation on horizontal and tilted surfaces - flat plate collector thermal analysis - testing methods- evacuated tubular collectors-concentrator collectors–classification-design and performance parameters-tracking systems-compound parabolic concentrators - parabolic trough concentrators - concentrators with point focus - Heliostats–performance ofthe collectors.

UNIT–2: SOLAR THERMAL TECHNOLOGIES (9)

Principle of working, types, design and operation of - Solar heating and cooling systems – Thermal Energy storage systems–Solar Desalination–Solar cooker: domestic, community–Solar pond – Solar drying – solar chimney-solar thermal electricity conversion.

UNIT–3: SOLAR PV FUNDAMENTALS (9)

Semiconductor – properties - energy levels - basic equations of semiconductor devices physics. Solar cells - p-n junction: homo and hetero junctions - metal-semiconductor interface - dark and illumination characteristics - figure of merits of solar cell – efficiency limits - variation of efficiency with band-gap and temperature - efficiency measurements –high efficiency cells – Solar thermo- photovoltaics.

UNIT–4: SPV SYSTEM DESIGN AND APPLICATIONS (9)

Solar cell array system analysis and performance prediction- Shadow analysis: reliability -solar cell array design concepts - PV system design - design process and optimization -detailed array design - storage autonomy - voltage regulation - maximum tracking –centralized and decentralized SPV systems-standalone-hybrid and grid connected system - System installation - operation and maintenances - field experience - PV market analysis and economics of SPV systems.

UNIT–5: SOLAR PASSIVE ARCHITECTURE (9)

Thermal comfort - bioclimatic classification – passive heating concepts: direct heat gain -indirect heat gain - isolated gain and sunspaces - passive cooling concepts: evaporativecooling - Radiative cooling- application of wind, water and earth for cooling; shading -paints and cavity walls for cooling– roofradiation traps - earth air-tunnel– energy efficient landscape design-thermal comfort.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs
CO1	Describe the solar radiation and various solar collectors.	**PO1,PO2, PO3**
CO2	Explainthevarioussolarthermalenergytechnologiesandtheirappli cations.	**PO1,PO2, PO3**
CO3	Analyze the various solar PV cell materials and conversion techniques.	**PO1, PO2, PO3**
CO4	Discuss various Solar SPV systems designs and their applications.	**PO1,PO2, PO3**
CO5	Apply solar passive building techniques for cooling and heating applications.	**PO1,PO2, PO3**

TEXTBOOKS:

1. G.D.Rai, "Non-Conventional Energy Sources",Khanna Publishers, NewDelhi, 2014.
2. Twidell, J.W. & Weir. A., "Renewable Energy Resources", EFN Spon Ltd., UK, 2015.

REFERENCEBOOKS:

1. Chetan Singh Solanki, "Solar Photovoltatics – Fundamentals, Technologies and Applications", PHI Learning Private limited, 2011.
2. John A.Duffie, William A.Beckman, "Solar Engineering of Thermal Processes", John Wiley & Sons, 2013.
3. LovegroveK., SteinW., "Concentrating Solar Power Technology", Wood head Publishing Series in Energy, Elsevier, 1/e, 2012.
4. "Solar Energy International, Photovoltaic–Design and Installation Manual", New Society Publishers, 2006.
5. Sukhatme SP, Nayak JK, "Solar Energy–Principle of Thermal Storage and collection", Tata McGrawHill, 2008.

