COURSE STRUCTURE AND DETAILED SYLLABI

FOR

B. Tech Regular (Full-Time) Four Year Degree Course

(For the Batches Admitted From 2020-2021)

&

B. Tech (Lateral Entry Scheme)

(For the Batches Admitted From 2021-2022)

ELECTRONICS AND COMMUNICATIONENGINEERING

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

Accredited by NBA, New Delhi & NAAC, Bengaluru | Affiliated to JNTUA, Ananthapuramu, Recognized by the UGC under Section 12 (B) and 12 (F) | Approved byAICTE, New Delhi.

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FOREWORD

The autonomy conferred Sri Venkateswara College Engineering and technology by JNT University, Ananthapuramu based on performance as well as future commitment and competency to impart quality education. It is a mark of its ability to function independently in accordance with the set norms the monitoring bodies UGC and AICTE. It reflects the confidence of the affiliating University in the autonomous institution to uphold and maintain standards it expects to deliver on its own behalf and thus awards degrees on behalf of college. Thus, an autonomous institution is given the freedom to have its own curriculum, examination system and monitoring mechanism, independent of the affiliating University but under its observance.

Sri Venkateswara College of Engineering and Technology is proud to win the confidence of all the above bodies monitoring the quality in education and has gladly accepted the responsibility of sustaining, the standards and ethics it has been striving for more than a decade in reaching its present standing in the arena of contemporary technical education. As a follow up, statutory bodies like Academic Council and Boards of Studies are constituted with the guidance of the Governing Body of the College and recommendations of the JNTUA, Ananthapuramu to frame the regulations, course structure and syllabi under autonomous status.

The autonomous regulations, course structure and syllabi have been prepared after prolonged and detailed interaction with several expertise solicited from academics, industry and research, to produce quality engineering graduates to the society.

All the faculty, parents and students are requested to go through all the rules and regulations carefully. Any clarifications needed are to be sought at appropriate time and with principal of the college, without presumptions, to avoid unwanted subsequent inconveniences and embarrassments. The cooperation of all the stake holders is sought for the successful implementation of the autonomous system in the larger interests of the college and brighter prospects of engineering graduates.

Principal

INSTITUTE VISION

To carve the youth as dynamic, competent, valued and knowledgeable professionals who shall lead the Nation to a better future and to mould the institution into a Center of Academic Excellence and advanced Research.

INSTITUTE MISSION

- To provide quality education, student-centered teaching-learning processes and state-of-art infrastructure for professional aspirants hailing from both rural and urban areas.
- To impart technical education that encourages independent thinking, develops strong domain of knowledge, contemporary skills and positive attitudes towards holistic growth of young minds.

QUALITY POLICY

Sri Venkateswara College of Engineering and Technology strides towards excellence by adopting a system of quality policies and processes with continued improvements to enhance student's skills and talent for their exemplary contribution to the society, the nation and the word.

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

R.V.S. Nagar, CHITTOOR – 517 127, A.P

www.svcetedu.org E-mail : principal@svcetedu.org

(Affiliated to J.N.T. University Anantapur, Ananthapuramu).

ACADEMIC REGULATIONS (R20) for

B.Tech Regular (Full - Time) Four Year Degree Program

(For the batches admitted from the academic year 2020-21)

and

B.Tech. (Lateral Entry Scheme)

(For the batches admitted from the academic year 2021-22)

1. Applicability : All the rules specified herein, approved by the Academic Council, will be in force and applicable to students admitted from the academic year 2020-2021 onwards. Any reference to "College" inthese rules and regulations stands for Sri Venkateswara College of Engineering and Technology (Autonomous).

2. Extent : All the rules and regulations, specified herein after shall be read as a whole for the purpose of interpretation and as and when a doubt arises, the interpretation of the Chairman, Academic Council is final. As per the requirements of statutory bodies, Principal, Sri Venkateswara College of Engineering and Technology (A) shall be the Chairman of the Academic Council.

3. Admission :

3.1 Admission into first year of Four Year B.Tech., Degree Program of study in Engineering:

3.1.1 Eligibility: A candidate seeking admission into the first year of four year B.Tech., Degree Program should have Passed either Intermediate Public Examination conducted by the Board of Intermediate Education, Government of Andhra Pradesh with Mathematics, Physics and Chemistry as optional subjects (or any equivalent examination recognized by the Board of Intermediate Education and JNTUA, Ananthapuramu) or Diploma in Engineering in the relevant branch conducted by the Board of Technical Education, Andhra Pradesh (or equivalent Diploma recognized by State Board of Technical Education, Government of Andhra Pradesh and JNTUA, Ananthapuramu) for admission.

3.1.2 Admission Procedure:

As per the existing stipulations of A.P State Council of Higher Education (APSCHE), Government of Andhra Pradesh, admissions are made into the first year of four year B.Tech., Degree Program as follows:

Seats under various categories are filled as per the norms prescribed by the Government of Andhra Pradesh.

3.2 Admission into the second year of four Year B.Tech., Degree Program (Lateral Entry Scheme) in Engineering:

3.2.1 Eligibility: Candidates qualified in ECET (FDH) and / or admitted by the Convener, ECET (FDH). In all such cases for admission, when needed, Permissions from the statutory bodies are to be obtained.

3.2.2 Admission Procedure: Lateral Entry seats are filled as per the norms prescribed by the Government of Andhra Pradesh from time to time.

4. Programs of study offered leading to the award of B.Tech degree:

1. B.Tech (Civil Engineering)
2. B.Tech (Electrical and Electronics Engineering)
3. B.Tech (Mechanical Engineering)
4. B.Tech (Electronics and Communication Engineering)
5. B.Tech (Computer Science and Engineering)
6. B.Tech (Information Technology)
7. B.Tech (Computer Science and Engineering (Artificial Intelligence and Machine Learning))
8. B.Tech (Computer Science and Engineering (Data Science))

5. Choice Based Credit System:

The Indian Higher Education Institutions (HEI's) are changing from the conventional course structure to Choice Based Credit System (CBCS) along with introduction to semester system at first year itself. The semester system helps in accelerating the teaching-learning process and enables vertical and horizontal mobility in learning.

The credit based semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The choice based credit system provides a 'cafeteria' type approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses and adopt an interdisciplinary approach to learning.

Choice Based Credit System (CBCS) is a flexible system of learning and provides choice for students to select from the prescribed elective courses. A course defines learning objectives and learning outcomes and comprises of Lectures / Tutorials / Laboratory Work / Field Work / Project Work / MOOCS / Internship / Comprehensive Examination / Seminars / Presentations / self-study etc. or a combination of some of these.

Under the CBCS, the requirement for awarding a degree is prescribed in terms of number of credits to be completed by the students.

The CBCS permits students to:

1. Choose electives from a wide range of elective courses offered by the departments.
2. Undergo additional courses of interest.
3. Adopt an interdisciplinary approach in learning.
4. Make the best use of expertise of the available faculty.

6. Medium of instruction:

The medium of instruction shall be English for all courses, examinations, seminar presentations and project work. The curriculum will comprise courses of study as given in course structure, in accordance with the prescribed syllabi.

7. Types of Courses:

Courses in a programme may be of five kinds: **Foundation, Skill, Core, Elective and Mandatory.**

7.1 Foundation / Skill Course:

Foundation courses are the courses based upon the content leads to enhancement of skill and knowledge. Skill subjects are those areas in which one needs to develop a set of skills to learn anything at all. They are fundamental to learn any subject.

7.2 Core Course:

There may be a core course in every semester. This is the course which is to be compulsorily studied by a student as a core requirement to complete the requirement of a programme in a said discipline of study.

7.3 Elective Course:

Electives provide breadth of experience in respective branch and applications areas. Elective course is a course which can be chosen from a pool of courses. It may be:

- Supportive to the discipline of study
- Providing an expanded scope
- Enabling an exposure to some other discipline / domain
- Nurturing student's proficiency / skill.

An elective may be discipline centric (Professional Elective) focusing on those courses which add generic proficiency to the students or may be chosen from an interdisciplinary area called as "Open Elective".

There are five professional elective groups. Students can choose not more than one elective from each of the five groups. Also there are four open elective groups, students can choose not more than one elective from each of the four groups.

8. Academic Year:

8.1 Course Duration:

8.1.1 Course duration for B. Tech program of study is 4 years and the maximum duration to complete the program is 8 years excluding the gap year.

8.1.2 For lateral entry students the course duration is 3 years and the maximum duration to complete the program is 6 years excluding the gap year.

8.2 Each academic year is divided into two semesters and each semester shall have a minimum of 16 Instructional Weeks.

9. Unique course identification code:

Every course of the B. Tech program will be placed in one of the eleven groups of courses as listed in the table 1. The various courses and their two-letter codes are given below.

Table 1: Group of Courses

S.No.	Branch	Code
1	Civil Engineering	CE
2	Electrical and Electronics Engineering	EE
3	Mechanical Engineering	ME
4	Electronics and Communication Engineering	EC
5	Computer Science and Engineering	CS
6	Information Technology	IT
7	Computer Science and Engineering(Artificial Intelligence and Machine Learning)	CM

8	Computer Science and Engineering(Data Science)	CD
9	Humanities and Basic Sciences	HS
10	MBA	MB
11	MCA	MC

10. Curriculum and Course Structure:

The curriculum shall comprise Foundation / Skill Courses, Core Courses, Elective Courses, Laboratory Courses, Audit Courses, Mandatory Courses, Comprehensive Examination / Mini Project, Internship and Project work. The list of elective courses may include subjects from allied disciplines also.

Assigning of Credits: Depending on the complexity and volume of the course, the number of contact hours per week will be assigned. Each Theory and Laboratory course carries credits based on the number of hours / week as follows.

- **Contact classes (Theory):** 1 credit per lecture hour per week.
- **Laboratory Hours (Practical):** 1 credit for 2 Practical hours, per week.

10.1 Course Structure:

Every program of study shall be designed to have 38-42 theory courses and 17-22 laboratory courses. Every course of the B.Tech program will be placed in one of the eight categories with average credits as listed in the Table 2. In this, a student has to carry out a mini project, project work and comprehensive Examination also.

Table 2: Category-wise Distribution of Credits

S.No.	Category	Subject Area and % of Credits	Average No. of Credits
1	Humanities and Social Sciences (HS), including Management courses	HS (05% to 10%)	10.5
2	Basic Sciences (BS) including Mathematics, Physics and Chemistry.	BS (15% to 20%)	21
3	Engineering Sciences (ES), including Workshop, Drawing, Basics of Electrical / Electronics / Mechanical / Computer Engineering.	ES (15% to 20%)	24
4	Professional Subjects-Core (PC), relevant to the chosen specialization / branch.	PC (30% to 40%)	51

5	Professional Elective Courses (PE), relevant to the chosen specialization / branch.	PE (10% to 15%)	15
6	Open Elective Courses (OE), from other technical and / or emerging subject area.	OE (05% to 10%)	12
7	Project Work, Internship Mini Project / Comprehensive Examination.	10% to 15%	16.5
8	Mandatory Courses	MC	Non-credit
9	Skill Oriented Courses	SC	10
TOTAL			**160**

10.2 There shall be mandatory student induction program for freshers, with a three-week duration before the commencement of first semester. Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations etc., as per the guidelines issued by AICTE.

10.3 All undergraduate students shall register for NCC / NSS activities. A student will be required to participate in an activity for two hours in a week during second and third semesters. Grade shall be awarded as Satisfactory or Unsatisfactory in the grade sheet on the basis of participation, attendance, performance and behavior. If a student gets an unsatisfactory Grade, he shall repeat the above activity in the subsequent semesters, in order to complete the degree requirements.

10.4 Courses like Environmental Science, Universal Human Values, Ethics, Indian Constitution, Essence of Indian Traditional Knowledge etc., are included in the curriculum as non-credit mandatory courses. Environmental Science is offered as mandatory course for all branches. A student has to secure 40% of the marks allotted in the internal evaluation for passing the course. No marks or letter grade shall be allotted for all mandatory non-credit courses.

10.5 There shall be 05 Professional Elective courses and 04 Open Elective courses. All the Professional & Open Elective courses shall be offered for 03 credits. All Open Electives are offered to students of all branches in general. However, a student shall choose an open Elective from the list in such a manner that he has not studied the same course in any form during the Programme.

10.6 A student shall be permitted to pursue up to a maximum of two open elective courses under MOOCs during the Programme as mentioned in course structure. Each of the courses must be of minimum 8 - 12 weeks in duration. Attendance will not be monitored for MOOC courses. 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.

10.6.1 In case a student fails to complete the MOOC / MOOCs in the stipulated semester he has to re-register and complete the same. In case any provider discontinues the course, Institution shall allow the student to opt for any other course from the list provided by the department from time to time.

10.6.2 Students have to acquire a certificate from the agencies approved by the BOS with grading or percentage of marks in order to earn 3 credits.

10.6.3 The certificate submitted by the student will be duly verified and attested by the concerned BOS chairman, and the same will be forwarded to examination branch before the end of the stipulated semester.

10.7 The department shall invite registration forms from the students at the beginning of the semester for offering professional and open elective courses. Elective course shall be offered by the Department only if a minimum of 20 percent of students in the class / section strength register for that course.

10.8 Students shall undergo mandatory summer internships for a minimum of six weeks duration at the end of second and third year of the Programme. There shall also be mandatory full internship in the final semester of the Programme along with the project work.

10.9 There shall be 05 skill-oriented courses offered during II B.Tech I Semester to IV B.Tech I Semester. Among the five skill courses, four courses shall focus on the basic and advanced skills related to the domain courses and the remaining one shall be a soft skills course.

10.10 Under graduate Degree with Honors/Minor shall be issued by the University, upon the recommendation of the college, to the students who fulfill all the academic eligibility requirements for the B.Tech program and Honors/Minor program. The objective is to provide additional learning opportunities to academically motivated students.

11. Evaluation Methodology:

11.1 Theory Course:

Each theory course will be evaluated for a total of 100 Marks, with 40 Marks for Continuous Internal Assessment (CIA) and 60 Marks for Semester End Examination (SEE).

11.2 Continuous Internal Assessment (CIA):

The distribution of marks for Continuous Internal Assessment is as follows:

Two Sessional Examinations : 30 Marks

Five Assignments	: 10 Marks
	40 Marks

11.3 Question Paper Pattern for Sessional Examinations:

11.3.1 Each sessional exam question paper consists of two parts, namely Part A and Part B. Part A is compulsory which carries 10 marks and consists of five short answer type questions with each carrying 2 marks. In Part B, 4 essay type questions with internal choice (either or type) each carrying 5 marks may be given. The questions may be set as per Bloom's Taxonomy. Time duration for each sessional exam is 2 hours. Internal marks for sessional examinations shall be arrived at by considering the marks secured by the student in both the sessional examinations with 80% weightage to the better sessional exam and 20% to the other.

11.3.2 Five assignments, each one for 10 marks shall be given to the students at the end of each unit. Internal marks for the assignments shall be awarded by considering the average of the five assignments.

11.4 Semester End Examination (SEE):

The SEE is conducted for 60 marks of 3 hours duration. The syllabus for the theory course is divided into FIVE units. SEE Question Paper consists of two parts, Part A and Part B.

Part A consists of 05 short answer type questions, each carries 2 marks for a total of 10 marks with no choice.

Part B Consists of 5 questions with one question from each of the 5 units with internal choice with 10 marks for each question.

The emphasis on the questions is broadly based on objective skill, analytical skill and application skill following the outcome based education.

11.5 Laboratory Course:

Each Laboratory Course will be evaluated for a total of 100 marks, consisting of 40 marks for internal assessment (CIA) and 60 marks for semester end lab examination. Out of 40marks of CIA, continuous lab assessment (SEE) for day to day performance will be done for 20 marks, final internal lab examination carries 15 marks and Viva-Voce carries 5 marks. The semester end lab examination for 60 marks shall be conducted by two examiners, one of them being internal examiner (subject teacher) and the other being external examiner (other than the teacher handled) to be nominated by the Principal from the panel of experts as recommended by the Chairman, BOS. The scheme of valuation for the 60 Marks will be informed to the students in advance by the concerned Chairman, BOS and displayed in the laboratory during the beginning of the semester.

11.6. Drawing Courses:

All the **drawing** related courses are evaluated in line with laboratory courses. The distribution shall be 40 marks for internal evaluation (20 marks for day to day work and 20 marks for final internal test) and 60 marks for semester end examinations.

- **Question paper pattern for drawing courses will be followed as mentioned in the syllabus.**

  The following course is considered as theory subject, but for all practical purposes examination will be conducted like practical.

  i. Computer Aided Engineering Drawing

11.7 Mandatory Courses:

Mandatory courses will not carry any credits; but, a pass in the examination during the programme shall be necessary requirement for student to qualify for the award of Degree. The student is declared pass in each such course after securing 40% of the marks in internal examination. Evaluation will be done by conducting descriptive examination at the end of the semester for 100 marks, internally.Its result shall be declared with “satisfactory” (Pass) or Not Satisfactory (Fail) performance.Attendance is mandatory for these courses**.**

The examination will be conducted for 100 marks of 3 hours duration. The syllabus for the course is divided into FIVE units. The Question Paper consists of two parts, Part A and Part B. Part A consists of 5 short answer type questions, each carries 5 marks for a total of 25 marks with no choice.Part B Consists of 5 questions with one question from each of the 5 units with internal choice with 15 marks for each question.

The emphasis on the questions is broadly based on objective skill, analytical skill and application skill following the outcome based education.

11.8 Community Service Project: Community Service Project should be an integral part of the curriculum, as an alternative to the 2 months of Summer Internships / Apprenticeships / On the Job Training, whenever there is an exigency when students cannot pursue their summer internships.

11.9 Project Work:

There shall be a Project Work in the IV year second semester which carries 12 credits. Out of 100 marks allotted for the project work, 40 marks shall be for Internal Evaluation and 60 marks for the End Semester Examination (Viva – Voce). The Viva – Voce shall be conducted by a committee consisting of HOD, Project Supervisor and an External Examiner nominated by the

Principal from the panel of examiners recommended by Chairman, BOS. The Evaluation of project work shall be conducted at the end of the IV year – II semester. The Internal Evaluation shall be made by the departmental committee, on the basis of two seminars given by each student on the topic of his project.

11.10 Framework for Mandatory Internships:

11.10.1 Two summer internships each with a minimum of six weeks duration, done at the end ofsecond and third years, respectively are mandatory. The internship can be done by the students at local industries, Govt. Organizations, construction agencies, Industries, Hydel andthermal power projects and also in software MNCs.

11.10.2 Evaluation of the summer internships shall be through the departmental committee. A student will be required to submit a summer internship report to the concerned departmentand appear for an oral presentation before the departmental committee. The report and theoral presentation shall carry 40% and 60% weightages respectively.

11.10.3 In the final semester, the student should mandatorily undergo internship and parallelly he should work on a project with well-defined objectives. At the end of the semester the candidate shall submit an internship completion certificate and a project report. A student shall also be permitted to submit project report on the work carried out during the internship. The project report shall be evaluated with an external examiner.

11.10.4 The College shall facilitate and monitor the student internship programs. Completion of internships is mandatory, if any student fails to complete internship, he will not be eligible for the award of degree. In such cases, the student shall repeat and complete the internship.

11.11 Framework for Skill Oriented Courses:

11.11.1 For skill oriented/skill advanced courses, one theory and 2 practical hours or two theory hours may be allotted as per the decision of concerned BOS.

11.11.2 Out of the five skill courses two shall be skill-oriented courses from the same domain and shall be completed in second year. Of the remaining 3 skill courses, one shall be necessarily be a soft skill course and the remaining 2 shall be skill-advanced courses either from the same domain or Job oriented skill courses, which can be of inter disciplinary nature.

11.11.3 A pool of interdisciplinary job-oriented skill courses shall be designed by a Common Board of studies by the participating departments / disciplines and the syllabus along with the prerequisites shall be prepared for each of the laboratory infrastructure requirements. The list of such courses shall be included in the curriculum structure of each branch of Engineering, so as to enable the student to choose from the list.

11.11.4 The student shall be given an option to choose either the skill courses being offered by the college or to choose a certificate course being offered by industries / Professional bodies / APSSDC or any other accredited bodies as approved by the concerned BoS.

11.11.5 The Board of studies of the concerned discipline of Engineering shall review the skill advanced courses being offered by eligible external agencies and prepare a fresh list every year incorporating latest courses based on industrial demand.

11.11.6 If a student chooses to take a Certificate Course offered by industries / Professional bodies / APSSDC or any other accredited bodies, in lieu of the skill advanced course offered by the Department, the credits shall be awarded to the student upon producing the Course Completion Certificate from the agency / professional bodies as approved by the Board of studies.

11.11.7 If a student prefers to take a certificate course offered by external agency, the department shall mark attendance of the student for the remaining courses in that semester excluding the skill course in all the calculations of mandatory attendance requirements upon producing a valid certificate as approved by the concerned Board of Studies, the student is deemed to have fulfilled the attendance requirement of the course and acquire the credits assigned to the course.

11.11.8 A committee shall be formed at the level of the college to evaluate the grades / marks given for a course by external agencies and convert to the equivalent marks / grades. There commended conversions and appropriate grades/marks are to be approved by the Academic Council.

11.12 Gap Year:

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 II year to pursue entrepreneurship full time. This period may be extended to two years at the most and these two years would not be counted for the time for the maximum time for graduation. The HOD of the respective department shall forward such proposals submitted by the students to the Principal. An evaluation committee shall be constituted by the Principal to evaluate the proposal submitted by the student and the committee shall decide whether or not to permit student (s) to avail the Gap Year.

11.13 Frame work for Minor Degree in a Discipline (Minor Degree / Programme):

The concept of Minor degree is introduced in the curriculum of all B. Tech. programs offering a Major degree. The main objective of Minor degree in a discipline is to provide additional learning opportunities for academically motivated students and it is an optional feature of the B.Tech Program. In order to earn a Minor degree in a discipline, a student has to earn 20 extra credits, by studying FIVE courses each carrying four credits (in each course, three credits for theory and one credit for lab).

a) Students who are desires 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 Civil Engineering under this scheme, he will get Major degree of Mechanical Engineering with minor degree of Civil Engineering.

b) Student can also opt for industry relevant tracks of any branch to obtain the minor degree. For example, a B.Tech Mechanical Engineering student can opt for the industry relevant tracks like Data Mining track, IOT track, Machine learning track, etc.

11.13.1 Students having a CGPA of 8.0 or above up to II B.Tech I-Semester without any backlogs shall be permitted to register for Minor degree.

11.13.2 An SGPA and CGPA of 8.0 has to be maintained in the subsequent semesters without any backlog subjects in order to keep the Minor discipline registration live or else it shall be cancelled.

11.13.3 Students aspiring for a Minor degree must register from II B.Tech II-Semester onwards and must opt for a Minor in a discipline other than the discipline he is registered in or any industry relevant track of any branch.

11.13.4 The Evaluation pattern of the courses shall be similar to the regular program courses evaluation.

11.13.5 Minimum strength required for offering a Minor in a discipline is considered as 20% of the class size and Maximum should be 80% of the class size.

11.13.6 Minor degree program should be completed by the end of IV B. Tech I-Semester.

11.13.7 A student registered for Minor degree shall pass in all subjects that constitute the requirement for the Minor degree program. No class / division (i.e., second class, first class and distinction, etc.) shall be awarded for Minor degree program.

11.13.8 The Minor degree shall be mentioned in the degree certificate as Bachelor of Technology in XXX with Minor in YYY. For example, Bachelor of Technology in Computer Science & Engineering with Minor in Electronics & Communication Engineering or the chosen industry relevant track. This shall also be reflected in the transcripts, along with the list of courses taken for Minor degree program with CGPA mentioned separately.

11.13.9 Separate course/class work and time table shall be arranged for the various Minor degree programs. Attendance regulations for these Minor discipline programs shall be as per regular courses.

NOTE: Interested meritorious students shall be permitted to register either for Minor degree in a discipline or industry relevant track of any branch (or) Honors Degree in a discipline only, but not both.

11.14 Framework for Honors Degree in a Discipline:

11.14.1 This concept is introduced in the curriculum for all conventional B. Tech. programmes.

The main objective of Honors degree in a discipline is to provide additional learning opportunities for academically motivated students and it is an optional feature of the B. Tech. programme. In order to earn a Honors degree in his/her discipline, a student has to earn 20 extra credits by studying five advanced courses each carrying four credits for 20 credits in the concerned branch of Engineering. In place of advanced courses, he can study equivalent MOOC courses available under SWAYAM / Other platform, as decided by the institution from time to time. The Evaluation pattern of theory subjects will be similar to the regular programme evaluation. Students aspiring for Honors degree must register from II B.Tech, II Semester onwards. However, Honors degree registrations are not allowed before II B.Tech, II Semester and after III B.Tech, I Semester.

11.14.2 Students having a CGPA of 8.0 or above up to II year-I semester and without any backlog subjects will be permitted to register for degree with Honors. The SGPA and CGPA of 8.0 has to be maintained in the subsequent semesters without any backlog subjects in order to keep the degree with Honors registration live or else it will be cancelled.

NOTE: Interested meritorious students shall be permitted to register either for Honors degree or Minor degree in a discipline or industry relevant track of any branch but not both.

12. Attendance Requirements and Detention Policy:

12.1 A student shall be eligible to appear for Semester – End examinations if he acquires a minimum of 40% in each subject and 75% of attendance in aggregate of all the subjects in a semester.

12.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted on medical grounds by the College Academic Committee. A stipulated fee shall be payable towards condonation of shortage of attendance to the College.

12.3 Shortage of Attendance below 65% in aggregate shall in no case be condoned and the candidate will be detained.

12.4 Detained students are not eligible to take their end examination of that class and their registration shall stand cancelled.

12.5 A student detained due to shortage of attendance, will have to repeat that semester when offered next.

13. Conduct of Semester End Examination and Evaluation:

13.1 Semester end examination shall be conducted by the Controller of Examination (COE) by inviting 50% Question Papers from the External and 50% Question papers from the Internal Subject Experts. Principal will decide the External and Internal subject experts.

13.2 The answer papers of semester end examination should be evaluated externally / internally.

13.3 The marks for the internal evaluation components will be added to the external evaluation marks secured in the Semester – End examinations, to arrive at total marks for any subject in that semester.

13.4 Performance in all the subjects is tabulated program-wise and will be scrutinized by the office of the Controller of Examinations. Total marks obtained in each subject are converted into letter grades. Finally subject-wise marks and grades details, subject-wise and branch-wise pass percentages are calculated through software.

13.5 Results Committee:

Results Committee comprising of Principal, Controller of Examinations, Additional Controller of Examinations (Confidential), One Senior Professor nominated by the Principal and the University Nominee will oversee the details of marks, grades and pass percentages of all the subjects and branch-wise pass percentages.

13.6 Office of the Controller of Examinations will generate student-wise result sheets and the same will be published through college website.

13.7 Student-wise Grade Sheets are generated and issued to the students.

14. Academic Requirements for Promotion / Completion of Regular B.Tech Programme of Study:

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

14.1 For Students Admitted in B.Tech (Regular) Program:

i. A student shall be deemed to have satisfied the minimum academic requirements for each theory, practical, design drawing subject or project, if he secures not less than 35% of marks in the Semester End examination and a minimum of 40% of marks in the sum total of the internal evaluation and Semester-End examination taken together.

ii. A student shall be promoted from second year to third year only if he fulfills the academic requirement of securing **33** credits from:

a) Two Regular and two Supplementary Examinations of I-Year I Semester.
b) Two Regular and one Supplementary Examinations of I-Year II Semester.
c) One Regular and one Supplementary Examination of II-Year I semester.
d) One Regular Examination of II-Year II Semester.

Irrespective of whether the candidate appear for Semester-End Examination or not as per the normal course of study.

iii. A student shall be promoted from third year to fourth year Program of study only if he fulfills the academic requirements of securing **50** credits from:

a) Three Regular and Three Supplementary Examinations of I-Year I Semester.

b) Three Regular and Two Supplementary Examinations of I-Year II Semester

c) Two Regular and Two Supplementary Examination of II-Year I Semester.

d) Two Regular and One Supplementary Examinations II-Year II Semester.

e) One Regular and One Supplementary examination of III-Year I Semester.

f) One Regular Examination of III-Year II semester.

Irrespective of whether the candidate appears for the Semester-End examination or not as per the normal course of study and in case of getting detained for want of credits by sections 14.1 (ii) and 14.1 (iii) above, the student may make up the credits through supplementary examinations before the date of commencement of class work for III Year I Semester or IV Year I Semester as the case may be.

iv. A student shall register for all the **160** credits and earn all the **160** credits. Marks obtained in all the **160** credits shall be considered for the award of the class based on CGPA.

v. A student who fails to earn **160** credits as indicated in the course structure within eight academic years from the year of his admission shall forfeit his seat in B. Tech., Program and his admission stands cancelled.

vi. A student will be eligible to get under graduate degree with Honours or additional Minor Engineering, if he completes an additional **20** credits.

vii. A student will be permitted to register either for Honours degree or additional Minor Engineering but not both.

14.2 For Lateral Entry Students:

i. A student shall be deemed to have satisfied the minimum academic requirements for each theory, practical, design, drawing subject or project if he secures not less than 35% of marks in the Semester-End examination and a minimum of 40% of marks in the sum total of the internal evaluation and Semester-End examination taken together.

ii. A student shall be promoted from third year to fourth year only if he fulfills the academic requirements of securing **34** credits from the following examinations.

a) Two Regular and Two Supplementary Examinations of II Year I Semester.

b) Two Regular and One Supplementary Examination of II Year II Semester.

c) One Regular and One Supplementary Examination of III Year I Semester.

d) One Regular Examination of III-Year II Semester.

Irrespective of whether the candidate appear the Semester-End examination or not as per the normal Course of study and in case of getting detained for want of credits the student may make up the credits through supplementary exams of the above exams before the date of commencement of class work for IV Year I Semester.

iii. A student shall register for all **121** credits and earn all the **121** credits. Marks obtained in all **121** credits shall be considered for the award of the class based on CGPA.

iv. A student who fails to earn **121** credits as indicated in the course structure within six academic years from the year of his admission shall forfeit his seat in B.Tech., Program and his admission stands cancelled.

v. A student will be eligible to get under graduate degree with Honours or additional Minor Engineering, if he completes an additional **20** credits.

vi. A student will be permitted to register either for Honours degree or additional Minor Engineering but not both.

15. Letter Grades and Grade Points:

15.1 Performances of students in each course are expressed in Letter Grades based on absolute grading system. The UGC recommends a 10-point grading system with the following letter grades as given in the Table 3.

Table 3: Grade Points Scale (Absolute Grading)

Percentage of Marks	Grade Point	Letter Grade
90-100	10	S (Outstanding)
80-89	9	A+ (Excellent)
70-79	8	A (Very Good)
60-69	7	B+ (Good)
50-59	6	B (Above Average)
45-49	5	C (Average)
40-44	4	D (Pass)
Below 40	0	F (Fail)
Absent	0	N (Absent)

15.2 A student obtaining Grade F shall be considered Failed and will be required to re-appear in the examination.

15.3 For non credit courses, 'P' for 'Satisfactory' or 'F' for 'Not Satisfactory' is indicated and this will not be counted for the computation of SGPA / CGPA.

15.4 At the end of each semester, the institute issues grade sheet indicating the SGPA and CGPA of the student. However, grade sheet will not be issued to the student if he has any outstanding dues.

16.0 Computation of SGPA and CGPA:

16.1 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.

$$SGPA = \Sigma (Ci \times Gi) / \Sigma C_i$$

where, Ci is the number of credits of the ith subject and Gi is the grade point scored by the student in the ith course

16.2 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.

$$CGPA = \Sigma (C_i \times S_i) / \Sigma C_i$$

where 'Si' is the SGPA of the i^{th} semester and Ci is the total number of credits in that semester

16.3 Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the Grade Sheets.

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

16.5 Grade Point: It is a numerical weight allotted to each letter grade on a 10-point scale.

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

16.7 As per AICTE regulations, conversion of CGPA into equivalent percentage is as follows:

Equivalent Percentage to SGPA = (SGPA – 0.50) x 10

Equivalent Percentage to CGPA = (CGPA – 0.50) x 10

17. Grade Sheet:

A grade sheet will be issued to each student indicating his performance in all subjects registered in that semester indicating the SGPA and CGPA. SGPA and CGPA will be rounded off to the second place of decimal.

18. Consolidated Grade Sheet:

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

19. Award of Degree:

The Degree will be conferred and awarded by Jawaharlal Nehru Technological University Anantapur, Ananthapuramu on the recommendation of the Principal of SVCET (Autonomous), Chittoor

19.1 Eligibility:

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

- Registered and successfully completed all the components prescribed in the program of study for which he is admitted.
- Successfully acquired the minimum required credits as specified in the curriculum corresponding to the branch of study within the stipulated time.
- Obtained CGPA greater than or equal to 4.0 (Minimum requirement for declaring as passed.)

19.2. Award of Class:

Declaration of Class is based on CGPA

Cumulative Grade Point Average	Class
≥7.5	First Class with Distinction
≥6.5 and<7.5	First Class
≥5.5 and <6.5	Second Class
≥4.0 and<5.5	Pass Class

20. Personal Verification /Recounting / Revaluation / Final Valuation

20.1 Personal Verification of Answer Scripts:

Candidates appear in a particular semester end examinations may appeal for verification of their answer script(s) for arithmetic correction in totaling of marks and any omission / deletion in evaluation as per the notifications issued from time to time in the prescribed proforma and by paying the prescribed fee per answer script.

It is clarified that personal verification of answer script shall not tantamount to revaluation of answer script. This is only a process of reverification by the candidate. Any mistake / deficiency with regard to arithmetic correction in totaling of marks and any omission / deletion in evaluation if found, the institution will correct the same.

20.2 Recounting / Revaluation:

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

20.3 Final Valuation:

Students shall be permitted for request for final valuation of the Semester–End Examination answer scripts within a stipulated period after the publication of the revaluation results by paying the necessary fee. The final valuation shall be carried out by an expert not less than Associate Professor as per the scheme of valuation supplied by the examination branch in the presence of the student, Controller of Examinations and Principal. However students are not permitted to discuss / argue with the examiner. If the increase in marks after final valuation is equal to or more than 15% of the previous valuation marks, the marks obtained after final valuation shall be treated as final. If the variation of marks after final valuation is less than 15% of the previous valuation marks, then the earlier valuation marks shall be treated as the final marks.

21. Supplementary Examinations:

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

22. Termination from the Program:

The admission of a student to the program may be terminated and the student is asked to leave the institute in the following circumstances:

a. The student fails to satisfy the requirements of the program within the maximum period stipulated for the program.
b. The student fails to satisfy the norms of discipline specified by the institute from time to time.

23. With-Holding of Results:

If the candidate has not paid any dues to the institute / if any case of indiscipline / malpractice is pending against him, the results of the candidate will be withheld. The issue of the degree is liable to be withheld in such cases.

24. Graduation Day:

The institute shall have its own annual Graduation Day for the award of Provisional Certificates to students completing the prescribed academic requirements in each case, in consultation with the University and by following the provisions in the Statute. The college shall institute prizes and medals to meritorious students and award them annually at the Graduation Day. This will greatly encourage the students to strive for excellence in their academic work.

25. Discipline:

Every student is required to observe discipline and decorum both inside and outside the institute and not to indulge in any activity which will tend to bring down the honor of the institute. If a student indulges in malpractice in any of the theory / practical examination, continuous assessment examinations he shall be liable for punitive action as prescribed by the Institute from time to time.

26. Grievance Redressal Committee:

The institute shall form a Grievance Redressal Committee for each course in each department with the Course Teacher and the HOD as the members. This Committee shall solve all grievances related to the course under consideration.

27. Transitory Regulations:

Students who got detained for want of attendance (or) who have not fulfilled academic requirements (or) who have failed after having undergone the 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 continue to be in the academic regulations of the batch they join later. A regular student has to satisfy all the eligibility requirements within the maximum stipulated period of eight years, and a lateral entry student within six years, for the award of B.Tech Degree.

28. Mode of Learning:

Preferably 50% course work for the Theory courses in every semester shall be conducted in the blended mode of learning. If the blended learning is carried out in online mode, then the total attendance of the student shall be calculated considering the offline and online attendance of the student.

29. Student Transfers:

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

Students admitted on transfer from JNTU affiliated institutes, Universities and other institutes are required to pass all the subjects studied in the previous institution. Further, the students who have passed some of the subjects at the earlier institution, if the same subjects are prescribed in different semesters in the transferred institutions, the student has to study the substitute subjects as prescribed by concerned 'Board of Studies'.

30. General Instructions:

i. The academic regulations should be read as a whole for purpose of any interpretation.
ii. Disciplinary action for Malpractice/improper conduct in examinations is appended.
iii. Where the words " he" , " him" , " his" , occur in the regulations, they include" she" , " her"," hers" .
iv. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal is final.
v. The Principal may change or amend the academic regulations of common BOS or syllabi at any time and the changes or amendments shall be made applicable to all the students on rolls with effect from the dates notified by the Principal.
vi. The above rules and regulations are to be approved/ratified by the College Academic Council as and when any modification is to be done.

FAILURE TO READ AND UNDERSTAND THE REGULATIONS IS NOT AN EXCUSE

ANNEXURE – I

COMMUNITY SERVICE PROJECT

Allocation of Community Service Project for the students will be done as per the decision of the concerned BOS Chairman

Introduction:

Community Service Project is an experiential learning strategy that integrates meaningful community service with instruction, participation, learning and community development.

Community Service Project involves students in community development and service activities and applies the experience to personal and academic development.

Community Service Project is meant to link the community with the college for mutual benefit. The community will be benefited with the focused contribution of the college students for the village/ local development. The college finds an opportunity to develop social sensibility and responsibility among students and also emerge as a socially responsible institution.

Objective:

Community Service Project should be an integral part of the curriculum, as an alternative to the 2months of Summer Internships / Apprenticeships / On the Job Training, whenever there is an exigency when students cannot pursue their summer internships. The specific objectives are;

- To sensitize the students to the living conditions of the people who are around them,

- To help students to realize the stark realities of the society.

- To bring about an attitudinal change in the students and help them to develop societal consciousness, sensibility, responsibility and accountability.

- To make students aware of their inner strength and help them to find new /out of box solutions to the social problems.

- To make students socially responsible citizens who are sensitive to the needs of the disadvantaged sections.

- To help students to initiate developmental activities in the community in coordination with public and government authorities.

- To develop a holistic life perspective among the students by making them study culture, traditions, habits, lifestyles, resource utilization, wastages and its management, social problems, public administration system and the roles and responsibilities of different persons across different social systems.

Implementation of Community Service Project:

- Every student should put in a minimum of 180 hours for the Community Service Project during the summer vacation.

- Each class/section should be assigned with a mentor.

- 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

- 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.

- 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 be reflected in the grade memo of the student.

- The Community Service Project should be different from the regular programmes 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 principal of the college.

- Award of marks shall be made as per the guidelines of Internship/apprentice/ on the job training

Procedure:

- 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.

• 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.

- *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*

EXPECTED OUTCOMES:

BENEFITS OF COMMUNITY SERVICE PROJECT TO STUDENTS:

Learning Outcomes:

- Positive impact on students' academic learning
- Improves students' ability to apply what they have learned in "the real world"
- Positive impact on academic outcomes such as demonstrated complexity of understanding, problem analysis, problem-solving, critical thinking, and cognitive development
- Improved ability to understand complexity and ambiguity Personal Outcomes
- Greater sense of personal efficacy, personal identity, spiritual growth, and moral development
- Greater interpersonal development, particularly the ability to work well with others, and build leadership and communication skills Social Outcomes
- Reduced stereotypes and greater inter-cultural understanding
- Improved social responsibility and citizenship skills
- Greater involvement in community service after graduation Career Development
- Connections with professionals and community members for learning and career opportunities
- Greater academic learning, leadership skills, and personal efficacy can lead to greater Opportunity Relationship with the Institution
- Stronger relationships with faculty
- Greater satisfaction with college
- Improved graduation rates

BENEFITS OF COMMUNITY SERVICE PROJECT TO FACULTY MEMBERS:

- Satisfaction with the quality of student learning
- New avenues for research and publication via new relationships between faculty and community
- Providing networking opportunities with engaged faculty in other disciplines or institutions
- A stronger commitment to one's research

BENEFITS OF COMMUNITY SERVICE PROJECT TO THE INSTITUTION:

- Improved institutional commitment
- Improved student retention
- Enhanced community relations

BENEFITS OF COMMUNITY SERVICE PROJECT TO COMMUNITY:

- Satisfaction with student participation
- Valuable human resources needed to achieve community goals
- New energy, enthusiasm and perspectives applied to community work
- Enhanced community-university relations.

RULES FOR DISCIPLINARY ACTION FOR MALPRACTICE / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices / Improper Conduct	Punishment
	If the candidate	
1.(a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	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 to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled.
3.	Comes in a drunken condition to 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 to appear for the remaining examinations of the subjects of that Semester/year.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of 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 for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.

5.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of 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 for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
6.	Possess 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 of seat.
7.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred 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 practicals 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 candidate is subject to the academic regulations in connection with forfeiture of seat. If the impostor is an outsider, he will be handed over to the police and a case is registered against him.
8.	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 of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-	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 also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against

	in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction or property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	them.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges 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. 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.	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.
11.	Copying 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 Examination committee for further action to award suitable punishment.	

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

Department of Electronics and Communication Engineering

VISION

To become a centre of excellence in the field of electronics and communication offering higher order of learning and conducting contemporary research thereby producing globally competitive and ethically strong engineering professionals.

MISSION

- Establish a scintillating learning environment to produce quality graduates with passion for knowledge and creativity in the field of Electronics and Communication Engineering.
- Impart quality education through periodically updated curriculum to meet the challenges of the industry and research at the global level.
- Enhancing employability of the students by providing skills through comprehensive experiential learning.
- Developing professional etiquette and ethical integrity among the students to face real-time life challenges.
- Empower the faculty through continuous training in domain, research and pedagogy for enhancing learning outcomes of the students and Research output.

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

Department of Electronics and Communication Engineering

Program Education Objectives (PEOs)

PEO1: Utilize knowledge, skills, and resources to enrich professional careers to pursue higher studies in the electronics and communication engineering and allied areas.

PEO2: Develop entrepreneurship skills to achieve professional success with start-ups.

PEO3: Develop attitude in lifelong learning and practice the profession with Integrity and responsibility.

PROGRAM OUTCOMES (PO'S):

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

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

3. 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.

4. 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.

5. 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.

6. 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.

7. 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.

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

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

10. 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.

11. 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.

12. 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 of technological change.

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

Department of Electronics and Communication Engineering

Program Specific Outcomes

PSO1: Design and develop dedicated engineering circuits and systems using the concepts, principles and methodologies in electronics, communication and signal processing applications in relevance to industry and society.

PSO2: Use modern tools, techniques and methodologies to design, analyse and develop intelligent systems in VLSI, Embedded and modern Semiconductor technology for customized solutions.