REFERENCEWEBSITE:

1. https://nptel.ac.in/courses/112/104/112104300/
2. https://nptel.ac.in/courses/115/103/115103123/

CO-PO MAPPING:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2	1	-	-	-	-	-	-	-	-	-
CO.2	3	2	1	-	-	-	-	-	-	-	-	-
CO.3	3	2	1	-	-	-	-	-	-	-	-	-
CO.4	3	2	1	-	-	-	-	-	-	-	-	-
CO.5	3	2	1	-	-	-	-	-	-	-	-	-
CO*	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-

IV B.Tech - VII Semester

20OCSM472 **FOUNDATIONS OF MACHINE LEARNING** **L T P C**
(OPEN ELECTIVE – 4) **3 0 0 3**

PRE-REQUISITES: A course on Probability and Statistics

COURSE EDUCATIONAL OBJECTIVES:

1. To learn the theoretical foundations of machine learning.
2. To understand various supervised learning algorithms.
3. To understand the support vector machine.
4. To learn different types of unsupervised learning algorithms.
5. To introduce the basic applications of machine learning.

UNIT 1: INTRODUCTION **(9)**

Review of Linear Algebra, Definition of learning systems,Designing a learning system, Learning Paradigms – PAC learning – Basics of Probability – Version Spaces, Goals and applications of machine learning; Classification of learning system, Basic concepts in Machine Learning.

UNIT 2: SUPERVISED LEARNING ALGORITHMS **(9)**

Linear and Non-Linear examples, Multi–Class & Multi-Label classification, Linear Regression, Multilinear Regression, Naïve Bayes Classifier, Decision Trees, K-NN classifier, Logistic regression, Perceptrons.

UNIT 3: UNSUPERVISED LEARNINGALGORITHMS **(9)**

Clustering basics (Partitioned, Hierarchical and Density based), K-Means clustering, K-Mode clustering, Self organizing maps, Expectation maximization, Principal Component Analysis.

UNIT 4: ENSEMBLE LEARNING AND EVALUATION METRICS **(9)**

Bagging and Boosting (Random forests, Adaboost, XG boost inclusive), ROC Curves, Evaluation Metrics, Significance tests – Error correction in Perceptrons.

UNIT 5: MACHINE LEARNING IMPLEMENTATION **(9)**

Data collection – Preprocessing (Missing values, Normalization, Adopting to chosen algorithm etc.,) – Outlier Analysis (Z-Score) - Model selection & evaluation – Optimization of tuning parameters – Setting the environment – Visualization of results.

COURSE OUTCOMES:

On successful completion of the course the student will be		**POs related to COs**
CO1	Understand the basics of machine learning.	**PO1, PO2**
CO2	Identify the suitable supervised learning algorithm for problem solving.	**PO1, PO2**
CO3	Understand the concept of support vector machine.	**PO1,PO2, PO3**
CO4	Apply appropriate unsupervised learning algorithm for solving real-world problems.	**PO1,PO2,PO3,PO4,PO5**
CO5	Explore the applications of machine learning.	**PO1, PO2, PO3, PO4, PO5**

TEXT BOOKS:

1. Ethem Alpaydin,"Introduction to Machine Learning", fourth Edition, MIT Press, Prentice Hall of India, 2020.
2. Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar, "Foundations of Machine Learning", MIT Press, 2018.

REFERENCES:

1. Charu C. Aggarwal, "Data Classification Algorithms and Applications", CRC Press, 2015.
2. Jeremy Watt, Reza Borhani, and Aggelos K. Katsaggelos, "Machine Learning Refined Foundations, Algorithms, and Applications", Cambridge University Press, 2016.
3. Miroslav Kubat, "An Introduction to Machine Learning", Second Edition, Springer International Publishing, 2017.

REFERENCE WEBSITE:

1. AndrewNg,"MachineLearning",StanfordUniversityhttps://www.coursera.org/learn/machi ne-learning/home/info.
2. https://nptel.ac.in/courses/106105152/1
3. https://nptel.ac.in/courses/106106139/1

"CO-PO MAPPING"

CO- PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	-
CO4	2	2	2	2	2	-	-	-	-	-	-	-
CO5	3	2	2	2	2	-	-	-	-	-	-	-
CO*	**2.6**	**2.4**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

IV B.TECH. - VII SEMESTER

20OHSM472	**TOTAL QUALITY MANAGEMENT** (OPEN ELECTIVE – 4)	**L T P C** **3 0 0 3**

PRE-REQUISITES: NIL

COURSE EDUCATIONAL OBJECTIVES:

1. To understand the concepts of total quality management, and Contributions of TQM
2. To learn TQM principles and impact of 5s, Kaizen, PDSA cycles in continuous process improvement.
3. To study the basic need of quality control and process control in an organization
4. To learn the traditional and modern TQM tools and techniques
5. To study the quality standard, requirements and elements in Quality management system

UNIT –1: INTRODUCTION ON TOTAL QUALITY MANAGEMENT (9)

Introduction – Need for quality – Evolution of quality – Definition of quality – Dimensions of manufacturing and service quality – Basic concepts of TQM – Definition of TQM – TQM frame work – Contributions of Deming, Juran and Crosby – Barriers to TQM.

UNIT –2: TQM PRINCIPLES (9)

Leadership – Strategic quality planning – Quality statements – Customer focus, customer orientation, customer satisfaction, customer complaints and retention – Employee involvement – Motivation – Empowerment – Teams and teamwork – Recognition and reward – Performance appraisal – Continuous process improvement – PDSA cycle, 5s, Kaizen – Supplier partnership, partnering, supplier selection and supplier rating.

UNIT –3: QUALITY CONTROL (9)

Control chart for attributes – Control chart for non-conforming – p chart and np chart – Control chart for nonconformities: C and U charts – Control chart for variables: X chart, R chart and σ chart – State of control and process out of control identification in charts, pattern study and process capability studies.

UNIT –4: TQM TOOLS AND TECHNIQUES (9)

The seven traditional tools of quality – New management tools – Six-sigma: Concepts, methodology, applications to manufacturing, service sector – Bench marking – Bench marking process – FMEA – Stages – Types – Quality circles – Quality function development (QFD) – Taguchi quality loss function – TPM – Reliability fundamentals and concepts.

UNIT –5: QUALITY SYSTEMS AND STANDARDS (9)

Need for ISO 9000 – ISO 9001-2008 Quality System – Benefits of ISO registration – ISO 9000 standards – AS 9100, TS16949 and TL 9000 – ISO 9001 Requirements – Implementation – Documentation – Internal and external audits – Registration – TQM implementation in manufacturing and service sectors. **Environmental Management System:** ISO 14000 Series Standards – Concepts and Requirements of ISO 14001.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		POs and COs Mapping
CO1	Describe the concepts of total quality management, and Contributions of TQM	**PO1, PO11, PO12**
CO2	Understand the TQM principles and impact of 5s,Kaizen, PDSA cycles in continuous process improvement.	**PO1, PO11, PO12**
CO3	Illustrate the basic need of quality control and process control in an organization	**PO1, PO2, PO11, PO12**
CO4	Summarize the traditional and modern TQM tools and techniques	**PO1, PO3, PO11, PO12**
CO5	Realize the quality standard, requirements and elements in Quality management system	**PO1,PO11, PO12**

TEXT BOOKS:

1. Bester field Dale H, Bester field Carol, Bester field Glen H, Bester field Mary, Urdhwareshe Hemant and Urdhwareshe Rashmi, "Total Quality Management", Pearson Education,5/e, 2018, New Delhi.
2. Douglas.C. Montgomery, John Wiley, "Introduction to Statistical Quality Control", 7/e, 2013,.

REFERENCE BOOKS:

1. D.R. Kiran, Butterworth-Heinemann, "Total Quality Management", 1/e, 2016, .
2. Poornima M. Charantimath, "Total Quality Management", Pearson Education, New Delhi, 3/e,2017,
3. Tapan K. Bose,"Total Quality of Management", Pearson Education India 2010,.
4. Bedi Kanishka, "Quality Management", Oxford University Press, India 2006,.
5. Ramasamy Subbura, "Total Quality Management", McGraw Hill Education 2011,

REFERENCE WEBSITE:

1. https://nptel.ac.in/courses/110/104/110104085/
2. https://nptel.ac.in/courses/110/104/110104080/
3. https://nptel.ac.in/courses/112/107/112107259/
4. https://nptel.ac.in/courses/110/101/110101150/

CODES/TABLES:

1. Use of approved statistical table permitted in the examination.

CO-PO MAPPING

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2	2	2	-	-	-	-	-	-	-	-
CO.2	3	2	2	2	-	-	-	-	-	-	-	-
CO.3	3	2	2	2	-	-	-	-	-	-	-	-
CO.4	3	2	2	2	-	-	-	-	-	-	-	-
CO.5	3	2	2	2	-	-	-	-	-	-	-	-
CO*	**3**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-

SREENIVASAINSTITUTEOFTECHNOLOGYANDMANAGEMENTSTUDIES
(Autonomous)
ELECTRONICS AND COMMUNICATION ENGINEERING
(Accredited by NBA)

IV B.Tech. - VII Semester

20ECE474	**ARM & PIC PROGRAMMING**	**L T P C**
	(SAC COURSE)	**0 1 2 2**

PRE-REQUISITES: Microprocessor and Microcontroller
Course Educational Objective:

1. Demonstrate the knowledge in ARM Processor architecture.

2. To provide knowledge on
   - Architecture
   - Addressing modes
   - Instruction set

3. To provide knowledge on Advanced ARM processor

4. To Analyze the PIC microcontroller and its interrupts

5. Programming the Timers, serial ports and Interrupts.

UNIT-I: INTRODUCTION TO ARM PROCESSORS:

(6)

ARM Processor fundamentals, ARM Architecture – Register, CPSR, Pipeline, exceptions and interrupts interrupt vector table.

UNIT-II: ARM INSTRUCTION SET

(6)

ARM instruction set – Data processing, Branch instructions, load store instructions, Software interrupt instructions, Program status register instructions, loading constants, Conditional execution, Introduction to Thumb instructions.

UNIT-III: Advanced ARM Processor

(6)

Advanced ARM Processors: Introduction to CORTEX Processor and its architecture, Register organization and memory organization.

UNIT-III: PIC MICROCONTROLLER

(6)

Background of PIC, characteristics of PIC microcontroller, PIC 16F877 architecture, memory organization, parallel and serial input and output, Interrupts, instruction set of the PIC 16F877.

UNIT- IV: TIMERS, SERIAL PORT AND INTERRUPTS

(6)

Programming timers 0 and 1, Counter programming, Programming timers 2 and 3, Basics of serial communication, PIC connection to RS232, Serial port programming in assembly.

Total Hours:30

SREENIVASAINSTITUTEOFTECHNOLOGYANDMANAGEMENTSTUDIES
(Autonomous)
ELECTRONICS AND COMMUNICATION ENGINEERING
(Accredited by NBA)
List of Demo/Experiments (Only for Skill Enhancement, Not for Exams)

1. Introduction to ARM development board
2. Write an program to perform Arithmetic operations of two numbers.
3. Write an program to find factorial of the number.
4. Write an program to perform logical operations of two numbers.
5. Introduction to PIC Development board
6. Arithmetic operations using PIC controller
7. Logical operations using PIC controller
8. Bit manipulation operations using PIC microcontrollers.
9. Call and unconditional branch instruction programming using PIC
10. Implementation of Timer/ Counter using PIC microcontroller
11. Display "Hello World" message using Internal UART
12. . Interface a Stepper motor and rotate it in clockwise and anti-clockwise direction

COURSE OUTCOMES:

On successful completion of the course the student will be able to,		**POs related to COs**
CO1	Able to understand ARM architecture and its registers.	PO1, PO2
CO2	Able to understand ARM instruction set and its memory organization	PO1,PO2
CO3	Analyze the architecture of Advanced ARM processor	PO1, PO2,
CO4	Analyze in detail about PIC microcontroller and its instruction set	PO1, PO2
CO5	Understand Timer, Serial port and its various operating modes	PO1,PO2

TEXT BOOKS:

1. ARM System Developers guide, Andrew N SLOSS, Dominic SYMES, Chris WRIGHT, Elsevier, 2012
2. Muhammad Ali Mazidi, Rolin D. McKinlay, Danny causey, PIC Microcontroller and Embedded Systems: Using C and PIC18, Pearson Education, 2008.