PSO3: Appropriate principles and algorithms to implement secured communication systems for problem solving Using signals, images, information from radars and satellite, fiber optics, wired and wireless systems.

Induction Program: 3 weeks

(Common for All Branches of Engineering)

Semester-0 **Regulations: R20**

S.No	Category	Course code	Course title	Hours per week L	T	P	Credits
1	MC		Physical Activities -- Sports, Yoga and Meditation, Plantation	0	0	6	0
2	MC		Career Counselling	2	0	2	0
3	MC		Orientation to all branches -- career options, tools, etc.	3	0	0	0
4	EC		Orientation on admitted Branch-- corresponding labs, tools and platforms	2	0	3	0
	ES		Proficiency Modules & Productivity Tools	2	1	2	0
5	MC		Assessment on basic aptitude and mathematical skills	2	0	3	0
6	MC		Remedial Training in Foundation Courses	2	1	2	0
7	MC		Human Values & Professional Ethics	3	0	0	0
8	BS		Communication Skills -- focus on Listening, Speaking, Reading, Writing skills	2	1	2	0
9	ES		Concepts of Programming	2	0	2	0
Total				**20**	**3**	**22**	**0**

SRIVENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
R.V.S. NAGAR, CHITTOOR-517 127, ANDHRA PRADESH
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Scheme of Instruction and Examination under R20 Regulations

I B.Tech., I Semester -ECE

S.No	Category	Course Code	Course Name	Hours/week			Credits	Scheme of Examination Maximum Marks		
				L	T	P	C	CIA	SEE	Total
1	BS	20AHS02	Differential Equations and Multivariable Calculus	3	1	0	3	40	60	100
2	BS	20AHS03	Engineering Chemistry	3	0	0	3	40	60	100
3	HS	20AHS01	Communicative English	3	0	0	3	40	60	100
4	ES	20AEE03	Network Theory	3	1	0	3	40	60	100
5	ES	20ACS01	C Programming and Data Structures	3	1	0	3	40	60	100
6	HS	20AHS06	Engineering Chemistry Lab	0	0	3	1.5	40	60	100
7	BS	20AHS05	Communicative English Lab	0	0	3	1.5	40	60	100
8	ES	20ACS03	C Programming and Data Structures Lab	0	0	3	1.5	40	60	100
9	MC	20AMB01	Design Thinking	2	0	0	-	100	00	100
Total credits				**17**	**3**	**9**	**19.5**	**420**	**480**	**900**

I B.Tech., II Semester -ECE

S. No	Category	Course Code	Course Name	Hours/week			Credits	Scheme of Examination Maximum Marks		
				L	T	P	C	CIA	SEE	Total
1	BS	20AHS04	Engineering Physics	3	0	0	3	40	60	100
2	BS	20AHS08	Algebra and Transformation Techniques	3	1	0	3	40	60	100
3	ES	20ACS04	Problem Solving and Programming using Python	3	1	0	3	40	60	100
4	ES	20AEC01	Electronic Devices and Circuits	3	1	0	3	40	60	100
5	ES	20AME01	Computer Aided Engineering Drawing	1	0	4	3	40	60	100
6	BS	20AHS07	Engineering Physics Lab	0	0	3	1.5	40	60	100
7	ES	20ACS05	Problem Solving and Programming using Python Lab	0	0	3	1.5	40	60	100
8	ES	20AME02	Engineering Practice Lab	0	0	3	1.5	40	60	100
9	MC	20AHS09	Environmental Sciences	2	0	0	0	100	00	100
10	20ANSS1/20ANCC1		NSS/NCC	0	0	2	-	-	-	-
Total credits				**15**	**3**	**13**	**19.5**	**420**	**480**	**900**

II B.Tech., I Semester - ECE

S. No	Category	Course Code	Course Name	Hours/week			Credits	Scheme of Examination Maximum Marks		
				L	T	P	C	CIA	SEE	Total
1	BS	20AHS10	Numerical Methods	3	1	0	3	40	60	100
2	PC	20AEC02	Electronic Circuit Analysis	3	0	0	3	40	60	100
3	PC	20AEC03	Signals and Systems	3	0	0	3	40	60	100
4	PC	20AEC04	Switching Theory and Logic Design	3	0	0	3	40	60	100
5	PC	20AEE13	Electrical Technology	3	0	0	3	40	60	100
6	PC	20AEC05	Electronic Devices and Circuits Lab	0	0	3	1.5	40	60	100
7	PC	20AEC06	Signals and Systems Lab	0	0	3	1.5	40	60	100
8	PC	20AEE14	Electrical Technology Lab	0	0	3	1.5	40	60	100
9	SC	20AEC07	PCB Design	1	0	2	2	40	60	100
10	MC	20AMB02	Universal Human Values-I	2	0	0	0	100	_	100
11	AC	20AHS11	Quantitative Aptitude and Reasoning -I	2	0	0	-	-	-	-
12	20ANSS1/20ANCC1		NSS/NCC	0	0	2	-	-	-	-
			Total credits	**20**	**01**	**13**	**21.5**	**460**	**540**	**1000**

II B.Tech., II Semester -ECE

S. No	Category	Course Code	Course Name	Hours/week			Credits	Scheme of Examination Maximum Marks		
				L	T	P	C	CIA	SEE	Total
1	ES	20AEC08	Probability Theory and Stochastic Processes	3	0	0	3	40	60	100
2	BS	20AHS12	Complex Analysis and Probability Distribution	3	1	0	3	40	60	100
3	PC	20AEC09	Analog Communications	3	0	0	3	40	60	100
4	PC	20AEC10	Linear IC Applications	3	0	0	3	40	60	100
5	HS	20AMB03	Managerial Economics and Financial Analysis	3	0	0	3	40	60	100
6	PC	20AEC11	Electronic Circuit Analysis Lab	0	0	3	1.5	40	60	100
7	PC	20AEC12	Linear IC Applications Lab	0	0	3	1.5	40	60	100
8	PC	20AEC13	Analog Communications Lab	0	0	3	1.5	40	60	100
9	SC	20AEC14	Arduino Programming	1	0	2	2	40	60	100
10	AC	20AHS15	Quantitative Aptitude and Reasoning -II	2	0	0	0	-	-	-
			Total credits	**18**	**00**	**11**	**21.5**	**360**	**540**	**900**
Honor Degree hours distribution **3-1-0-4**										
Minor General Degree hours distribution **3-0-2-4** and Minor Industrial Relevant Track Degree hours distribution 3-**1-0-4**										
Internship 2 months (Mandatory) during summer vacation/Community service project (to be evaluated during III year, I Sem)										

III B.Tech., I Semester -ECE

S. No	Category	Course Code	Course Name	Hours/week			Credits	Scheme of Examination Maximum Marks		
				L	T	P	C	CIA	SEE	Total
1	PC	20AEC17	Digital Communications	3	0	0	3	40	60	100
2	PC	20AEC18	Digital IC Applications	3	0	0	3	40	60	100
3	PC	20AEC19	Microprocessors and Microcontrollers	3	0	0	3	40	60	100
4	OE/ JOE	**Open Elective/ Job Oriented Elective –I**		3	0	0	3	40	60	100
		20AEE16	Control Systems							
		20AME20	Total Quality Management and Reliability Engineering							
		20ACS07	Object Oriented Programming through JAVA							
		20AEC20	Biomedical Instrumentation							
		20AEC21	Computer Architecture							
5	PE	**Professional Elective Courses-I**		3	0	0	3	40	60	100
		20AEC22	Electromagnetic Theory							
		20AEC23	Information Theory and Coding Techniques							
		20AEC24	Nano Technology and Applications							
		20AEC25	MEMS and NEMS							
		20AEC26	Television and Video Engineering							
6	PC	20AEC27	Microprocessors and Microcontrollers Lab	0	0	3	1.5	40	60	100
7	PC	20AEC28	Digital Communications Lab	0	0	3	1.5	40	60	100
8	SC	20AEC29	VHDL Programming	1	0	2	2	40	60	100
9	MC	20AHS21	Indian Constitution	2	0	0	0	100	0	100
10	AC	20AHS17	Quantitative Aptitude and Reasoning –III	0	0	2	0	-	-	-
11	AC	20AHS18	French Language	0	0	2	0	-	-	-
		20AHS19	German Language							
		20AHS20	Japanese Language							
12	20AEC30/20AECB6		Summer Internship/Community Service Project	0	0	0	1.5	40	60	100
			Total	**18**	**0**	**12**	**21.5**	**460**	**540**	**1000**

Honor Degree hours distribution **3-1-0-4**

Minor General Degree hours distribution **3-0-2-4** and Minor Industrial Relevant Track Degree hours distribution 3**-1-0-4**

III B.Tech., II Semester -ECE

<table>
<tr><th rowspan="2">S. No</th><th rowspan="2">Category</th><th rowspan="2">Course Code</th><th rowspan="2">Course Name</th><th colspan="3">Hours/week</th><th>Credits</th><th colspan="3">Scheme of Examination Maximum Marks</th></tr>
<tr><th>L</th><th>T</th><th>P</th><th>C</th><th>CIA</th><th>SEE</th><th>Total</th></tr>
<tr><td>1</td><td>PC</td><td>20AEC32</td><td>VLSI Design</td><td>3</td><td>0</td><td>0</td><td>3</td><td>40</td><td>60</td><td>100</td></tr>
<tr><td>2</td><td>PC</td><td>20AEC33</td><td>Digital Signal Processing</td><td>3</td><td>0</td><td>0</td><td>3</td><td>40</td><td>60</td><td>100</td></tr>
<tr><td>3</td><td>PC</td><td>20AEC34</td><td>Digital Design through Verilog HDL</td><td>3</td><td>0</td><td>0</td><td>3</td><td>40</td><td>60</td><td>100</td></tr>
<tr><td rowspan="6">4</td><td rowspan="6">PE</td><td colspan="2">Professional Elective Courses-II</td><td rowspan="6">3</td><td rowspan="6">0</td><td rowspan="6">0</td><td rowspan="6">3</td><td rowspan="6">40</td><td rowspan="6">60</td><td rowspan="6">100</td></tr>
<tr><td>20AEC35</td><td>Microwave Engineering and Antennas</td></tr>
<tr><td>20AEC36</td><td>Medical Electronics</td></tr>
<tr><td>20AEC37</td><td>Wireless Communication Systems</td></tr>
<tr><td>20AEC38</td><td>Electronic Measuring Instruments</td></tr>
<tr><td>20AEC39</td><td>Cognitive Radio Networks</td></tr>
<tr><td rowspan="6">5</td><td rowspan="6">OE/
JOE</td><td colspan="2">Open Elective/ Job Oriented Elective –II</td><td rowspan="6">3</td><td rowspan="6">0</td><td rowspan="6">0</td><td rowspan="6">3</td><td rowspan="6">40</td><td rowspan="6">60</td><td rowspan="6">100</td></tr>
<tr><td>20ACS08</td><td>Relational Data Base Management Systems</td></tr>
<tr><td>20AEE33</td><td>Neural Networks and Fuzzy Logic</td></tr>
<tr><td>20ACM02</td><td>Artificial Intelligence for Engineers</td></tr>
<tr><td>20AEC40</td><td>Consumer Electronics</td></tr>
<tr><td>20AEC41</td><td>RF Integrated Circuits</td></tr>
<tr><td>6</td><td>PC</td><td>20AEC42</td><td>Digital Signal Processing Lab</td><td>0</td><td>0</td><td>3</td><td>1.5</td><td>40</td><td>60</td><td>100</td></tr>
<tr><td>7</td><td>PC</td><td>20AEC43</td><td>Microwave Lab</td><td>0</td><td>0</td><td>3</td><td>1.5</td><td>40</td><td>60</td><td>100</td></tr>
<tr><td>8</td><td>PC</td><td>20AEC44</td><td>VLSI Lab</td><td>0</td><td>0</td><td>3</td><td>1.5</td><td>40</td><td>60</td><td>100</td></tr>
<tr><td>9</td><td>SC</td><td>20AHS16</td><td>Advanced English Communication Skills</td><td>1</td><td>0</td><td>2</td><td>2</td><td>40</td><td>60</td><td>100</td></tr>
<tr><td>10</td><td>MC</td><td>20AHS23</td><td>Essence of Indian Traditional Knowledge</td><td>2</td><td>0</td><td>0</td><td>0</td><td>100</td><td>-</td><td>100</td></tr>
<tr><td colspan="4" align="right">Total credits</td><td>18</td><td>0</td><td>11</td><td>21.5</td><td>460</td><td>540</td><td>1000</td></tr>
<tr><td colspan="11">Honor Degree hours distribution 3-1-0-4</td></tr>
<tr><td colspan="11">Minor General Degree hours distribution 3-0-2-4 and Minor Industrial Relevant Track Degree hours distribution 3-1-0-4</td></tr>
<tr><td colspan="11">Industrial/Research Internship (Mandatory) 2 Months during summer vacation (to be evaluated during IV year, I Sem)</td></tr>
</table>

IV B.Tech., I Semester -ECE

S. No	Category	Course Code	Course Name	Hours/week L	T	P	Credits C	Scheme of Examination Maximum Marks CIA	SEE	Total
1	PE	**Professional Elective Courses-III**		3	0	0	3	40	60	100
		20AEC46	Cellular and Mobile Communication							
		20AEC47	Transducer Engineering							
		20AEC48	Data Communication Networks							
		20AEC49	Adhoc Networks							
		20AEC50	Advanced Microprocessors							
2	PE	**Professional Elective Courses-IV**		3	0	0	3	40	60	100
		20AEC51	Digital Image Processing							
		20AEC52	Analog IC Design							
		20AEC53	Semiconductor Testing							
		20AEC54	Speech Processing							
		20AEC55	Advanced Digital Signal Processing							
3	PE	**Professional Elective Courses-V**		3	0	0	3	40	60	100
		20AEC56	Embedded Systems							
		20AEC57	Satellite Communications							
		20AEC58	Telecommunication Switching Systems and Networks							
		20AEC59	Millimetre Wave Communication Networks							
		20AEC60	Radar Systems							
4	OE/ JOE	**Open Elective/ Job Oriented Elective –III**		3	0	0	3	40	60	100
		20ACS39	Cloud Computing							
		20AME18	Robotics and Artificial Intelligence							
		20AMB10	Industrial Marketing							
		20AEC61	Automotive Sensors and Networking							
		20AEC62	Principles of Photovoltaic Cells and Methods							
5	OE/ JOE	**Open Elective/ Job Oriented Elective –IV**		3	0	0	3	40	60	100
		20AEE69	Digital Control Systems							
		20AEE70	Sensors and Transducers							
		20ACS28	Internet of Things							
		20AEC63	Machine Learning and Applications							
		20AEC64	ARM Based System Design							
6	HSS	**Humanities and social science Elective**		3	0	0	3	40	60	100
		20AMB04	Creativity and Innovation							
		20AMB05	Leadership Essentials							
		20AMB06	Law for Engineers							
		20AMB07	Entrepreneurship Essentials							
		20AMB08	Essentials of Management Science							
7	SC	20AEC65	Embedded System Programming	1	0	2	2	40	60	100
8	MC	20AMB12	Professional Ethics	2	0	0	-	100	-	100
9		20AEC66	Industrial / Research Internship	0	0	0	3	40	60	100
			Total	**21**	**0**	**2**	**23**	**420**	**480**	**900**

Honor Degree hours distribution **3-1-0-4**

Minor General Degree hours distribution **3-0-2-4** and Minor Industrial Relevant Track Degree hours distribution 3**-1-0-4**

IV B.Tech., II Semester -ECE

S.No.	Category	Code	Course Title	Hours / week			Credits	Scheme of Examination Max. Marks		
				L	T	P	C	CIA	SEE	Total
1	Major Project	20AEC70	Project, Project work, Seminar and Internship in Industry	0	0	24	12	40	60	100
	INTERNSHIP (6 MONTHS)									
Total							**12**	40	60	100

Scheme of Instruction and Examination under R20 Regulations

Courses for B. Tech Degree with Honors in Electronics and Communication Engineering:

SNO	COURSE CODE	Course Title	L	T	P	C	PRE-REQ	OFFERED TO
POOL-1 offered in II-II (Any 1 Course from POOL-1)								
1	20AEC71	Pulse and Digital Circuits	3	1	0	4	EDC	ECE
2	20AEC72	Electronics System Design	3	1	0	4	STLD	ECE
3	20AEC73	Communication Engineering	3	1	0	4	PTSP	ECE
4	20AEC74	Linear System Theory	3	1	0	4	Algebra and Transformation Techniques	ECE
POOL-2 offered in III-I (Any 1 Course from POOL-2)								
1	20AEC75	Microelectronic Devices Technology and Circuits	3	1	0	4	EDC	ECE
2	20AEC76	Digital IC Design	3	1	0	4	STLD	ECE
3	20AEC77	Modern Analog Communication Systems	3	1	0	4	AC	ECE
4	20AEC78	Signal Compression Theory and Methods	3	1	0	4	SS	ECE
POOL-3 offered in III-II (Any 1 Course from POOL-3)								
1	20AEC79	Nano Electronics	3	1	0	4	EDC	ECE
2	20AEC80	FPGA Architecture & Applications	3	1	0	4	STLD	ECE
3	20AEC81	Modern Digital Communication Systems	3	1	0	4	DC	ECE
4	20AEC82	Bio Medical Signal Processing	3	1	0	4	Bio medical Engineering	ECE
POOL-4 offered in III-II (Any 1 Course from POOL-4)								
1	20AEC83	Semiconductor Memory Design and Testing	3	1	0	4	EDC	ECE
2	20AEC84	Hardware Software Co-Design	3	1	0	4	MPMC	ECE
3	20AEC85	Microwave Integrated Circuits Design	3	1	0	4	MW and OC	ECE
4	20AEC86	Wavelets: Theory and Construction	3	1	0	4	Linear System Theory	ECE
POOL-5 offered in IV-I (Any 1 Course from POOL-5)								
1	20AEC87	Lithography Techniques for Device Fabrication	3	1	0	4	EDC	ECE
2	20AEC88	SOC Design	3	1	0	4	VLSI Design	ECE
3	20AEC89	Optical Networks	3	1	0	4	OC	ECE
4	20AEC90	DSP System Design	3	1	0	4	DSP	ECE

Scheme of Instruction and Examination under R20 Regulations

Courses for Minor Degree in Electronics and Communication Engineering

(a) Minor (General – for students opting from other disciplines of Engineering)

S.No	Year & Sem	Category	Course Code	Category	Hours/week			Credits	Scheme of Examination Max. Marks		
					L	T	P	C	CIA	SEE	Total
1	II-II	PC	20AEC91	Analog Electronics	3	0	2	4	40	60	100
2	III-I	PC	20AEC92	Analog IC Applications	3	0	2	4	40	60	100
3	III-II	PC	20AEC93	Digital IC Design Using VHDL	3	0	2	4	40	60	100
4	III-II	PC	20AEC94	Principles of Communications	3	0	2	4	40	60	100
5	IV-I	PC	20AEC95	Advanced Communications	3	0	2	4	40	60	100
				Total credits	**15**	**0**	**10**	**20**	**200**	**300**	**500**

Scheme of Instruction and Examination under R20 Regulations

(b)Minor (Specialization- Industry Relevant Track)

S.NO	COURSE CODE	COURSE NAME	L	T	P	CR	PRE-REQ	OFFERED TO	OFFERED IN
TRACK-1 VLSI									
1	20AEC96	Basics of VLSI	3	1	0	4	EDC	ECE	II-II
2	20AEC97	Design of ASIC	3	1	0	4	STLD	ECE	III-I
3	20AEC98	Low power VLSI Design	3	1	0	4	VLSI	ECE	III-II
4	20AEC99	VLSI Design Verification and Testing	3	1	0	4	DICA	ECE	III-II
5	20AECA0	EDA Tools	3	1	0	4	DICA, VLSI	ECE	IV-I
TRACK-2 EMBEDDEDSYSTEMS									
1	20AECA1	C Programming for Embedded Systems	3	1	0	4	C Programming	ECE	II-II
2	20AECA2	Embedded System Design	3	1	0	4	MPMC	ECE	III-I
3	20AECA3	Embedded Networking	3	1	0	4	ESD	ECE	III-II
4	20AECA4	Embedded Real Time Operating Systems	3	1	0	4	CA, ESD	ECE	III-II
5	20AECA5	FPGA based Embedded System Design	3	1	0	4	ESD, VLSI	ECE	IV-I
TRACK-3 WIRELESS AND MOBILE COMMUNICATION SYSTEMS									
1	20AECA6	Introduction to wireless and Mobile Communication Systems	3	1	0	4	MATHS	ECE	II-II
2	20AECA7	Radio Receivers and Coding Techniques	3	1	0	4	AC	ECE	III-I
3	20AECA8	Wireless Sensor Networks	3	1	0	4	WC	ECE	III-II
4	20AECA9	Optical Wireless Communications	3	1	0	4	WC, OC	ECE	III-II
5	20AECB0	5G Mobile Networks	3	1	0	4	WC, CMC	ECE	IV-I
TRACK-4 NANO SCIENCE AND TECHNOLOGY									
1	20AECB1	Nanotechnology	3	1	0	4	EDC	ECE	II-II
2	20AECB2	Nanotechnology in Flexible Electronics Applications	3	1	0	4	EDC	ECE	III-I
3	20AECB3	Nano Materials for Solar Energy and Photovoltaics	3	1	0	4	SCA	ECE	III-II
4	20AECB4	Nano Electronics and Nano Photonics	3	1	0	4	NTA	ECE	III-II
5	20AECB5	Nano Material Synthesis and Characterization Techniques	3	1	0	4	NTA	ECE	IV-I

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

I B.Tech I Semester (Common to all Branches)

L	T	P	C
3	1	0	3

20AHS02 DIFFERENTIAL EQUATIONS AND MULTIVARIABLE CALCULUS

Course Outcomes:

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

1. Classify and interpret the solution of ordinary differential equations.
2. Apply the principles of differential equations to the engineering and scientific problems.
3. Analyze the maxima and minima of functions of two or more variables.
4. Evaluate the double and triple integral to find surface area and volumes.
5. Compute the derivatives and line integrals of vector functions and learn their applications.

UNIT-I **9 Hours**

DIFFERENTIAL EQUATIONS: Exact differential Equations - Linear Differential Equations – Bernoulli's Equations – Non – homogenous Linear Differential equation of second and higher order with constant coefficients with R.H.S terms of the form e^{ax}, S$inax$, $Cosax$, x^m, $e^{ax}V(x)$, $x^mV(x)$ and $xV(x)$.

UNIT-II **9 Hours**

APPLICATIONS OF DIFFERENTIAL EQUATIONS: Orthogonal Trajectories (Cartesian and polar forms) - Newton's law of cooling- Law of natural Growth and Decay- L-R-C circuits, Bending of beams- Mass spring System

UNIT-III **9 Hours**

FUNCTIONS OF SEVERAL VARIABLES: Partial derivatives- chain rule- Total derivative, Jocobian-Maxima and Minima for functions of two variables – Lagrange's method of multipliers of three variables only.

UNIT-IV **9 Hours**

APPLICATIONS OF INTEGRATION: Length of an arc and area using integral.

Multiple Integrals: Double and Triple Integrals-Change of variables-Change of order of Integration (Cartesian and polar forms). Surface area and Volume of solid of revolution.

UNIT-V **9 Hours**

VECTOR CALCULUS: Gradient, Divergence, Curl and their properties (without identities). **Vector Integration**: Line Integrals – Potential functions – Area, Surface and Volume integrals –Green's theorem- Stoke's theorem& Gauss Divergence theorems (without proof) – problems on Green's, Stoke's and Gauss's Theorem.

Text Books:

1. Higher Engineering Mathematics, Dr. B.S. Grewal, Kanna Publications, 40^{th} edition.
2. A Text book of Engineering Mathematics –I, T.K.V. Iyengar, B. Krishna Gandhi and others , S. Chand and company.

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics. John Wiley & Sons.2016
2. Thomson, A Text book of Engineering Mathematics, Book Collection
3. B.V. Ramana, A Text book of Engineering Mathematics-I, Tata Mc Grawhill.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	2	-	-	-	-	-	-	-	-	-	-	-
CO3	2	2	-	1	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	-	2	-	-	-	-	-	-	-	-	-	-	-
Average	2.8	2	-	1.6	-	-	-	-	-	-	-	-	-	-	-
Level of Correlation	3	2	-	2	-	-	-	-	-	-	-	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

I B.Tech I Semester (Common to CE, ME, ECE, CAI, CSC & CSO)
I B.Tech II Semester (Common to EEE, CSE, IT, CSE (DS) & CSE (AI &ML))

L	T	P	C
3	**0**	**0**	**3**

20AHS03 ENGINEERING CHEMISTRY

Course Outcomes:

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

1. Understand the impact of hard water and its removal, apply the concept of estimation of hardness.
2. Analyze the selection of suitable engineering materials for specific applications.
3. Understand the Effect of corrosion and to know the designing of corrosion resistant articles.
4. Apply suitable fuels based on analysis of coal, calorific value for a particular application, calculation of air requirements for combustion of fuel, types of various batteries.

UNIT - I **9 Hours**

WATER TECHNOLOGY: Sources of water - impurities in water - Hardness of Water and its unit of expression - Estimation of hardness in water by EDTA titration method - Numerical problems - Boiler troubles and prevention methods - Estimation of Dissolved Oxygen in water by Winkler's method - specifications for drinking water Bureau of Indian Standards(BIS) and World health organization(WHO) standards - Water softening methods by Internal conditioning and External conditioning methods - Chlorination Of Domestic Water Treatment - Desalination of Brackish Water by Reverse Osmosis and electro dialysis methods.

UNIT - II **12 Hours**

MATERIALS CHEMISTRY: High Polymers: Polymers – Definition - Nomenclature of polymers - Types of polymerization reactions addition, condensation and copolymerization with examples. Plastics: Thermoplastics and thermosetting plastics and differences between them - Preparation, Properties and Engineering applications of PE, PTFE, PVC, Nylon and Bakelite. Conducting polymers - polyacetylene, polyaniline, polypyrroles - mechanism of conduction and applications. **Rubbers:** Natural Rubbers – Vulcanization - Synthetic Rubbers (Buna-S, Silicone Rubber, Neoprene) preparation, properties and applications. **Lubricants:** Functions of Lubricants - Classification of Lubricants - various properties of Lubricants (Viscosity, Viscosity Index, Flash and fire point, Cloud and pour point, Aniline point, Acid value or Neutralization number. **Refractories**: Important properties of refractories (Refractoriness, Refractoriness under Load, Porosity, Thermal spalling) and their applications.

UNIT - III **9 Hours**

CHEMISTRY OF CORROSION: Introduction on corrosion - causes and consequences of corrosion - Types of corrosion - Dry, Wet, Galvanic, Differential Corrosion - Mechanism of Dry and Wet corrosion - Factors influencing the corrosion - Control of corrosion - Cathodic protection by Sacrificial anodic and impressed current cathodic protection - Electro Plating and Electroless plating (Copper and Nickel).

UNIT - IV **11 Hours**

FUELS AND COMBUSTION: Fuels, Classification of Solid, Liquid and Gaseous fuels - Analysis of coal - Proximate and Ultimate analysis - Refining of Petroleum - Preparation of synthetic petrol - Bergius process - knocking and anti-knock agents - Octane and Cetane values - Calorific value - HCV, LCV - Numerical problems using Dulong-Petit's formula - Measurement of calorific value using Bomb calorimeter and Junkers gas calorimeter - Numerical problems.

Combustion: Calculation of air quantity requirement for Combustion - Numerical problems.

UNIT-V **9 Hours**

ELECTROCHEMICAL ENERGY SYSTEMS: Electrochemical Cells - Electrode potential - Standard electrode potential - Nernst equation - cell potential calculations - Basic concepts of pH metry, Potentiometry and Conductometric Titrations - Working principles and applications of different batteries - Dry cell, Lithium-ion cell, Lead-acid cell and Nickel-cadmium cell with discharging and recharging reactions - Working principles and applications of hydrogen-oxygen fuel cell, methanol-oxygen fuel cell.

Text Books:

1. A text book of Engineering Chemistry, Jain & Jain, Dhanpat Rai Publishing Company, 15th edition, New Delhi, 2008.
2. Chemistry for Engineers, Prof. K.N.Jayaveera, Dr.G.V.Subba Reddy and Dr. C.Ramachandraiah, McGraw Hill Higher Education Hyd., 3rd edition, 2009.

Reference Books:

1. Engineering Chemistry, Dr. K. B. Chandrasekhar, Dr. U.N. Dash, Dr. Sujatha Mishra, Scitech Publications (India) Pvt. Limited, Hyderabad, 2009.
2. A text book of Engineering Chemistry, Dr. K. RaviKrishnan, Sri Krishna Publications, Secunderabad, Telangana, New edition. July, 2015.
3. Chemistry of Engineering Materials, C.V. Agarwal, C. Parameswara Murthy and Andra Naidu, BS Publications, Hyderabad, 9th edition, 2006.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	3	2.25	-	-	-	-	-	-	-	-	-	-	-	-	-
Level of Correlation	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-

3- High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

I B. Tech I Semester (Common to CE, ME, ECE, CAI, CSC & CSO)
I B. Tech II Semester (Common to EEE, CSE, IT, CSE (DS) & CSE (AI & ML))

L T P C
3 0 0 3

20AHS01 COMMUNICATIVE ENGLISH

Course Outcomes:

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

1. Develop knowledge of basic grammatical concepts to understand asking and answering general questions on familiar topics and making paragraphs.
2. Interpret context, topic, and pieces of specific information from social or Transactional dialogues spoken by native speakers of English.
3. Examine language aspects to do role plays, to study graphic elements and information transfer.
4. Demonstrate discourse markers to make effective oral presentations and to write structured essays.

UNIT- I **10 Hours**

EXPLORATION

LESSON: A proposal to Girdle the Earth, Nellie Bly.

LISTENING: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.

SPEAKING: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.

READING: Skimming to get the main idea of a text; scanning to look for specific pieces of information.

READING FOR WRITING: Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph

GRAMMAR AND VOCABULARY: Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countable and uncountable; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentence.

UNIT- II **8 Hours**

ON CAMPUS

LESSON: The District School As It Was by One Who Went It, Warren Burdon

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 followed by short structured talks.

READING: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

WRITING: Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters.

GRAMMAR AND VOCABULARY: Cohesive devices - linkers, sign posts and transition signals; use of articles and zero article; prepositions.

UNIT- III **11 Hours**

WORKING TOGETHER

LESSON: The Future of Work

LISTENING: Listening for global comprehension and summarizing.

SPEAKING: Discussing specific topics in pairs or small groups and reporting.

READING: Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.

WRITING: Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetition

GRAMMAR AND VOCABULARY: Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.

UNIT- IV **8 Hours**

FABRIC OF CHANGE

LESSON: H.G. Wells and the Uncertainties of progress, Peter J. Bowler.

LISTENING: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.

SPEAKING: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/direction.

READING: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.

WRITING: Information transfer; describe, compare, contrast, identify significance/ trends based on information provided in figures/charts/graphs/tables.

GRAMMAR AND VOCABULARY: Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of antonyms

UNIT- V

TOOLS FOR LIFE **8 Hours**

LESSON: Leaves from the Mental Portfolio of a Eurasian, Sui San Far.

LISTENING: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.

SPEAKING: Formal oral presentations on topics from academic contexts – without the use of PPT slides.

READING: Reading for comprehension.

WRITING: Writing structured essays on specific topics using suitable claims and evidences

GRAMMAR AND VOCABULARY: Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

Text Books

1. English all round: Communication Skills for under graduation Learners Vol. I, Orient Black Swan Publishers, First Edition2019.

Reference Books

1. Academic writing: A handbook for international students, Bailey, Stephen, Routledge.2014.
2. Pathways: Listening, Speaking and Critical Thinking Chase. BeckyTarver, Heinley ELT; 2nd Edition, 2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Education.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	3	-	-	-	-	-
CO2	2	2	-	-	-	-	-	-	-	3	-	-	-	-	-
CO3	3	3	-	-	-	-	-	-	-	3	-	-	-	-	-
CO4	3	-	-	-	-	-	-	-	3	3	-	-	-	-	-
Average	2.75	2.5	-	-	-	-	-	-	3	3	-	-	-	-	-
Level of Correlation	3	3	-	-	-	-	-	-	3	3	-	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY, CHITTOOR
(AUTONOMOUS)

	L	T	P	C
I B.Tech I Semester (ECE)	**3**	**1**	**0**	**3**

20AEE03 NETWORK THEORY

Course Outcomes:

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

1. Apply the circuit concept of fundamental laws and Reduction Techniques
2. Apply sinusoidal Steady State Analysis for different parameters
3. Design of different types of AC and DC network theorems
4. Apply the Transient responses of R-L-C circuits
5. Design of Two port networks and Filters.

UNIT-I

CIRCUIT ELEMENTS & REDUCTION TECHNIQUES:

Circuit Concept - R-L-C parameters- Voltage and Current sources- Independent and dependent sources –Source transformation – voltage & current relationship for passive elements – Kirchhoff's laws- Network reduction techniques – series, parallel, series-parallel combinations, star to delta or delta to star transformation, Node and mesh analysis.

UNIT –II

SINUSOIDAL STEADY STATE ANALYSIS

R.M.S and average values for different periodic waveforms, Steady state analysis of R, L and C (inSeries, parallel and series parallel combinations) with sinusoidal excitation- Resonance-series, parallel circuits, concept of band width and Q factor,

UNIT –III

NETWORK THEOREMS

Superposition, Reciprocity, Thevenin's, Norton's and Maximum Power Transfer theorems (Statement without proof), problems using dependent and independent sources for DC and AC excitations.

UNIT –IV

TRANSIENT ANALYSIS

Transient response of R-L, R-C, R-L-C circuits (Series combinations only) for DC and sinusoidal excitations- Initial Conditions-Solution using differential equation approach and Laplace transform methods.

UNIT –V

TWO-PORT NETWORKS& NETWORK SYNTHESIS

TWO-PORT NETWORKS: Z, Y,ABCD, h-parameters-Conversion of one parameter set to another - conditions for reciprocity and symmetry – Two port network connections in series, parallel and cascaded.

NETWORK SYNTHESIS: Introduction to band pass, low pass, high pass and band reject filters.

Text Books:

1. Ravish R. Singh: network analysis and synthesis, tata mc graw hill company,1st edition2013
2. Network Theory: - A sudhakar and shyam mohan s palli,TMH publication 2nd edition 2004
3. Network Analysis- ME Van Valkenburg, Prentice Hall of India, 3rd Edition, 2000

References:

1. Engineering Circuit Analysis- William Hayt and Jack E Kemmety, McGraw Hill, 5th Edition, 1993
2. Electric circuits-J.Ed minister and M.Nahvi-Schaum's Outlines, TMH, 1999
3. Franklin F. Kuo, Network Analysis and Synthesis, Wiley India Education, 2nd Ed., 2006.

Mapping:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	3	-	2	-	-	-	-	-	-	-	-	-
CO2	3	2	3	2	-	2	-	-	-	-	-	-	-	-	-
CO3	2	1	1	1	-	1	-	-	-	-	-	-	-	-	-
CO4	2	2	1	1	-	1	-	-	-	-	-	-	-	-	-
CO5	2	1	2	2	-	2	-	-	-	-	-	-	-	-	-
Average	2.4	1.8	1.8	1.8	-	1.6	-	-	-	-	-	-	-	-	-
Level of Correlation	3	2	2	2	-	2	-	-	-	-	-	-	-	-	-

3- High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

I B.Tech I Semester (Common to all branches) **L T P C**
3 1 - 3

20ACS01 C PROGRAMMING & DATA STRUCTURES

Course Outcomes:

After Completion of the course the student will be able to

1. Analyze the basic concepts of C Programming language.
2. Design applications in C, using functions, arrays, pointers and structures.
3. Apply the concepts of Stacks and Queues in solving the problems.
4. Explore various operations on Linked lists.
5. Demonstrate various tree traversals and graph traversal techniques.
6. Design searching and sorting methods

UNIT-1 7 hrs

Introduction to C Language - C language elements, structure of C program, A simple C program, variable declarations and data types, operators and expressions, decision statements - If and switch statements, loop control statements - while, for, do-while statements, arrays, control statements-break and continue, programming examples.

UNIT – 2 10 hrs

Functions: Defining a function, Accessing a function, Function prototypes, Passing arguments to a function, Parameter passing mechanisms - Call-by-value, Call-by-reference, Recursion, Storage classes (auto, static, register, extern),**Arrays**: Declaration and Definition of an array, Processing an Array, Passing arrays to functions, Two dimensional and Multi-dimensional arrays**, Strings:** Defining and Initialization of Strings, NULL character, Reading and Writing a string , Processing the string , String handling functions.

UNIT-3 8 hrs

Pointers: Fundamentals, Pointer declarations, Pointers and One-dimensional array, Dynamic memory allocation, Operations on pointers**, Structures and Unions**: Declaration, Definition and Initialization of structures, Accessing structures, User defined data type (typedef), Enumerated Data types, Nested structures, Array of structures, Structures and pointers, Passing structures to functions, Unions.

UNIT – 4 10 hrs

Data Structures

Overview of data structures, stacks and queues, representation of a stack, operations on a stack, implementation of a stack, evaluation of arithmetic expressions, infix, prefix, and postfix notations, evaluation of postfix expression, conversion of expression from infix to postfix, recursion, queues - various positions of queue, representation of queue, insertion, deletion, searching operations.

Linked Lists – Singly linked list, dynamically linked stacks and queues, polynomials using singly linked lists, using circularly linked lists, insertion, deletion and searching operations, doubly linked lists and its operations, circular linked lists and its operations.

UNIT-5 9 hrs

Trees - Tree terminology, Binary trees, representation, binary tree traversals. Binary tree operations, Graphs - graph terminology, graph representation, elementary graph operations, Breadth First Search (BFS) and Depth First Search (DFS), connected components, spanning trees.

Searching and Sorting – sequential search, binary search, exchange (bubble) sort, selection sort, Insertion sort.

Text Books:

1. Behrouz A. Forouzan, Richard F. Gilberg, ―C Programming & Data Structures‖, India Edition, Course Technology, 2010.
2. The C Programming Language, Brian W Kernighan and Dennis M Ritchie, Second Edition, Prentice HallPublication.
3. Fundamentals of Data Structures in C, Ellis Horowitz, SartajSahni, Susan Anderson-Freed, Computer Science Press.
4. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education.
5. B.A. Forouzon and R.F. Gilberg, "COMPUTER SCIENCE: A Structured Programming Approach Using C", Third edition, CENGAGE Learning, 2016.
6. Richard F. Gilberg & Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach withC", Second Edition, CENGAGE Learning, 2011.

Reference Books:

1. Pradip Dey and Manas Ghosh, Programming in C, Oxford University Press, 2nd Edition2011.
2. E. Balaguruswamy, "C and Data Structures", 4th Edition, Tata Mc Graw Hill.
3. A.K. Sharma, Computer Fundamentals and Programming in C, 2nd Edition, University Press.
4. M.T. Soma shekara, "Problem Solving Using C", PHI, 2nd Edition 2009.

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	1	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	1	2	-	-	-	-	-	-	-	-	-	-	-
CO5	3	3	2	3	-	-	-	-	-	-	-	-	-	-	-
CO6	3	3	3	2	-	-	-	-	-	-	-	-	-	-	-
Average	3	3	2.25	2	-	-	-	-	-	-	-	-	-	-	-
Level of Correlation	3	3	2	2	-	-	-	-	-	-	-	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

I B.Tech I Semester (Common to CE, ME, ECE, CAI, CSC & CSO)
I B.Tech II Semester (Common to EEE, CSE, IT, CSE (DS) & CSE (AI &ML))

L	T	P	C
0	0	3	1.5

20AHS06 ENGINEERING CHEMISTRY LAB

Course Outcomes:

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

1. Estimate the amount of metal ions, hardness of water, chlorides in water, acidity, alkalinity,dissolved oxygen in water by using volumetric analysis.
2. Demonstrate the importance of viscosity index, flash point and fire point of lubricants and to prepare a polymer.
3. Apply pH meter, conductivity meter and potentiometer to find the normality and amounts of substances in solution

Any **TEN** of the following experiments

1. Estimation of Hardness of water by EDTA method.
2. Estimation of Chlorides in Water sample.
3. Determination of acid strength by using a pH meter (I) Strong acid VS Strong base (II) Weak acidVs Strong base.
4. Estimation of Copper using EDTA by complexometric method.
5. Determination of effect of temperature on absolute and kinematic viscosity of oils through Redwood viscometer No.1.
6. Estimation of Ferrous Ion by Potentiometry using standard Potassium Dichromate in a Redox reaction.
7. Determination of rate of corrosion by weight loss method.
8. Determination of acid strength by Conductometric method – Strong acid VS Strong base.
9. Determination of Alkalinity of water sample.
10. Determination of Acidity of water sample.
11. Estimation of Dissolved Oxygen in water by Winkler’s method.
12. Estimation of Ferrous Ion by Potassium Dichromate method.
13. Determination of Flash and Fire point by using Pensky Marten’s apparatus.
14. Preparation of Phenol-Formaldehyde resin.
15. Determination of moisture content in a coal sample

Text Books:

1. Chemistry pre-lab manual by Dr K. N. Jayaveera and K.B. Chandra Sekhar, S.M. EnterprisesLtd., 2007.
2. Vogel’S text book of Quantitative Inorganic Analysis, ELBS Edition, 1994.

Equipment Required:

1. Glassware: Burettes, Pipettes, Standard Flasks, Beakers, Measuring jars, BOD bottles and Reagent bottles.
2. Analytical balance,
3. Pensky Marten’s apparatus
4. Redwood viscometer,
5. Conductometer,
6. Potentiometer.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	3	2.67	-	-	-	-	-	-	-	-	-	-	-	-	-
Level of Correlation	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

I B.Tech I Semester (Common to CE, ME, ECE, CAI, CSC & CSO)
I B.Tech II Semester (Common to EEE, CSE, IT, CSE(DS) & CSE(AI &ML))

L	T	P	C
0	**0**	**3**	**1.5**

20AHS05 COMMUNICATIVE ENGLISH LAB

Course Outcomes:

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

1. Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
2. Develop communication skills through debates, oral presentations, group discussions and various language learning activities
3. Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and reading comprehension.
4. Evaluate and exhibit acceptable etiquette essential in social and professional settings.