REFERENCE BOOKS:

1. Douglas U, Hall, "Micro Processors & Interfacing", revised 2nd edition,TMH,New Delhi,2007.
2. Liu & Gibson,"Microcomputer Systems the Family:"Architecture Programming and Design", , 2nd edition, PHI, New Delhi.

Reference Website:

https://www.tutorialspoint.com/microprocessor/microcontrollers_ARM_architecture.htm

https://www.tutorialspoint.com/embedded_systems/es_microcontroller.htm

CO-PO mapping

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-
CO*	3	2	-	-	-	-	-	-	-	-	-	-

IV B.Tech. – VIII Semester

20ECE481	PROJECT WORK	L T P C
		0 0 0 12

PREREQUISITES: Creativity and Innovation lab

Course Educational Objectives

1. To develop the ability to undertake problem identification, formulation and solution.
2. To demonstrate the ability to engage in design and to execute to an appropriate professional Standard.
3. To develop the capacity to undertake lifelong learning.
4. To develop the ability to communicate effectively, not only with engineers but also with the community at large.
5. To develop an understanding of the social, cultural, global and environmental responsibilities of the professional Engineer, and the principles of sustainable design and development

PROJECT WORK:

The aim of the project work is to deepen comprehension of principles by applying them to a new problem which may be the design / fabrication / analysis for a specific application, a research project with a focus on an application needed by the industry / society, a computer project, a management project or a design and analysis project. A project topic must be selected by the students in consultation with their guides. To train the students in preparing project reports and to face reviews and viva voce examination. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated jointly by external and internal examiners constituted by the Head of the Department based on oral presentation and the project report.

Course Outcomes

On successful completion of this course, the students should be able to		POs related to COs
CO1	Demonstrate in-depth knowledge on the project topic	PO1
CO2	Identify, analyze and formulate complex problem chosen for project work to attain substantiated conclusions.	PO2
CO3	Design solutions to the chosen project problem.	PO3
CO4	Undertake investigation of project problem to provide valid conclusions.	PO4
CO5	Use the appropriate techniques, resources and modern engineering tools necessary for project work.	PO5
CO6	Apply project results for sustainable development of the society	PO6
CO7	Understand the impact of project results in the context of environmental sustainability	PO7
CO8	Understand professional and ethical responsibilities while executing the project work.	PO8
CO9	Function effectively as individual and a member in the project team.	PO9
CO10	Develop communication skills, both oral 3and written for preparing and presenting project report.	PO10
CO11	Demonstrate knowledge and understanding of cost and time analysis required for carrying out the project.	PO11
CO12	Engage in lifelong learning to improve knowledge and competence in the chosen area of the project.	PO12

CO-PO Mapping

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	-	-	-	-	-	-	-	-	-	-	-
CO2	-	**3**	-	-	-	-	-	-	-	-	-	-
CO3	-	-	**3**	-	-	-	-	-	-	-	-	-
CO4	-	-	-	**3**	-	-	-	-	-	-	-	-
CO5	-	-	-	-	**3**	-	-	-	-	-	-	-
CO6	-	-	-	-	-	**3**	-	-	-	-	-	-
CO7	-	-	-	-	-	-	**3**	-	-	-	-	-
CO8	-	-	-	-	-	-		**3**	-	-	-	-
CO9	-	-	-	-	-	-	-	-	**3**	-	-	-
CO10	-	-	-	-	-	-	-	-	-	**3**	-	-
C011	-	-	-	-	-	-	-	-	-	-	**3**	-
CO12	-	-	-	-	-	-	-	-	-	-	-	**3**