UNIT-I

1. Phonetics for listening comprehension of various accents.
2. Reading comprehension
3. Describing objects/places/persons

UNIT-II

1. JAM
2. Small talks on general topics
3. Debates

UNIT-III

1. Situational dialogues – Greeting and Introduction
2. Summarizing and Note making
3. Group Discussion

UNIT-IV

1. Asking for Information and Giving Directions
2. Information Transfer
3. Non-verbal Communication – Dumb Charade

UNIT-V

1. Oral Presentations
2. Précis Writing and Paraphrasing
3. Reading Comprehension and spotting errors

PRESCRIBED SOFTWARE FOR PRACTICE:

Sky Pronunciation, Pro-power 2 & Globarena

Reference Books

1. Academic writing: A handbook for international students, Bailey, Stephen, Routledge, 2014.
2. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
3. Cambridge Academic English (B2), Hewings, Martin. 2012.
4. Effective Technical Communication, Ashrif Rizvi, TataMcGrahill, 2011
5. Technical Communication by Meenakshi Raman & Sangeeta Sharma, 3rd Edition, O U Press 2015.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	3	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	3	3	-	-	-	-	-
CO3	2	2	-	-	-	-	-	-	-	3	-	-	-	-	-
CO4	3	-	-	-	-	-	-	-	-	3	-	-	-	-	-
Average	2.75	2.33	-	-	-	-	-	-	3	3	-	-	-	-	-
Level of Correlation	3	2	-	-	-	-	-	-	3	3	-	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

I B.Tech I Semester (Common to All Branches)

L	T	P	C
0	0	3	1.5

20ACS03 C-PROGRAMMING & DATA STRUCTURES LAB

Course Outcomes:

After completion of the course the student will be able to

1. Demonstrate basic concepts of C programming language.
2. Develop C programs using functions, arrays, structures and pointers.
3. Apply the concepts Stacks and Queues using C Programming.
4. Illustrate operations on Linked lists.
5. Develop searching and sorting methods.

Week l

a) Programs using, I/O statements and expressions.

b) Programs using decision-making constructs.

Week 2

Write C programs that use both recursive and non-recursive functions

i) To find the factorial of a given integer.
ii) To solve Towers of Hanoi problem.

Week 3

a) Write a C program to find both the largest and smallest number in a list of integers.
b) Write a C program that uses functions to perform the following:
i) Addition of Two Matrices ii) Multiplication of Two Matrices

Week 4

Write a C program that uses functions to perform the following operations:

i) To insert a sub-string in to a given main string from a given position.
ii) Given a string -a$bcd./fg‖ find its reverse without changing the position of special characters. (Example input:a@gh%;j and output:j@hg%;a)

Week 5

From a given paragraph perform the following using built-in functions:

a. Find the total number of words.
b. Capitalize the first word of each sentence.
c. Replace a given word with another word.

Week 6

a) Write a C Program to perform various arithmetic operations on pointer variables.
b) Write a C Program to demonstrate the following parameter passing mechanisms:
i) call-by-value ii) call-by-reference

Week 7

Write C programs that implement stack (its operations) using

i) Arrays
ii) Pointers

Week 8

Write C programs that implement Queue (its operations) using

i) Arrays
ii) Pointers

Week 9

Write a C program that uses Stack operations to perform the following:

i) Converting infix expression into postfix expression
ii) Evaluating the postfix expression

Week 10

Write a C program that uses functions to perform the following operations on singly linked list.

i) Creation ii) Insertion iii) Deletion iv) Traversal

Week 11

Write a C program that uses functions to perform the following operations on Doubly linked list.

i) Creation ii) Insertion iii) Deletion iv) Traversal

Week 12

Write a C program that uses functions to perform the following operations on circular linked list.

i) Creation ii) Insertion iii) Deletion iv) Traversal

Week 13

Write a C program that uses functions to perform the following:

i) Creating a Binary Tree of integers
ii) Traversing the above binary tree in preorder, inorder and postorder.

Week 14

Write C programs that use both recursive and non-recursive functions to perform the following searching operations for a key value in a given list of integers:

i) Linear search
ii) Binary search

Week 15

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

Week 16 (Case Study)

Create a -Railway reservation system with the following modules

i) Booking
ii) Availability checking
iii) Cancellation
iv) Prepare chart

Text Books:

1. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education.
2. B.A. Forouzon and R.F. Gilberg, "COMPUTER SCIENCE: A Structured Programming Approach Using C", Third edition, CENGAGE Learning, 2016.
3. Richard F. Gilberg & Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach with C", Second Edition, CENGAGE Learning, 2011.

Reference Books:

1. Pradip Dey and Manas Ghosh, Programming in C, Oxford University Press, 2nd Edition 2011.
2. E.Balaguruswamy, "C and Data Structures", 4th Edition, Tata Mc Graw Hill.
3. A.K.Sharma, Computer Fundamentals and Programming in C, 2nd Edition, University Press.
4. M.T.Somashekara, "Problem Solving Using C", PHI, 2nd Edition 2009.

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	-	3	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	3	3	-	-	-	2	-	-	-	-	-	-
CO3	3	3	1	2	3	-	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	2	-	-	-	-	-	-	-	-	-	-
CO5	3	3	3	2	3	-	-	-		-	2	-	-	-	-
Average	3	2.8	2.2	2.33	2.8	-	-	-	2	-	2	-	-	-	-
Level of Correlation	3	3	2	2	3	-	-	-	2	-	2	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

I B.Tech I Semester (Common to CE, ME, ECE, CAI & CSC &CSO)
I B.Tech II Semester(Common to EEE,CSE, IT, CSE(DS) & CSE(AI &ML)

20AMB01 DESIGN THINKING

(Mandatory course)

L	T	P	C
2	0	0	0

COURSE OUTCOMES:

After completion of the course the student will be able to

1. Explain design thinking concepts and models to be used to perform human centered design (Understanding).
2. Apply design thinking tools techniques to produce good design (Applying).
3. Develop innovative products or services for a customer (Creating).
4. Build prototypes for complex problems using gathered user requirements (Creating).

UNIT I: INTRODUCTION TO DESIGN THINKING:

Design Thinking Process: Types of the thinking process, Common methods to change the human thinking process, Design thinking: Definition, Origin of design thinking, Importance of design thinking, Design vs Design thinking, Problem solving, Understanding design thinking and its process model, Design thinking tools.

UNIT II: EMPATHIZE:

Design thinking phases, How to empathize, Role of empathy in design thinking, purpose of empathy maps, Things to be done prior to empathy mapping, Activities during and after the session, Understanding empathy tools : Customer Journey Map, Personas.

UNIT III: IDEATION:

Challenges in idea generation, need for systematic method to connect to user, Visualize, Empathize, and Ideate method, Importance of visualizing and empathizing before ideating, Applying the method, Ideation Tools: How Might We? (HMW), Story board, Brainstorming.

UNIT IV: PROTOTYPING:

What is a prototype? - Prototyping as a mindset, prototype examples, prototyping for products; Why we prototype? Fidelity for prototypes, Process of prototyping- Minimum Viable prototype.

UNIT V: TESTING PROTOTYPES:

Prototyping for digital products: What's unique for digital products, Preparation; Prototyping for physical products: What's unique for physical products, Preparation; Testing prototypes with users.

TEXT BOOKS:

1. S.Salivahanan, S.Suresh Kumar, D.Praveen Sam, "Introduction to Design Thinking",TataMc Graw Hill, First Edition,2019.
2. Kathryn McElroy, "Prototyping for Designers: Developing the best Digital and Physical Products", O'Reilly,2017.

REFERENCE BOOKS:

1. Michael G. Luchs, Scott Swan , Abbie Griffin,"Design Thinking – New Product Essentials from PDMA", Wiley, 2015.
2. Vijay Kumar, "101 Design Methods: A Structured Approach for Driving Innovation in Your Organization", 2012.

ADDITIONAL LEARNING RESOURCES:

1. https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process
2. https://www.ibm.com/design/thinking/page/toolkit
3. https://www.interaction-design.org/literature/article/define-and-frame-your-design-challenge-by-creating-your-point-of-view-and-ask-how-might-we
4. https://hbr.org/2018/09/design-thinking-is-fundamentally-conservative-and-preserves- the-status-quo
5. https://hbr.org/2018/09/why-design-thinking-works
6. https://hbr.org/2015/09/design-thinking-comes-of-age
7. https://www.culturepartnership.eu/en/article/ten-tools-for-design-thinking
8. https://nptel.ac.in/courses/109/104/109104109/
9. https://nptel.ac.in/courses/110106124/

MAPPING COs WITH POs:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	2	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	2	3	-	-	-	-	-	-	-	3	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	3	2	-	-	-	-	-	-	-	-	-	-	-
Average	-	2	3	2	-	-	-	-	-	-	3	-	-	-	-
Level of Correlation	-	2	3	2	-	-	-	-	-	-	3	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

I B.Tech I Semester (Common to EEE, CSE, IT, CSE(DS) & CSE(AI &ML))
I B.Tech II Semester (Common to CE, ME, ECE, CAI, CSC & CSO)

L	T	P	C
3	0	0	3

20AHS04 ENGINEERING PHYSICS

Course Outcomes:

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

1. Demonstrate strong fundamental knowledge in optic, lasers and optical fibers.
2. Comprehend and apply quantum mechanical principles towards the free electron theory.
3. Learn about the crystal structure, magnetic materials, semiconductors, superconductors and their applications.
4. Propose preparation methods for different nanomaterials and relate structure of nanomaterials with their property.

UNIT-I **9 Hours**

OPTICS

INTERFERENCE: Introduction - Principle of superposition - Conditions for sustained interference – interference in thin films by reflection – Newton's Rings - Determination of wavelength of light and refractive index of liquid.

DIFFRACTION: Introduction–Definition of Fresnel and Fraunhofer diffraction - Fraunhofer diffraction due to single slit and double slit.

UNIT-II **LASERS & FIBER OPTICS** **9 Hours**

Lasers: Introduction - Laser Characteristics - spontaneous and stimulated emission of radiation - Einstein's coefficients - population inversion - Ruby laser - He-Ne laser- Applications of laser. **Fiber Optics:** Introduction - Principle of optical fiber - Acceptance angle and acceptance cone - Numerical aperture - Classification of Optical Fibers-Optical fiber communication system-Applications of optical fibers.

UNIT-III **9 Hours**

PRINCIPLE OF QUANTUM MECHANICS: Wave and particles - de Broglie hypotheses - de Broglie's wavelength for electron - Properties of Matter waves -Schrödinger time independent wave equation - Physical significance of wave function -Particle in one dimensional infinite potential box (qualitative only).

CRYSTAL PHYSICS: Single crystalline, Polycrystalline and amorphous materials -

Fundamental of crystallography- Space lattice - Basis - unit cell - Lattice parameters - Crystal systems –Bravais

Lattice - Structure and packing fraction of Simple cubic and body centered cubic - Miller Indices- Bragg's law- X-ray diffraction by powder method.

FREE ELECTRON THEORY: Electrical conductivity of Classical free electron theory and Quantum free electron theory - merits and demerits - Kronig penny model (qualitative only).

UNIT-IV SEMICONDUCTORS & SUPERCONDUCTORS 9 Hours

SEMI CONDUCTORS: Introduction - Intrinsic and extrinsic Semiconductors - Fermi level- Drift and diffusion - Einstein's equation - Hall Effect – LED.

SUPERCONDUCTORS: General properties of superconductors - Meissner effect - Penetration depth – Type I and Type II superconductors - Josephson effect - Application of superconductors.

UNIT-V MAGNETISM & NANOMATERIALS 9 Hours

MAGNETISM: Introduction and basic definitions - Origin of magnetic moment -Classification of magnetic materials - Hysteresis curve - Hard and Soft Magnetic Materials - Applications.

NANOMATERIALS: Introduction - Significance of Nano scale - Types of nanomaterials -Ball Milling-Chemical vapor deposition - Properties of nanomaterials, Optical and magnetic – application of Nano materials.

Text Books:

1. Engineering Physics, Thyagarajan K, Tata Mcgraw Hill Publishers, New Delhi, 2013.

2.A Text book of Engineering Physics, Avadhanulu and Kshirasagar, Revised Edition,S. Chand, New Delhi, 2014.

3. Gaur R K and Gupta S L, Engineering Physics, Dhanpat Rai Publications, New Delhi, 2010.

Reference Books:

1. Solid State Physics, Pillai. S.O, New Age International, New Delhi, 2005.
2. Introduction to Nanoscience and Technology, Chattapadhyay K.K, Banerjee A.N, New Delhi.
3. Engineering Physics, Vijaya kumara K, S. Chand & Company Ltd., New Delhi .

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	1	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	1	-	-	-	-	-	-	-	-	-	-	-
CO4	2	-	-	2	1	-	-	-	-	-	-	-	-	-	-
Average	2.75	2	-	1.33	1	-	-	-	-	-	-	-	-	-	-
Level of Correlation	3	2	-	1	1	-	-	-	-	-	-	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

I B.Tech II Semester (Common to All Branches)

L	T	P	C
3	1	0	3

20AHS08 ALGEBRA AND TRANSFORMATION TECHNIQUES

Course Outcomes:

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

1. Solve the system of linear equations and determine the eigen values and eigen vectors.
2. Apply the Laplace transform techniques to solve ordinary differential equations.
3. Apply Fourier series to expand periodic and elementary functions.
4. Evaluate Fourier sin and cosine transforms for given functions.
5. Analyze the principles of Z-transforms for solving the difference equation.

UNIT-I **10 Hours**

MATRICES: Rank of a matrix by echelon form, normal form. Solving system of homogeneous and non-homogeneous linear equations. Eigen values and Eigen vectors. Cayley- Hamilton theorem (without proof) – Finding inverse and power of a matrix by Cayley-Hamilton theorem. Diagonalization of a matrix.

UNIT-II **10 Hours**

LAPLACE TRANSFORMS: Laplace transforms of standard functions - First Shifting Theorem -Transforms of derivatives and integrals- Unit step Function – Second Shifting Theorem –Laplace transforms of Periodic functions – Inverse Laplace transforms - Convolution theorem. Applications of Laplace Transforms to ODE

UNIT-III **7 Hours**

FOURIER SERIES: Determination of Fourier coefficients- Fourier series- Even and odd functions -Fourier series in an arbitrary interval -Half-range Fourier sine and cosine expansions.

UNIT-IV **8 Hours**

FOURIER TRANSFORMS: Fourier integral theorem (only statement) - Fourier sine and cosine integrals. Fourier Transforms - Fourier sine and cosine Transforms – properties –Inverse transforms – Infinite Fourier transforms.

UNIT-V **10 Hours**

Z-TRANSFORMS: Standard functions **-** Properties - Damping rule- Shifting rule - Initial and final value theorems. Inverse Z- transforms - Convolution theorem - Solution of difference equations by Z- transforms.

Text Books:

1. Higher Engineering Mathematics, Dr. B. S. Grewal, 44/e Kanna Publications, 2017.
2. A Text book of Engineering Mathematics –II, T. K. V. Iyengar, B. Krishna Gandhi and others, S. Chand and company. 8th Revised edition, 2013.

Reference Books:

1. A Text Book of Engineering Mathematics-I, B.V. Ramana, , Tata Mc Grawhill
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons-2016.
3. Introductory Methods of Numerical Analysis S.S. Sastry, Printice Hall of India publications, 2012.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	2	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	3	2	-	2	-	-	-	-	-	-	-	-	-	-	-
Level of Correlation	3	2	-	2	-	-	-	-	-	-	-	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

I B.Tech II Semester (Common to all branches)

L	T	P	C
3	1	-	3

20ACS04 PROBLEM SOLVING AND PROGRAMMING USING PYTHON

Course Outcomes:

After Completion of the course the student will be able to

1. Demonstrate knowledge in Basics of python programming
2. Use the data structure lists, Dictionaries and Tuples.
3. Solve the problems by applying the modularity principle.
4. Demonstrate knowledge in OOP.
5. Demonstrate various mathematical operations using Numpy, Analyze Data using Pandas and visualizations using Matplotlib.

UNIT- I 9 hrs

INTRODUCTION TO PROBLEM SOLVING, EXPRESSION AND DATA TYPES

Fundamentals: what is computer science - Computer Algorithms - Computer Hardware - Computer software - Computational problem solving the Python programming language - Overview of Python, Environmental Setup, First program in Python, Python I/O Statement. **Expressions and Data Types:** Literals, Identifiers and Variables, Operators, Expressions. Data types, Numbers, Type Conversion, Random Number.

Problem solving: Restaurant Tab calculation and Age in seconds.

UNIT- II

CONTROL STRUCTURES& COLLECTIONS 10 hrs

Control Structures: Boolean expressions, Selection control and Iterative control. **Arrays -** Creation, Behavior of Arrays, Operations on Arrays, Built-In Methods of Arrays. **List** –Creation, Behavior of Lists, Operations on Lists, Built-In Methods of Lists. **Tuple -**Creation, Behavior of Tuples, Operations on Tuples, Built-In Methods of Tuples. **Dictionary** – Creation, Behavior of Dictionary, Operations on Dictionary, Built-In Methods of Dictionary. **Sets** –Creation, Behavior of Sets, Operations on Sets, Built-In Methods of Sets, Frozen set.

Problem Solving: A Food Co-op's Worker Scheduling Simulation.

UNIT- III

STRINGS, FUNCTIONS AND FILES 10 hrs

Strings - String Literal, Assigning String to a variable, Multiline Strings, String Slicing, Built-in Functions and Methods. **Functions** – Creating functions, calling a function, passing arguments to functions, function with return statement, Recursive function, Lambda Function**. Files** – File Handling, Create, Write, Read and Delete Files

UNIT-IV 9 hrs

OBJECT ORIENTED PROGRAMMING AND EXCEPTIONS

OOP - Classes and Objects, Encapsulation, Inheritance, Polymorphism, Constructor and Destructor, Self-parameter, Local and Global Scope, Access Modifiers, Polymorphism, super() method. Modules in python. **Exceptions** – Handling Exceptions, Raising Exceptions, Exception Chaining, User Defined Exceptions.
Problem solving: Credit card calculation.

UNIT- V 8 hrs

INTRODUCTION TO NUMPY, PANDAS, MATPLOTLIB: Exploratory Data Analysis (EDA), Data Science life cycle, Descriptive Statistics, Basic tools (plots, graphs and summary statistics) of EDA, Philosophy of EDA. Data Visualization: Scatter plot, bar chart, histogram, boxplot, heat maps, etc.

Text Books:

1. Introduction to Computer Science using Python: A Computational Problem-Solving Focus, First Edition, Charles Dierbach, Wiley India , 2012.
2. Programming Python, Mark Lutz, O’Reilly Publications, Fourth Edition, 2011.

Reference Books:

1. Core Python Programming, 2 nd edition,R. Nageswara Rao, Dreamtech Press, 2018.
2. Fundamentals of Python, Third Edition, Kenneth Lambert and B.L. Juneja, Cengage Learning,2012.

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	3	3	2	-	-	-	-	-	-	-	-	-	-
CO4	3	3	1	1	-	-	-	-	-	-	-	-	-	-	-
CO5	3	3	3	3	3	-	-	-	-	-	-	-	-	-	-
Average	3	2.75	2.33	2.33	2.5	-	-	-	-	-	-	-	-	-	-
Level of Correlation	3	3	3	3	3	-	-	-	-	-	-	-	-	-	-

3- High mapping 2-Medium Mapping 1- Low Mapping

Sri Venkateswara College of Engineering and Technology
(Autonomous)

I B.Tech II Semester (ECE)
II B.Tech I Semester (EEE)

L	T	P	C
3	1	-	3

20AEC01 ELECTRONICS DEVICES AND CIRCUITS

Course Outcomes:

After completion of the course students will be able to

CO1: Obtain the knowledge of Diode, special electronic Devices with their characteristics.
CO2: Develop the ability to understand the design and working of various rectifiers and filters.
CO3: Know the various configurations, working and various biasing techniques of BJT.
CO4: Know the working of JFET, MOSFET.

UNIT I PN JUNCTION DIODE AND ITS APPLICATIONS:

Qualitative theory of PN Junction, PN Junction Characteristics, biasing- band diagrams and current flow, Diode current equations under forward bias and reverse bias conditions, diode as a switch, Junction breakdown in diodes and breakdown voltages, effect of temperature on diode characteristics, Junction capacitance under forward bias and reverse bias, V-I characteristics and Specifications of Zener Diode, simple Zener voltage regulator and its limitations.

UNIT II RECTIFIERS AND FILTERS:

A Half-Wave Rectifier, Ripple Factor, A Full-Wave Rectifier, A Bridge Rectifier, The Harmonic Components in Rectifier Circuits, Inductor Filter, Capacitor Filter, L-Section Filter, Multiple L Section Filter, Π-Section Filter, Π-Section Filter with a Resistor Replacing the Inductor, Summary of Filters.

UNIT III BIPOLAR JUNCTION TRANSISTOR:

The Junction Transistor, Transistor Current Components, The Transistor as an Amplifier, Transistor Construction, Detailed study of the Currents in a Transistor, The Transistor Alpha. The Common-Base Configuration, The Common-Emitter Configuration, The Common Collector Configuration. The operating point, Analysis of Fixed Bias, Collector-to-Base bias, Emitter– Feedback bias, Collector-Emitter feedback bias Self—bias circuits, Stability factor, Bias compensation techniques, Bias Compensation, Thermal Runaway, Thermal Stability.

UNIT IV FIELD EFFECT TRANSISTORS:

The Junction Field-Effect Transistor, The Pinch-Off Voltage VP, The JFET Volt-Ampere Characteristics, The FET as a Voltage Variable Resistor (VVR), Comparison of JFET and BJT, The Metal Oxide Semiconductor Field Effect

Transistor (MOSFET) – Enhancement and Depletion Modes-Construction and Volt-Ampere characteristics, Comparison of MOSFET with JFET.

UNIT V SPECIAL PURPOSE ELECTRONIC DEVICES:

Principle of Operation, and Characteristics of Tunnel Diode, Varactor Diode, Schottky Barrier Diode, Silicon Control Rectifier (SCR), Uni-Junction Transistor (UJT), Semiconductor photo devices - LDR, LED, Photo diodes & Photo transistors.

Text Books:

1. Millman's Electronic Devices and Circuits, 4th Edition, Jacob Millman, Christos C. Halkias and SatyabrathaJit, McGraw Hill Education, 2016.
2. Electronic Devices and Circuits, 4th Edition, S Salivahanan and N Suresh Kumar, McGraw Hill Education, 2017.

Reference Books:

1. Electronic Devices and Circuits, 6th edition, T.F. Bogart Jr., J.S. Beasley and G. Rico, Pearson Education, 2008.
2. Electronic Devices and Circuits, 5th edition, David A. Bell, Oxford University Press, 2008.
3. Electronic Devices and Circuits, 10th Edition, R.L. Boylestad and Louis Nashelsky, PearsonPrentice Hall, 2009.

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	3	-	-	-	-	-	-	-	-	2	3	1
CO2	3	2	1	2	-	-	-	-	-	-	-	-	3	2	1
CO3	2	2	1	2	-	-	-	-	-	-	-	-	3	2	1
CO4	2	2	1	1	1	-	-	-	-	-	-	-	2	2	1
Average	2.5	2.25	1.25	2	1	-	-	-	-	-	-	-	2.5	2.25	1
Level of Correlation	3	2	1	2	1	-	-	-	-	-	-	-	3	2	1

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

I B.Tech I Semester (Common to EEE, CSE, IT, CSE(DS) & CSE(AI&ML))

I B.Tech II Semester (Common to CE, ME & ECE)

20AME01	Computer Aided Engineering Drawing	L	T	P	C
		1	0	4	3

Course Outcomes:

After completion of this course, the student will be able to

1. Communicate his/her ideas effectively by using Auto CAD software.
2. Project the points, lines, planes, solids with digital environment
3. Represent sectional views of solids and develop the sectioned object surfaces.
4. Communicate his/her ideas effectively by using Orthographic Projections and Isometric Views using computer software.

UNIT:I **10 hours**

Geometrical constructions of polygons (in scribing, circum scribing), special methods circle-tangents, Conics-ellipse, parabola, hyperbola -properties of conics, special methods of construction.

UNIT:II **10 hours**

Projections of points, straight lines-lines inclined to both the principal planes, determination of true length, traces and true inclinations.

UNIT:III **10 hours**

Projections of planes inclined to both the principal planes.

Projection of regular solids prisms, Pyramids, cylinders, tetrahedron and cones axis inclined to one plane.

UNIT:IV **10 hours**

Sections of solids such as prisms, pyramids, cylinders, tetrahedron and cones (solids in simple position) True shape of the section.
Development of surfaces of simple solids, as above and part solids.

UNIT:V **10 hours**

Principles of isometric projection is o metric scale isometric projection of planes and solids conversion of orthographic views into isometric views and vice-versa.

Practice:

1.Geometrical constructions:

a) Sketching of polygons - Triangles, Square, Rectangle, Pentagon, Hexagon, Circle at different positions.

Sketching of Tangents to the circles

2.Conics:

Constructions of Ellipse, Parabola ,Hyperbola

3.Points:

Drawing the quadrant sand positioning of the points with reference to H.P and V.P with dimensions.

4.Lines:

Sketching of lines when they are

1.Parallel to both H.P & V.P

2.Parallel to V.P/H.P and perpendicular to H.P/V.P

3.Parallel toV.P/H.P and inclined to H.P/V.P

4.Inclined to both the planes

a) Sketching of the line to measure true length & true inclinations

b) Sketching of the line to determine the traces

5 Planes:

Sketching of the planes when they are

a) Perpendicular to V.P/H.Pandparallel to H.P /V.P

b) Inclined to V.P/H.P and perpendicular to H.P/V.P

c) Perpendicular to both V.P and H.P.

d) Inclined to bothV.P and H.P.

6 Solids:

a) Sketching of 2D shapes and convert it to 3D solids (Prisms, Pyramids, cube , cylinder, one, tetrahedron)

b) Sketching of projections of solids when the position of axisis

i. Perpendicular to V.P/H.P and parallel toH.P/V.P.

ii. Inclined to V.P/H.P and parallel toH.P/V.P.

iii. Parallel to both V.P and H.P.

7. Sections of solids:

a) Different types of hatching on the polygons.

b) Sketching of sections of solids when the section/cutting planeis

i. Parallel to V.P/H.P and perpendicular to H.P/V.P.

ii. Inclined to V.P/H.P and perpendicular to H.P/V.P.

iii. Perpendicular to both principal planes.

c) Sketching of sections when the cutting plane passing through different positions-base, axis, corner, apex /vertex, generator, lateraledge.

Sketching of true shapes

8 Development of surfaces:

Sketching of developed surfaces of

a) cylinder, prisms using parallel line method

b) cone, pyramids using radial line method

c) truncated solids and frustum

9.Orthographic Projections:

Sketching of 2D views of front, top and side views of 3D objects.

10. Isometric projections:

a) Setting of isometric grid

b) Sketching of isometric views of 3D models / shapes.

Text Book(s)

1. K. L. Narayana and S. Bheemanjaneyulu, Engineering Drawing with Auto CAD 2016 ,New Age Publishers, NewDelhi,2017

2 Basant Agrawal and C.M.Agrawal, Engineering Drawing, McGraw Hill Education 2ndedition.

Reference Books

1. K.Venugopal, Engineering Drawing and Graphics+Auto Cad, New Age International (P)Ltd, Publishers , New Delhi, Fourth Edition
2. Siddiquee Arshad. N., Zahid A. Khan, Mukhtar Ahmad, Engineering Drawing: With primeron AUTO CAD, PHI Learning Pvt. Ltd.,

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	-	3	-	-	-	3	3	-	-	-	-	-
CO2	3	3	3	-	3	-	-	-	3	-	-	-	-	-	-
CO3	3	3	-	-	3	-	-	-	3	-	-	-	-	-	-
CO4	3	3	-	-	3	-	-	-	3	3	-	-	-	-	-
Average	3	3	3	-	3	-	-	-	3	3	-	-	-	-	-
Level of Correlation	3	3	3	-	3	-	-	-	3	3	-	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

I B.Tech I Semester (Common to EEE, CSE, IT, CSE (DS) & CSE (AI&ML))
I B.Tech II Semester (Common to CE, ME, ECE, CAI, CSC & CSO)

L	T	P	C
0	0	3	1.5

20AHS07 ENGINEERING PHYSICS LAB

Course Outcomes:

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

1. Explore the knowledge of Spectrometer and other optical instruments.
2. Apply concepts of magnetic materials, lasers, semiconductor, and it's their relative parameters.
3. Access, process and analyze scientific information of optical communication.

A minimum of 10 experiments to be conducted during the academic year

1. Determine the wavelengths of given light source - Spectrometer.
2. Dispersive power of prism.
3. Determine the thickness of thin wire by Interference.
4. Determine the wavelength of given laser source - Diffraction grating.
5. Determine the radius of curvature of given piano convex lens by forming Newton Rings.
6. Magnetic field along the axis of a current carrying coll - Stewart and Gee's method.
7. Numerical Aperture of an optical fiber.
8. Bending losses In Optical Fiber.
9. Determine the wavelength of Laser source using optical fiber.
10. Determine Hall Coefficient and Carrier concentration of the given Semiconductor.
11. Determine the energy loss of ferromagnetic sample by plotting B-H curve.
12. Energy gap of a given semiconductor.

13. Solar Cell: To study the V-I Characteristics of solar cell.

14. Determine the particle size using laser source.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	1	-	-	2	-	-	-	-	-	-	-	-	-	-
CO3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	2.67	1	-	-	2	-	-	-	-	-	-	-	-	-	-
Level of Correlation	3	1	-	-	2	-	-	-	-	-	-	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

I B.Tech – II Semester (Common to all Branches)

L	T	P	C
-	-	3	1.5

20ACS05 PROBLEM SOLVING AND PROGRAMMING USING PYTHON LAB

Course Outcomes:

After Completion of the course the student will be able to

1. Write, Test and Debug Python Programs
2. Implement Conditionals and Loops for Python Programs
3. Use functions and represent Compound data using Lists, Tuples and Dictionaries
4. Read and write data from & to files in Python

WEEK 1

a. Write a python script to display a simple message

b. Write a python script to perform basic arithmetic operations on two values which are accepted from the user.

WEEK 2

a. Write a python script to calculate the factorial of a given number.

b. Write a python script to calculate sum of individual digits of a given number.

c. Write a Python program that prompts the user for two floating-point values and displays the result of the first number divided by the second with exactly six decimal places displayed.

WEEK 3

a. Write a python script to find the largest number among three numbers and display them in ascending order using if-else construct.

b. Write a python script to display Fibonacci sequence of numbers using while loop, for loop and do-while loop constructs.

c. Write a python script to display the prime number series up to the given N Value.

WEEK 4

a. Write a Python program

i. To calculate sum all the items in a list.

ii . To remove duplicates from a list.

iii. To find the list of words that are longer than n from a given list of words.

iv. To get the difference between the two lists.

v. To append a list to the second list.

b.Write a Python program to print a specified list after removing the 0th, 4th and 5th elements.

Sample List : ['Red', 'Green', 'White', 'Black', 'Pink', 'Yellow']

Expected Output : ['Green', 'White', 'Black']

c.Write a python script to arrange the given list of elements in ascending or descending order.

WEEK 5

a. To write a python program to create, slice, change, delete and index elements using Tuple.

b. Write a Python program to replace last value of tuples in a list.

Sample list: [(10, 20, 40), (40, 50, 60), (70, 80, 90)]

Expected Output: [(10, 20, 100), (40, 50, 100), (70, 80, 100)]

WEEK 6

a. Write a program to demonstrate working with dictionaries in Python

WEEK 7

a. Write a Python program

i. To create a set.

ii. To remove item(s) from a set.

iii. To remove an item from a set if it is present in the set.

iv. To create a union and intersection of sets.

v. To create set difference.

WEEK 8

a. Write a python script to demonstrate string methods.

b. Write a Python program to count the number of characters (character frequency) in a string.

Sample String: google.com'

Expected Result : {'g': 2, 'o': 3, 'l': 1, 'e': 1, '.': 1, 'c': 1, 'm': 1}

c. Write a Python program to reverse a string.

Sample String : "1234abcd"

Expected Output : "dcba4321"

d. Write a Python script that takes input from the user and displays that input back in upper and lower cases.

e. Write a Python script to get a string made of 4 copies of the last two characters of a specified string (length must be at least 2).

Sample Input /Output

Input: Python – Output: onononon

Input: Exercises – Output: esesesesf

f. Write a Python function that checks whether a passed string is palindrome or not.

WEEK 9

a. Write a python script to find GCD of two numbers using recursive and non recursive functions.

b. Write a python script to convert the following using functions:

i. Fahrenheit to Celsius temperature.
ii. Celsius to Fahrenheit temperature.

WEEK 10

a. Write a python script to demonstrate the Exception Handling.

WEEK 11

a. Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order

b. Write a script named copyfile.py. This script should prompt the user for the names of two text files. The contents of the first file should be the input that to be written to the second file.

WEEK 12

a. Write a program to demonstrate a) arrays b) array indexing such as slicing, integer array indexing and Boolean array indexing along with their basic operations in NumPy.

b. Write a program to compute summary statistics such as mean, median, mode, standard deviation and variance of the given different types of data.

WEEK 13

a. Write a python script to implement inheritance.

b. Write a python script to implement constructor.

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	3	3	3	-	-	-	-	-	-	-	-	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	3	3	3	2.5	3	-	-	-	-	-	-	-	-	-	-
Level of Correlation	3	3	3	3	3	-	-	-	-	-	-	-	-	-	-

3- High mapping 2-Medium Mapping 1- Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

I B.Tech I Semester (Common to EEE, CSE, IT, CSE(DS) & CSE(AI&ML))

IB.Tech II Semester(Common to CE, ME & ECE)

20AME02	Engineering Practice lab	L	T	P	C
		0	0	3	1.5

Course Outcomes:

After completion of this course, the student will be able to

1. Perform a different prototype model in the carpentry trade such as Mortise and Ten on joint, and Table stand using wood turning lathe.
2. Prepare models such as Dove tail joint and Half Round joint using Fitting tools and rectangulartray, and funnel prototypes in the trade of Tinsmithy.
3. Perform various basic House Wiring techniques such Staircase wiring (i.e. control of one lamp by two switches fixed at two different places), and wiring for tube light
(Fluorescent Lamp)/Focus light.
4. Fabricate different models in a foundry shop such as single and two pieces pattrens and prototypes in the trade of Welding such as T-Joint and H-Joint.

TRADES FOR EXERCISES:

a. Carpentry shop.

1. Preparea Mortise and ten on joint from a given 300 x 40 x 25mm soft wood stock.
2. Preparea Table stand (desired shape) by using wood turning Lathe from a given300x 40x25mm soft wood stock.

b. Fitting shop

1. Prepare a Dovetail joint from a given 100x50x5mm M.S. stock.
2. Prepare a Half Round joint from a given 100x50x5mm M.S. stock.

c. Sheet metal shop

1. Prepare a Funnel from given G.I. sheet.
2. Prepare a Rectangular Tray from given G.I. sheet.

d. House-wiring

1. Stair case wiring (i.e. Control of one lamp by two switches fixed at two differentplaces).

2. Prepare a wiring for tube light (‘’Fluorescent Lamp ‘’)/ Focus light
3. Prepare a mould for a single piecepattern (Connectingrod)
4. Prepare a mould for a Double piecepattern(SteppedPulley)

e. Welding

1. Prepare a T-Joint from given M.S Flat pates using Arc Welding.
2. Prepare a H-Joint from given M.S Flat pates using Arc Welding.

2. TRADES FOR DEMONSTRATION:

a) Plumbing
b) Machine Shop
c) Metal Cutting

Apart from the above the shop rooms should display charts, layouts, figures, circuits, hand tools, hand machines, models of jobs, materials with names such as different woods, wood faults, Plastics, steels, meters, gauges, equipment, CD or DVD displays, First aid, shop safety etc. (though they may not be used for the exercises but they give valuable information to the student). In the class work or in the examination knowledge of all shop practices may be stressed upon rather than skill acquired in making the job.

Reference Books

1 Work shop Manual/P.Kannaiah/K.L.Narayana/SciTechPublishers.
2 Engineering Practices Lab Manual, Jeyapoovan, Saravana Pandian,4/eVika0073
3 Dictionary of Mechanical Engineering Nayler,Jaico Publishing House.
4 Engineering Work shopby Vishnu Universal Learning.
5 Engineering Work shop by GRI Einstitute.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	-	3	-	-	-	3	-	-	-	-	-	-
CO2	3	2	2	-	3	-	-	-	3	-	-	-	-	-	-
CO3	3	2	2	-	3	-	-	-	3	-	-	-	-	-	-
CO4	3	2	2	-	3	-	-	-	3	-	-	-	-	-	-
Average	3	2	2	-	3	-	-	-	3	-	-	-	-	-	-
Level of Correlation	3	2	2	-	3	-	-	-	3	-	-	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

I B.Tech I Semester (Common to EEE, CSE, CSE (DS), CSE (AI & ML) & IT)
I B.Tech II Semester (Common to CE, ME, ECE, CAI, CSC & CSO)

L	T	P	C
2	0	0	0

20AHS09 ENVIRONMENTAL SCIENCES

(Mandatory Course)

Course Outcomes:

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

1. Aware of the complex relationships between environment and human system.
2. Develop critical thinking (or) observation skills and apply them in the analysis of a problem (or) question related to the environment.
3. Identify the major pollutants and abatement devices in order to protect the environment from pollution for effective environmental management.
4. Analyze and interpret the fundamental physical, chemical, biological principles and social factors that govern natural process.

UNIT-I **5 Hours**

ECO SYSTEMS AND BIODIVERSITY AND ITS CONSERVATION: Definition, scope and importance, Need for public awareness. Concept of an ecosystem - Structure and function of an ecosystem.- Producers, consumers, decomposers - Energy flow in the eco systems - Ecological succession - Food chains, food webs and ecological pyramids -Introduction, types, characteristic features, structure and function of the following eco systems: - Forest ecosystem - Grass land ecosystem - Desert ecosystem - Aquatic eco systems (lakes, rivers, oceans) – Introduction - Definition: genetics, species and ecosystem diversity - Biogeographical classification of India. - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - India as a mega diversity nation - Hot-spots of biodiversity. - Threats to biodiversity: habitats loss, poaching of wild life, man wildlife conflicts- Endangered and endemic species of India- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT-II **5 Hours**

NATURAL RESOURCES:

Forest resources - Use and over-exploitation – deforestation - case studies - Timber extraction – mining- dams and their effects on forests and tribal people. **Water resources** - Use and over-utilization of surface and ground water - floods, drought - conflicts over water - dam's benefits and problems.

Mineral resources - Use and exploitation - environmental effects of extracting and using mineral resources - case studies. **Food resources** - World food problems - effects of modern agriculture - fertilizers- pesticides problems. **Energy Resources** - Growing energy needs- renewable and non-renewable energy sources, use of alternate energy sources - case studies - Role of an individual in conservation of natural resources - Equitable use of resources for sustainable life styles.

UNIT-III **5 Hours**

ENVIRONMENTAL POLLUTION: Definition Causes, 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, earth quake, cyclone and landslides.

UNIT-IV **5 Hours**

SOCIAL ISSUES AND THE ENVIRONMENT: Form unsustainable to sustainable development - Urban problems related to energy - Water conservation, rain water harvesting, water shed management - Resettlement and rehabilitation of people; its problems and concerns, case studies - Environmental ethics: issues and possible solutions - Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies - Wasteland reclamation - Consumerism and waste products - 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 legislations - Public awareness. Visit to a local area to document environment assets river / forest / grassland / hill / mountain.

UNIT-V **3 Hours**

HUMAN POPULATION AND THE ENVIRONMENT: Population growth and variation among nations - Population explosion- family welfare program - Environment and human health - Human rights - Value education - HIV / AIDS -Women and child welfare - Role of information technology in environment and human health - Case studies. Visit to a local polluted site-urban/rural/industrial/agricultural. Study of common plants, insects, birds. Study of simple ecosystems-pond, river, hills lopes, etc.

Text Books:

1. Textbook of Environmental studies, Erach Bharucha, UGC.
2. Fundamental concepts in Environmental Studies, D D Mishra, , S Chand & Co Ltd

References Books:

1. Environmental Science G. Tyler Miller and Scottt Spoolman, Cengage Learning Publishers, 15lhEdition, 2015.
2. Environmental Encyclopedia Cunningham, W. P, Cooper T.H, Gorhani, Jaico publications, Mumbai, 2001.
3. Environmental Chemistry, B.K.Sharma, Krishna Prakashan Media (p) Ltd, 2011.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	-	3	-	-	-	-	-	-	-	-
CO2	2	-	-	-	-	-	3	-	-	-	-	-	-	-	-
CO3	2	-	-	-	-	-	3	-	-	-	-	-	-	-	-
CO4	2	-	-	-	-	-	3	-	-	-	-	-	-	-	-
Average	2	-	-	-	-	-	3	-	-	-	-	-	-	-	-
Level of Correlation	2	-	-	-	-	-	3	-	-	-	-	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

I B. Tech II Semester ECE

Course Code: 20ANSS1/20ANCC1

NSS/NCC

L	T	P	C
0	0	2	-

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

II B.Tech-I Semester (Common to All Branches)

L	T	P	C
3	1	0	3

20AHS10 NUMERICAL METHODS

Course Outcomes:

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

1. Classify the algebraic and non-algebraic equations and solve them using different iterative methods.
2. Apply numerical techniques to solve engineering problems.
3. Interpret the data and drawing the valid conclusion.
4. Evaluate the numerical solutions of ordinary differential equations using single step and multi-step methods.
5. Solve real world problems using solutions of partial differential equations.

UNIT-I **10 Hours**

SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS: Introduction–Inter mediate value theorem-The Bisection method-The method of false position Newton - Raphson method- Problems on Iterative methods. Interpolation: Forward Differences - backward differences-Newton's forward and backward differences formulae for interpolation –Problems on Interpolation - Lagrange's interpolation formula-Inverse interpolation- Problems.

UNIT-II **8 Hours**

NUMERICAL DIFFERENTIATION AND INTEGRATION: Approximation of derivatives using interpolation polynomials-First and second order derivatives-Problems on numerical differentiation. Newton Cotes formulae – Numerical integration using Trapezoidal rule, Simpson's 1/3 rule and Simpson's 3/8 Rule.

UNIT-III **10 Hours**

CURVE FITTING: Fitting of Curves by method of Least - squares – Fitting of Straight lines – Fitting of second degree Parabola-Fitting of the exponential curve- Fitting of the power curve – Problems –Regression- Correlation–Problems on interpretation of data–Drawing conclusions.

UNIT-IV **8 Hours**

NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS: Taylor's series-Picard's method of successive Approximations -Euler's and Modified Euler's Method- Problems on single step methods– Runge – Kutta Methods – Predictor – corrector method-Milne's method.

UNIT-V **9 Hours**

PARTIAL DIFFERENTIAL EQUATIONS: Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions - Method of separation of variables - Solution of one-dimensional wave equation, heat equation and two–dimensional Laplace's equation.

Text Books:

1. Dr. B. S. GREWAL, Higher Engineering Mathematics. Kanna Publications, 42th edition.
2. B.V. Ramana, A Text Book of Engineering Mathematics-I, TATA MCGRAWHILL
3. E. Rukmangadachari and Keshava Reddy, A Text Book of Engineering Mathematics-I, PEARSON EDUCATION.
4. T.K.V. Iyengar, B. Krishna Gandhi and Others, A Text Book of Engineering Mathematics–I, S. Chand and Company.

References:

1. Erwin Kreyszig, Advanced EngineeringMathematics.JOHNWILEY&SONS-2016.
2. Jain.M. K, Iyengar T.K. V, Jain. R.K. Numerical Methods for Scientific and EngineeringComputation. New age International Publishers.
3. N. Bail, M.Goyal & C.Walking, A Text Book of Advanced Engineering Mathematics-A Computer Approach.
4. Pal, Mathematical Methods, Oxford University Press, 2009.
5. S.S. Sastry, Introductory Methods of Numerical Analysis, Printice Hall of India publications, 2011

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	3	2.4	-	-	-	-	-	-	-	-	-	-	-	-	-
Level of Correlation	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
II B.Tech I Semester ECE
(20AEC02)ELECTRONIC CIRCUIT ANALYSIS

L	T	P	C
3	0	0	3

Course Outcomes:

After completion of the course the student will be able to

CO1: Understand response of Transistor at Low Frequency, High Frequency, different types of multi-stage amplifiers, power amplifiers, and tuned amplifiers

CO2: Analyze the various parameters of Feedback amplifiers and Oscillators

UNIT-I: TRANSISTOR AT LOW FREQUENCIES (10 Periods)

Graphical Analysis of the CE Configuration, Two-port Devices and the Hybrid Model, Transistor Hybrid Model, The *h* Parameters, Analysis of a Transistor Amplifier Circuit using *h* parameters, The Emitter Follower, Comparison of Transistor Amplifier Configurations, Linear Analysis of a Transistor Circuit, Miller's Theorem and its Dual, Cascading Transistor Amplifiers, Simplified Common-emitter Hybrid Model, The Common-emitter Amplifier with an Emitter Resistance, High-input-resistance Transistor Circuits, The FET Small-signal Model, The Low-frequency Common Source and Common Drain Amplifiers.

UNIT-II: TRANSISTOR AT HIGH FREQUENCIES (10 Periods)

Transistor at high frequencies, Hybrid- π common emitter transistor model, Hybrid π conductance, Hybrid π capacitances, validity of hybrid π 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-III: MULTISTAGE AMPLIFIERS (8 Periods)

Classification of amplifiers, methods of coupling, Cascaded transistor amplifier and its analysis, analysis of two stage RC coupled amplifier, high input resistance transistor amplifier circuits and their analysis-Darlington pair amplifier, Cascode amplifier.

UNIT IV FEEDBACK AMPLIFIERS AND OSCILLATORS(9Periods)

Classification of Amplifiers, The Feedback Concept, The Transfer Gain with Feedback, General Characteristics of Negative-feedback Amplifiers, Input Resistance, Output Resistance, Bandwidth of Voltage Series, Voltage Shunt, Current Series and Current Shunt Feedback Configurations, Classification of Oscillators, Condition for Oscillations, The R-C Phase-shift Oscillator, The Wien Bridge Oscillator, Generalized Analysis of LC Oscillators-Hartley and Colpitts Oscillators and Crystal Oscillators, Frequency Stability of Oscillators.

UNIT V LARGE SIGNAL AMPLIFIERS AND TUNED AMPLIFIERS (8 Periods)

Classification, Class A Large-signal Amplifiers, Transformer Coupled Class A Audio Power amplifier, Efficiency of Class A amplifier, Class B amplifier, Efficiency of Class B Amplifier, Class B Push-pull Amplifier, Distortion in Power Amplifiers, Complementary Symmetry Class B Push Pull Amplifier, Class AB Amplifier, Class C Power Amplifier, Tuned Amplifiers, Q-Factor, Small Signal Tuned Amplifiers, Capacitance-Coupled Single-Tuned Amplifier, Double-Tuned Amplifier.

Total Periods: 45

Text Books:

1. Integrated Electronics-Analog and Digital Circuits and Systems by Jacob Millman and Christos Halkias and Chetan D Parikh, Second Edition, Tata McGraw-Hill, Fifth reprint 2011.
2. Electronic Devices and Circuits by Jacob Millman and Christos C Halkias and Satyabrata Jit, Fourth Edition, McGraw Hill Education (India) Private Limited, Second reprint 2016.
3. Electronic Devices and Circuits by S. Salivahanan, N. Suresh Kumar, Fourth Edition, McGraw Hill Education (India) Private Limited, 2017.

Reference Books:

1. Electronic Devices and Circuits Theory by Robert L. Boylestad and Louis Nashelsky, PHI, 9th Edition, 2008.

2. Micro Electronic Circuits by Adel S. Sedra and Kenneth C. Smith, Oxford University Press, 5th Edition, 2004.

3. Electronic Circuit Analysis-Rashid, Cengage learning, 2013.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	2	1	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	2	-	-
Average	3	3	-	-	-	-	-	-	-	-	-	-	2	1	-
Level of Correlation	3	3	-	-	-	-	-	-	-	-	-	-	2	1	-

3- High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech I Semester ECE

(20AEC03) SIGNALS AND SYSTEMS

L	T	P	C
3	0	0	3

Course Outcomes

After completion of the course the student will be able to

CO1: Apply the fundamental of signals and systems, Fourier series, Fourier transform and sampling theorem concepts to solve problems in Communication systems.

CO2: Analyze signals, system characteristics and response using convolution and correlation

CO3: Apply Laplace transform and Z-Transform techniques to solve problems in analog and discrete time systems

UNIT I FUNDAMENTALS OF SIGNALS AND SYSTEMS (10 Periods)

Definition and classification of signals and systems, Elementary signals such as Impulse, step, ramp, sinusoidal and exponential signals, Operations on signals. Basic System Properties (Continuous-Time and Discrete-Time),

Causal LTI Systems Described by Differential and Difference Equations.

Analogy between vectors and signals, orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, closed or complete set of orthogonal functions, Orthogonality in complex functions.

UNIT II FOURIER SERIES AND FOURIER TRANSFORM: (10 Periods)

Fourier series Representation of Continuous-Time Periodic Signals, Convergence of the Fourier series, Properties of Continuous-Time Fourier Series. The Continuous-Time Fourier Transform – properties.

Discrete-Time Fourier Transform – Properties, Basic Fourier Transform Pairs, Introduction to Hilbert Transform.

UNIT III CONVOLUTION AND CORRELATION OF SIGNALS: (10 Periods)

Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Convolution property of Fourier transforms, Cross correlation and auto correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function. Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

UNIT IV TIME & FREQUENCY CHARACTERIZATION OF SIGNALS AND SYSTEMS: **(7 Periods)**

The Magnitude-Phase Representation of the Fourier Transform, The Magnitude-Phase Representation of the Frequency Response of LTI Systems, 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. Statement and proof of sampling theorem of low pass signals, Effect of under sampling: Aliasing.

UNIT V LAPLACE AND Z -TRANSFORM:(8 Periods)

Laplace Transform: Definition, ROC, Properties, Inverse Laplace transforms, the S-plane and BIBO stability, Transfer functions, System Response to standard signals, Solution of differential equations with initial conditions.

Z–Transform: Definition, ROC, Properties, Poles and Zeros in Z-plane, The inverse Z-Transform, System analysis, Transfer function, BIBO stability, System Response to standard signals, Solution of difference equations with initial conditions

Total Periods: 45

Text Books:

1. A.V. Oppenheim, A.S. Willsky and S.H. Nawab, “Signals and Systems”, 2nd Edition, PHI, 2009.
2. Simon Haykin and Van Veen, “Signals & Systems”, 2nd Edition, Wiley, 2005.

Reference Books:

1. A. Anandkumar, "Signals and Systems", PHI, 2nd Edition, 2014.
2. B.P. Lathi, "Principles of LINEAR SYSTEMS and SIGNALS," Oxford Univ.Press, Second Edition International version, 2009.
3. C. L. Philips, J. M. Parr and Eve A. Riskin, "Signals, Systems and Transforms," Pearson education, 4thEdition, 2008.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	2	-	-	-	-	-	-	-	-	-	-	2
CO2	3	3	3	3	-	-	-	-	-	-	-	-	-	-	3
CO3	3	3	3	3	-	-	-	-	-	-	-	-	-	-	3
Average	3	3	2.7	2.7	-	-	-	-	-	-	-	-	-	-	2.7
Level of correlation	3	3	3	3	-	-	-	-	-	-	-	-	-	-	3

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

II B.Tech I Semester ECE

(20AEC04)SWITCHING THEORY AND LOGIC DESIGN

L	T	P	C
3	0	0	3

Course Outcomes:

After completion of the course the student will be able to

CO1: Understand various number systems, logic gates, Boolean algebra.

CO2: Analyze combinational circuits and sequential circuits, Memories.

UNIT I NUMBER SYSTEM & BOOLEAN ALGEBRA (8 Periods)

Digital systems, Binary Numbers, Number base conversions, complements of numbers, Signed Binary numbers, Binary codes. Boolean algebra - Basic definition, Basic theorems and properties, Boolean Functions, Canonical & Standard forms, other logic operations &Digital logic gates.

UNIT II GATE LEVEL MINIMIZATION (7 Periods)

The map method, four variable K-map, five variable K-map, POS & SOP Simplification, Don't care conditions, NAND & NOR Implementation, Other two-level Implementations, Exclusive-OR Function, Tabular Method-Simplification ofBoolean function using tabulation Method.

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

Combinational circuits, Analysis & Design procedure, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude comparator, Decoder, Encoders, Multiplexers, Demultiplexers, Code Converters.

UNIT IV ANALYSIS AND SYNTHESIS OF SEQUNTIAL CIRCUITS (10 Periods)

Sequential Circuits, Latches, Flips-Flops, Analysis of Clocked sequential circuits, State Reduction & Assignment, Design procedure, Registers & Counters – Registers, Shift Registers, Ripple Counters, Synchronous counters, other counters.

UNIT V ASYNCHRONOUS SEQUENTIAL LOGIC & PROGRAMMABLE MEMORIES (10 Periods)

Introduction, Analysis Procedure, Circuits with Latches, Design Procedure, Reduction of State and flow tables, Race-free State Assignment, Hazards, Error detection and correction, ROM, PLA, PAL

Total Periods: 45

Text Books:

1. M. Morris Mano& Michel D. Ciletti, "Digital Design", Pearson, 5th Edition 2011
2. ZviKohavi and Nirah K. Jha, "Switching theory and Finite Automata Theory", Cambridge, 3rdEdition 2010

Reference Books:

1. Subratha Goshal, "Digital Electronics", 2012, Cengage Learning
2. Comer, "Digital & State Machine Design", Third Indian edition, OXFORD

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	2	1	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	-	2	-
Average	3	3	-	-	-	-	-	-	-	-	-	-	2	1.5	-
Level of Correlation	3	3	-	-	-	-	-	-	-	-	-	-	2	2	-

3-High Mapping **2- Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY, CHITTOOR
(AUTONOMOUS)

	L	T	P	C
II B. Tech I Semester (ECE)	**3**	**1**	**0**	**3**

20AEE13 ELECTRICAL TECHNOLOGY

Course Outcomes:

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

CO1: Analyze the operation and applications of different types of D C machines and transformers.

CO2: Analysis the operation of induction motor and alternator.

CO3: Analyse the performance characteristics of ac machines

CO4: Apply the various special machines in real time.

UNIT-I DC MACHINES

DC GENERATOR: Review of magnetic circuits - construction and working principle, types, EMF equation, losses, open circuit and load characteristics, applications - problems.

DC MOTOR: working principle, torque equation, characteristics, applications, speed control of shunt motor, Swinburne's test, three-point starter-problems.

UNIT-II SINGLE PHASE TRANSFORMER

Working principle of single-phase transformer, constructional features, EMF equation, equivalent circuit, losses, efficiency and regulation of transformer, OC and SC test, predetermination of efficiency and regulation - problems.

UNIT-III THREE PHASE CIRCUITS

Introduction to poly phase systems, advantages of polyphase system, generation of three phase voltages, phase sequence, star and delta connections, relationship between phase and line quantities in three phase balanced circuits, power measurement in three phase systems using two wattmeter method - problems.

UNIT-IV THREE PHASE INDUCTION MOTOR AND ALTERNATOR:

Principle of operation, construction and types, slip, rotor frequency, torque, torque-slip characteristics problems.

ALTERNATORS: principle of operation, constructional features, types, EMF equation.

UNIT-V SPECIAL MACHINES

Single phase induction motors - construction, principle of operation (double field revolving theory) and applications of split phase induction motor, capacitor motor, shaded-pole motor. Construction, principle of operation and applications of universal motors and stepper motors.

Text books:

1. M.S. Naidu and S. Kamakshaiah, Electrical Technology, Tata McGraw-HillPublishing
company Ltd, New Delhi, 2007.
2. V.K.Mehta & Rohit Mehta, Principles of Electrical Engineering, S. Chand publications, 2nd Edition, 2003.

Reference books:

1. H.Cotton, Electrical Technology, CBS Publishers & Distributors, 7thEdition, 2004.
2. T.K.Nagasarkar, M.S.Sukhija, Basic Electrical Engineering, OxfordUniversity press New Delhi,2nd Edition, 2010.

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	2	2	-	2	-	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	2	-	-	-	-	-	-	-	-	-	-
CO4	2	1	1	-	1	-	-	-	-	-	-	-	-	-	-
Average	2.5	2	1.25	-	1.25	-	-	-	-	-	-	-	-	-	-
Level of Correlation	3	2	1	-	1	-	-	-	-	-	-	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

II B. Tech I Semester (ECE & EEE)
(20AEC05) ELECTRONICS DEVICES AND CIRCUITS LAB

L	T	P	C
0	0	3	1.5

Course Outcomes:

After completion of the course students will be able to

CO1: Apply analytical skill to measure voltage, frequency and phase of any waveform using CRO.

CO2: Design and Analyze the characteristics of different electronic devices such as diodes, transistors and their applications.

A minimum of 10 experiments to be conducted during the academic year

1. Study of CRO operations and its applications
2. P-N Junction Diode Characteristics
3. Zener Diode Characteristics
4. Half Wave Rectifier With and without Filter
5. Full Wave Rectifier With and without Filter
6. Input and output Characteristics of BJT in CE (Common Emitter Configuration)
7. Input and output Characteristics of BJT in CB (Common Base Configuration)
8. FET Characteristics (CS configuration)
   i) Drain Characteristics
   ii) Transfer Characteristics
9. UJT Characteristics
10. SCR Characteristics
11. LED Characteristics
12. Plot the characteristics of Photo Diode

Course Outcomes	Program Outcomes												Program specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	3	-	-	-	-	-	-	1	-	2	-	-
CO2	3	2	1	2	-	-	-	-	-	-	1	-	2	-	-
Average	3	2.50	1.5	2.50	-	-	-	-	-	-	1	-	2	-	-
Level of Correlation	3	3	2	3	-	-	-	-	-	-	1	-	2	-	-

3- High mapping 2-MediumMapping 1- Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B. Tech I Semester (ECE)

(20AEC06) Signals and Systems Lab

L	T	P	C
0	0	3	1.5

Course Outcomes:

After completion of the course students will be able to

CO1: Analyze various properties and processing of signals and systems using MATLAB.

CO2: Apply Fourier, Laplace and Z-transform techniques to analyze signals and systems using MATLAB

List of Experiments (Minimum Twelve experiments to be conducted)

1. Basic operations on Matrices
2. Generation of Various signals and Sequences (Periodic and Aperiodic), Such as Unit Impulse, Unit Step, Square, Saw Tooth, Triangular, Sinusoidal, Ramp, sine function.
3. Operations on Signals and Sequences such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average power.
4. Finding the Even and Odd parts of Signal or Sequence and Real and Imaginary parts of Signal.
5. Convolution between Signals and Sequences.
6. Autocorrelation and Cross correlation between Signals and Sequences.
7. Verification of Linearity and Time Invariance properties of a Given Continuous / Discrete System.
8. Computation of Unit Sample, Unit Step and Sinusoidal Responses of the given LTI system and verifying its Physical Realizability and Stability properties.
9. Gibbs phenomenon.
10. Finding the Fourier Transform of a given Signal and plotting its Magnitude and phase Spectrum.
11. Waveform Synthesis using Laplace Transform.

12. Locating Zeros and poles, and plotting the Pole-Zero maps in S-Plane and Z-Plane for the given Transfer Functions.

13. Generation of Gaussian Noise (Real and Complex), Computation of its Mean, M.S. Values and its Skew, Kurtosis, and PSD, Probability Distribution Function.

14. Sampling Theorem Verification.

Course Outcome	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*	*PSO1*	*PSO2*	*PSO3*
CO1	3	3	3	3	3	-	-	-	2	-	-	-	-	3	-
CO2	3	3	3	3	3	-	-	-	2	-	-	-	-	2	-
Average	3	3	3	3	3	-	-	-	2	-	-	-	-	2.5	-
Level of correlation	3	3	3	3	3	-	-	-	2	-	-	-	-	3	-

3- High mapping 2-Medium Mapping 1- Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY, CHITTOOR (AUTONOMOUS)

	L	T	P	C
II B. Tech I Semester (ECE)	**0**	**0**	**2**	**1.5**

20AEE14 ELECTRICAL TECHNOLOGY LAB

Course Outcomes:

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

CO1: Analyze the application of Network Theorems and analysis of electrical circuits.

CO2: Analysis of the concept of resonance in RLC circuits and Two-Port network.

CO3: Analysis of the performance characteristics of Transformer, Induction Motor and Alternator.

CO4: Analyze the different methods of speed control and testing of DC Machines.

CO5: Analyze the time response and error constants to design the electrical circuits

LIST OF EXPERIMENTS

Any TEN experiments are required to be conducted:

1. Verification of Superposition and Reciprocity theorems.
2. Verification of maximum power transfer theorem. Verification on DC, verification on AC with Resistive and Reactive loads.
3. Experimental determination of Thevenin’s and Norton’s equivalent circuits
4. Magnetization characteristics of D.C. Shunt generator. Determination of critical field resistance. Swinburne’s Test on DC shunt machine and Predetermination of efficiency as motor and generator.
5. Brake test on DC shunt motor. Determination of performance characteristics.
6. OC & SC tests on Single-phase transformer (Predetermination of efficiency and regulation at given power factors and determination of equivalent circuit).

7. Series & Parallel Resonance in RLC Network. Determination of

Timing and Resonant frequency, Bandwidth and Q Factor of circuit

8. Time response of first order RC/RL network for periodic non-sinusoidal inputs – time constant and steady state error determination.

9. Two port network parameters – z-y and ABCD Parameters and

10. analytical verification. Brake test on 3-phase Induction motor (performance characteristics).

11. Regulation of alternator by synchronous impedance method

12. Speed control of DC motor by Armature Voltage Control and Field Control Method

References books:

1. D. P. Kothari and B. S. Umre, Laboratory Manual for Electrical Machines, I.K International Publishing House Pvt. Ltd., 2017

Mapping:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	-	2	-	-	-	3	-	-	-	-	-	-
CO2	3	3	2	-	2	-	-	-	2	-	-	-	-	-	-
CO3	2	3	3	-	1	-	-	-	2	-	-	-	-	-	-
CO4	2	3	3	-	2	-	-	-	2	-	-	-	-	-	-
CO5	3	2	2	-	2	-	-	-	2	-	-	-	-	-	-
Average	2.4	2.6	2.6	-	1.8	-	-	-	2.2	-	-	-	-	-	-
Level of Correlation	3	3	3	-	2	-	-	-	2	-	-	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech I Semester ECE

(20AEC07)PCB Design

L	T	P	C
1	**0**	**2**	**2**

Course Outcomes:

After completion of the course the student will be able to

CO1: Understand the basic concepts of electronic components and PCB Design.

CO2: Apply tools and techniques for design PCBs

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:

1. **Open-source EDA Tool.**
2. **Single/Double-sided PCB.**

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	3	-	-	-	3	-	-	-	3	-	-
CO2	3	3	3	3	3	-	-	-	3	-	-	-	-	3	-
Average	3	3	3	3	3	-	-	-	3	-	-	-	3	3	-
Level of Correlation	3	3	3	3	3	-	-	-	3	-	-	-	3	3	-

3- High mapping **2-MediumMapping** **1- LowMapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

II B.Tech I Semester

(Common to CE, EEE, ME, ECE, CSE, IT, CSE(DS), CSE (AI &ML) ,**CAI , CSC &CSO)**

20AMB02 UNIVERSAL HUMAN VALUES-I

(Mandatory course)

L	T	P	C
2	0	0	0

COURSE OUTCOMES:

After completion of the course students will be able to

1. Apply the principles of natural acceptance to design a happy and prosperous living with responsibility.
2. Analyse the elements of sentient 'I' and material human body to design a living with responsibility for happiness and prosperity.
3. Apply the principles of 'trust' and 'respect' for designing a society with universal human order.
4. Analyse the situations causing imbalance in nature and further design an ecosystem for peaceful co-existence.
5. Apply the principles of science technology and management to solve contemporary problems professionally and ethically.

UNIT – I: **Course Introduction - Need, Basic Guidelines, Content and Process for Value Education**

Purpose and motivation for the course, recapitulation from Universal Human Values-I, 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 fulfillment of aspirations of every human being with their correct priority, Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario Method to fulfil the above human aspirations: understanding and living in harmony at various levels. 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 - II Understanding Harmony in the Human Being - Harmony in Myself

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.

UNIT – III Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfillment 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.

UNIT – IV Understanding Harmony in the Nature and Existence - Whole existence as Coexistence Understanding the harmony in the Nature Interconnectedness and mutual fulfillment 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

UNIT – V Implications of the above Holistic Understanding of Harmonyon Professional Ethics

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.

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

TEXT BOOKS:

1. RR Gaur, R Asthana, GP Bagaria,“ A Foundation Course in Human Valuesan dProfessionalEthics”,2nd,RevisedEdition,ExcelBooks,NewDelhi,2019.ISBN9 78-93-87034-47-1.
2. R Gaur ,R Asthana, GP Bagaria, “Teachers’ Manual for A Foundation Course in HumanValuesandProfessionalEthics”,2ndRevisedEdition,ExcelBooks,N ewDelhi,2019.ISBN978-93-87034-53-2.

REFERENCE BOOKS:

1. Jeevan Vidya: Ek Parichaya,ANagaraj, Jeevan Vidya Prakashan,Amar kantak,1999.
2. N.Tripathi, “Human Values”, New Age Intl. Publishers, New Delhi,2004.The Story of Stuff(Book).
3. Mohandas Karamchand Gandhi “The Story of My Experiments with Truth” E.F Schumacher.“Smallis Beautiful”Slowis Beautiful–Cecile AndrewsJ C Kumarappa “Economy of Permanence”PanditSunderlal “Bharat Mein AngrejiRaj”Dharampal.
4. Rediscovering India. MohandasK. Gandhi,“Hind Swarajor Indian Home Rule

”India WinsFreedom-Maulana AbdulKalam Azad Vivekananda –
Romain Rolland(English)Gandhi-Romain Rolland(English).

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	3	3	3	2	-	-	-	-	-	-
CO2	-	-	-	-	-	3	3	3	2	-	-	-	-	-	-
CO3	-	-	-	-	-	3	3	3	2	-	-	-	-	-	-
CO4	-	-	-	-	-	3	3	3	2	-	-	-	-	-	-
CO5	-	-	-	-	-	3	3	3	-	-	-	-	-	-	-
Average	-	-	-	-	-	3	3	3	2	-	-	-	-	-	-
Level of Correlation	-	-	-	-	-	3	3	3	2	-	-	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

II B.Tech - I Semester (Common to All Branches)

L	T	P	C
2	0	0	0

20AHS11 QUANTITATIVE APTITUDE AND REASONING-I

Course Outcomes:

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

1. Develop the thinking ability to meet the challenges in solving Logical Reasoning problems.
2. Solve campus placements aptitude papers covering Quantitative Ability and Verbal Ability.
3. Apply different placement practice techniques.

UNIT- I **9 Hours**

QUANTITATIVE ABILITY – I: Vedic Maths – Square - Square root – Cube - Cube root – Fractions – Mathematical operations – Number System – Types of numbers - Divisibility Rule – Unit Digit – Factors and Factorials – Remainder Theorem – Factorization and Trailing Zeroes – LCM And HCF

UNIT-II **9 Hours**

QUANTITATIVE ABILITY – II: Arithmetic Progression – Common Difference- n^{th} Term – Sum of terms – Geometric Progression – Common Ratio – n^{th} term – Sum of Terms – Averages - Weighted average – Percentages – Conversion – Increasing and decreasing in quantity – Change in Percentage – Successive discount – Compound Growth

UNIT-III **9 Hours**

REASONING ABILITY I: Coding and Decoding – Blood Relations – Directions – Number Series and Letter Series – Ranking and Ordering

UNIT-IV **9 Hours**

VERBAL I: Verbal analogy - Types - Parts of Speech – Noun, Pronoun, Adjective, Verb, Adverb, Preposition, Conjunction and Interjection - Prepositions –Preposition of Place, Preposition of Placement, Preposition of Time and Preposition of Duration - Articles – Usage of a, an, the, Omission of articles - Sentences - Pattern and Types.

UNIT-V **9 Hours**

SOFT SKILL I: Communication Skills - Self-Confidence - Introductions & Greetings - Presentation Skills - Self- Motivation

Text Books:

1. Quantitative Aptitude, Logic Reasoning & Verbal Reasoning, R S Agarwal, S.Chand Publications.
2. Quantitative Aptitude for Competitive Examinations, R S Agarwal, S.Chand Publications

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	2	-	-	-	-	-	-	-	2	-	-	-	-	-
CO3	2	-	-	-	-	-	-	-	-	2	-	-	-	-	-
Average	2.33	2	-	-	-	-	-	-	-	2	-	-	-	-	-
Level of Correlation	2	2	-	-	-	-	-	-	-	2	-	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B. Tech I Semester ECE

Course Code: 20ANSS1/20ANCC1

NSS/NCC

L	T	P	C
0	0	2	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech II Semester ECE

(20AEC08) PROBABILITY THEORY AND STOCHASTIC PROCESSES

L	T	P	C
3	0	0	3

Course Outcomes:

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

CO1	Understand the concepts of axiomatic formulation of modern Probability Theory and random variables
CO2	Analyze theorems, functions and properties of multiple random variables
CO3	Analyze the properties of temporal and spectral characteristics to solve errors in signal processing
CO4	Analyze the LTI systems by applying random inputs.

UNIT I PROBABILITY AND RANDOM VARIABLES:(10 Periods)

PROBABILITY:

Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Probability as a Relative Frequency, Joint Probability-properties, Conditional Probability-properties, Total Probability, Bays' Theorem, Independent Events: Two events and multiple events, properties of independent events.

RANDOM VARIABLES:

Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete and Continuous, Mixed Random Variable, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Raleigh, Conditional Distribution, Methods of defining Conditioning Event, Conditional Density, Properties, Expectation, Moments, Characteristic function, Moment generating function.

UNIT II MULTIPLE RANDOM VARIABLES: (10 Periods)

Vector Random Variables, Joint Distribution Function, Properties of Joint

Distribution, Marginal Distribution Functions, Joint Density Function, Properties of Joint Density, Marginal Density Functions, Conditional Distribution and Density – Point Conditioning, and Interval conditioning, Statistical Independence, Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem, (Proof not expected).

Operations on Multiple Random Variables:

Expected Value of a Function of Random Variables, Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, and Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties. Transformations of Multiple Random Variables.

UNIT III RANDOM PROCESSES – TEMPORAL CHARACTERISTICS:

(10 Periods)

The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, concept of Stationary and Statistical Independence. First-Order Stationary Processes, Second- Order and Wide-Sense Stationary, (N-Order) and Strict-Sense Stationary, Time Averages and Ergodicity, Mean Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function and Its Properties, Cross-Correlation Function and its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process.

UNIT IV RANDOM PROCESSES – SPECTRAL CHARACTERISTICS:

(8 Periods)

The Power density Spectrum: Properties, Relationship between Power density Spectrum and Autocorrelation Function, the Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function.

UNIT V LINEAR SYSTEMS WITH RANDOM INPUTS:(7Periods)

Random Signal Response of Linear Systems: System Response – Convolution, Mean and Mean-squared Value of System Response, autocorrelation Function of Response, Cross Correlation Functions of Input and Output, Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and Output, Band pass, Band-Limited and Narrowband Processes, Properties.

Total Periods:45

Text Books:

1. Peyton Z. Peebles, "Probability, Random Variables & Random Signal Principles", TMH, 4th Edition, 2001.
2. Athanasios Papoulis and S. Unni krishna Pillai, "Probability, Random Variables and Stochastic Processes", PHI, 4th Edition, 2002.

Reference Books:

1. R.P. Singh and S.D. Sapre, "Communication Systems Analog& Digital", TMH, 1995.
2. Henry Stark and John W.Woods, "Probability and Random Processes with Application to Signal Processing", Pearson Education, 3rd Edition.
3. George R. Cooper, Clave D. MC Gillem, "Probability Methods of Signal and System Analysis", Oxford, 3rd Edition, 1999.
4. S.P. Eugene Xavier, "Statistical Theory of Communication", New Age Publications, 2003.
5. B.P. Lathi, "Signals, Systems & Communications", B.S. Publications, 2003.

Couse Outcomes	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	-	-	-	-	-	-	-	3	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	3	-	-	-	-	-
CO3	3	3	-	-	-	-	-	-	-	3	-	-	3	-	-
CO4	3	3	-	-	-	-	-	-	-	3	-	-	-	-	3
Average	3	3	-	-	-	-	-	-	-	3	-	-	3	-	3
Level of Correlation	3	3	-	-	-	-	-	-	-	3	-	-	3	-	3

3-HIGH MAPPING **2-MEDIUMMAPPING** **1-LOWMAPPING**

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

II B. Tech – II Semester (Common to EEE and ECE)

L	T	P	C
3	1	0	3

20AHS12 COMPLEX ANALYSIS AND PROBABILITY DISTRIBUTIONS

Course Outcomes:

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

1. Use C-R equations and Milne Thomson method to solve analytic functions
2. Apply the line integrals using Cauchy's integral formula and expand the complex valued functions as Taylor's and Laurent series.
3. Utilize the Cauchy Residue Theorem to evaluate the improper integrals.
4. Demonstrate the properties of Beta and Gamma functions by their integral representation.
5. Apply Probability distributions to solve various Engineering Problems

UNIT-I **10 Hours**

COMPLEX VARIABLE -DIFFERENTIATION: Continuity-Differentiability - Analyticity-properties - Cauchy Riemann equations in Cartesian and polar coordinates - Harmonic conjugate harmonic functions - Milne Thompson method - Elementary Functions & their properties - e^z ,sinz ,Cosz, logz, Coshz and Sinhz.

UNIT-II **10 Hours**

COMPLEX VARIABLE- INTEGRATION: Line integral- - Cauchy's integral theorem - Cauchy's integral formula – Generalised Cauchy's integral formula - Complex Power Series - Expansion in Taylor's series Maclaurin's series and Laurent's series.

UNIT-III **8 Hours**

RESIUDUE CALCULUS:

Singular point- isolated singular point-pole of order m, Essential singularity - Residues -Residue theorem - Evaluation of integrals of the type

(a) improper real integrals $\int f(x)dx \ in \ [-\infty, \infty]$

(b) $\int f(cos\theta, sin\theta)d\theta \ in \ [c, c+2\pi]$

(c) $\int e^{imx} \ f(x)dx \ in \ [-\infty, \infty]$

UNIT-IV **8 Hours**

SPECIAL FUNCTIONS: Gamma and Beta Functions-their properties - Evaluation of Improper Integrals - Bessel and Legendre's functions - properties - Rodrigue formula - Recurrence relation - Orthogonality.

UNIT-V **9 Hours**

PROBABILITY DISTRIBUTIONS: Probability - probability axioms - addition law and multiplicative law of probability - conditional probability - Random variables (discrete and continuous) - probability density functions, properties - Probability distributions: Binomial - Poisson - Continuous distribution - normal distribution and their properties.

Text Books:

1. Grewal B.S, Higher Engineering Mathematics, Khanna publication, New Delhi, 43rd Edition, 2015.
2. Iyengar T.K.V, Krishna Gandhi .B and others, A Text Book of Engineering mathematics, Vol-III, New Delhi, S. Chand & company, 2012.
3. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & SonsPublications, 2012.

References:

1. Churchile and Brown, Complex Variables and its Applications, Mc Grawhill Publications, 9th Edition,2014.
2. Sankaraiah. C, A Text Book of Engineering Mathematics, Vijayawada, V.G.S Book Links, 2010.
3. Rukmangadachari.E., Kesava reddy.E. A Text Book of Engineering Mathematics –III, Pearson Education, 2010.
4. Miller and Freunds, Probability and Statistics for Engineers,7/e, Pearson, 2008.
5. Ramana .B.V., A Text Book of Engineering Mathematics, New Delhi, Tata Mc Graw Hill, 2007.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	3	-	2	-	-	-	-	-	-	-	-	-	-	-
Average	3	3	-	2	-	-	-	-	-	-	-	-	-	-	-
Level of Correlation	3	3	-	2	-	-	-	-	-	-	-	-	-	-	-

3- High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech II Semester ECE

(20AEC09) ANALOG COMMUNICATIONS

L	T	P	C
3	0	0	3

Course Outcomes:

At the end of course, students should be able to:

CO1: Analyze different types of analog communication system and different modulation techniques used in communication systems.

CO2: Understand and analyze the noise and its effect on different modulation techniques.

UNIT I INTRODUCTION (9 Periods)

Elements of communication Systems-information, Messages and Signals, Fundamental Limitations of communication Systems, Modulation, Modulation Benefits and Applications.

Amplitude Modulation & Demodulation: Baseband and carrier communication, Amplitude Modulation (AM), Modulation Index of AM, Single tone AM, Sideband and carrier power of AM, Generation of AM signal using Switching modulator, Demodulation of AM signal using Envelope detector.

UNIT II SUPPRESSED CARRIER MODULATION & DEMODULATION (10 Periods)

Double sideband suppressed carrier (DSB-SC) Modulation-Generation of DSB- SC signal using Switching modulator and Ring modulator, Frequency mixer, Demodulation of DSB-SC signal using Coherent detector, Single sideband (SSB) transmission-Time domain representation of SSB signals, Generation of SSB signals using Selective-Filtering method and Phase shift method, Demodulation of SSB signal using Coherent detector, Vestigial sideband (VSB) modulator & demodulator.

UNIT III ANGLE MODULATION & DEMODULATION: (10 Periods)

Concept of instantaneous frequency, generalized concept of angle modulation, Bandwidth of angle modulated waves–Narrow band frequency modulation (NBFM) and Wide band frequency modulation (WBFM), Phase modulation, Verification of Frequency modulation bandwidth relationship.

Generation of FM waves–Indirect method, Direct generation; Demodulation of FM, Bandpass limiter, Practical frequency demodulators, Pre-emphasis and De-emphasis filters, FM Capture Effect, Carrier Acquisition-phased locked loop (PLL), Costas loop.

UNIT IV NNOISE IN COMMUNICATION SYSTEMS (10 Periods)

Thermal Noise & Available Power, White noise and filtered noise, Noise equivalent bandwidth, Baseband systems with channel noise, Performance analysis (i.e. finding SNR expression) of AM, DSB-SC, SSB-SC, FM, PM in the presence of noise.

UNIT V PULSE ANALOG MODULATION (6 Periods)

Sampling of low pass signals, Types of sampling, Pulse Amplitude Modulation (PAM)generation and detection. Pulse time modulation schemes: PWM and PPM generation and detection.

Analog Communication Systems: Transmitters and Receivers for CW Modulation–direct conversion receiver, Super Heterodyne receivers, Receiver Measurements.

Total Periods: 45

Text Books:

1.B. P. Lathi, "Modern Digital and Analog Communication Systems," Oxford Univ.press,3rd Edition, 2006.

2.Bruce Carlson. A, & Paul B. Crilly, "Communication Systems–An Introduction To Signals &Noise in Electrical Communication", McGraw-Hill International Edition,5th Edition, 2010

Reference Books:

1.SimonHaykin, “Communication Systems”, Wiley-India edition, 3rd edition, 2010.

2.HerbertTaub& Donald L Schilling, “Principles of Communication Systems”, Tata McGraw-Hill, 3rd Edition, 2009.

3.Singh R.P. and Sapre S.D., “Communication Systems,” TMH, 2007.

4.George Kennedy and Bernard Davis, “Electronics & Communication System”, TMH,2004.

Course Outcomes	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*	*PSO1*	*PSO2*	*PSO3*
CO1	3	3	-	3	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	-	3	-	-	-	-	-	-	-	-	3	-	-
Average	3	3	-	3	-	-	-	-	-	-	-	-	3	-	-
Level of correlation	3	3	-	3	-	-	-	-	-	-	-	-	3	-	-

3- High mapping 2-Medium Mapping 1- Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech II Semester ECE

(20AEC10)LINEAR IC APPLICATIONS

L	T	P	C
3	0	0	3

Course Outcomes:

After completion of the course students will be able to

CO1 Understand the basic concepts of differential amplifiers and opamp

CO2 Analyze negative feedback circuits of op amp and the frequency response.

CO3 Design of various applications using IC 74&555 IC timer and ADC and DAC converters

UNITI: DIFFERENTIAL AMPLIFIERS AND OPAMPS DIFFERENTIAL AMPLIFIERS: (8 Periods)

Differential amplifier configurations, Balanced and unbalanced output differential amplifiers, current mirror, level Translator. Introduction, Classification of IC‘s, IC chip size and circuit complexity, basic information of Op-Amp IC741 Op-Amp and its features, Block diagram of opamp, Ideal op-amp, Equivalent Circuit, Voltage Transfer curve& open loop op-amp configurations.

UNIT II OP-AMP WITH NEGATIVE FEEDBACK AND FREQUENCY RESPONSE (10 Periods)

Introduction, feedback configurations, voltage series feedback, voltage shunt feedback and differential amplifiers, features of Practical op-amp. Frequency response: Introduction, compensating networks, frequency response of internally compensated op-amps and non-compensated op-amps, High frequency op-amp equivalent circuit, open loop gain Vs frequency, closed loop frequency response, circuit stability and slew rate.

UNIT III OP-AMP LINEAR APPLICATIONS: **(7 Periods)**

Peaking amplifier, summing, scaling and averaging amplifiers, Instrumentation amplifier, voltage to current converter, current to voltage converter, integrator, differentiator, first order LPF and HPF.

UNIT IV NON-LINEAR APPLICATIONS: (10 Periods)

Oscillators, Phase shift and wein bridge oscillators, Comparators, and its types, Square, triangular and saw tooth wave generators, Schmitt trigger, characteristics and limitations. Specialized applications: 555 timer IC (monostable & astable operation) & its applications, PLL, operating principles and its applications, VOLTAGE REGULATOR: Introduction, Series Op-Amp regulator, IC Voltage Regulators, IC 723 general purpose regulators

UNIT V ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS (10 Periods)

Analog and Digital Data Conversions, D/A converter – specifications – weighted resistor type, R-2R Ladder type, Inverted R-2R Ladder type DAC, A/D Converters –specifications – Flash type –Successive Approximation register type – Single Slope type – Dual Slope type and Counter types.

Total Periods:45

Text Books:

1. D. Roy Chowdhury, "Linear Integrated Circuits", New Age International (p) Ltd, 2 nd Edition, 2013.
2. Ramakanth A. Gayakwad, "Op-Amps & Linear ICs", PHI, 4th edition, 2010

Reference Books:

1. R.F.Coughlin & Fredrick Driscoll, "Operational Amplifiers & Linear Integrated Circuits", 6 th Edition, PHI.
2. David A. Bell, "Operational Amplifiers & Linear ICs", Oxford University Press, 2ndedition, 2010.
3. Sergio Franco, "Design with Operational Amplifiers & Analog Integrated Circuits", McGraw Hill, 2010.

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	-	3	-	-
CO2	2	2	2	2	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	-	3	-	-
Average	2.66	2.66	2.66	2.66	-	-	-	-	-	-	-	-	3	-	-
Level of correlation	3	3	3	2	-	-	-	-	-	-	-	-	3	-	-

3- High mapping 2-Medium Mapping 1- Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B. Tech II Semester CE, ME& ECE
III B. Tech I Semester EEE, CSE, IT, CSE(AI&ML), CSE(DS), CAI, CSC &CSO

20AMB03 MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
(Common to All Branches)

L	T	P	C
3	-	-	3

COURSE OUTCOMES:

After the completion of the course student will be able to

1. Explain the fundamental concepts and theoretical principles of the Economics
2. Apply economic principles for problem solving.
3. Identify market structures and types of business organizations.
4. List features, steps, merits, uses & limitations of Pay Back, ARR, NPV, PI & IRR methods of Capital Budgeting
5. Explain the basic concepts of book keeping and accounting, and analyze financial statements.

UNIT –I INTRODUCTION TO MANAGERIAL ECONOMICS

Managerial Economics: Definition, Nature and Scope –Demand analysis: Law of demand, Demand determinants, Elasticity of Demand: Definition, Types, Measurement and Significance –Demand forecasting methods (Survey methods, Statistical methods, Expert opinion method, Test marketing, Controlled experiments, Judgmental approach)

UNIT –II THEORY OF PRODUCTION AND COST ANALYSIS

Production function –Cobb Douglas Production function –Laws of Returns–Internal and External economies of scale COST ANALYSIS: Cost concepts, Fixed vs. Variable costs, Explicit vs. Implicit Costs, Out of Pocket costs Vs Imputed costs, Opportunity Cost and Sunk costs BREAK EVEN ANALYSIS: Concept of Break Even Point (BEP)–Break Even Chart – Assumptions underlying and Practical significance of BEP (Simple Problems).

UNIT –III INTRODUCTION TO MARKETS AND BUSINESS ORGANIZATIONS:

Market structures –Types of Competition –Features of perfect competition, Monopoly, Monopolistic competition –Price-Output Determination under perfect competition and Monopoly –Types of Business organization –Features, Merits and demerits of Sole proprietorship, Partnership and Joint stock companies –Types of companies –Public enterprises –Types and Features –Changing business environment in post –Liberalization scenario

UNIT –IV CAPITAL AND CAPITAL BUDGETING:

Capital and its Significance –Types of capital –Estimation of fixed and working capital requirements –Methods and sources of raising capital –Capital Budgeting Methods: Payback Method, Accounting Rate of Return (ARR), and Net Present Value (NPV) Method (Simple Problems).

UNIT –V FINANCIAL ACCOUNTING AND FINANCIAL ANALYSIS THROUGH RATIOS:

Double entry book keeping –Journal –Ledger –Trial Balance –Trading Account and balance sheet with simple adjustments Ratio analysis: Computation of Liquidity Ratios (Current and Quick Ratio), Activity Ratios (Inventory Turnover Ratio and Debtor Turnover Ratio), CapitalStructure Ratios (Debt-Equity Ratio and Interest Coverage Ratio) and Profitability Ratios (Gross Profit Ratio, Net Profit Ratio, Operating Ratio, P/E Ratio and EPS).

TEXT BOOKS:

1. Aryasri A. R., Managerial Economics and Financial Analysis, 4/E, TMH, 2009.
2. Varshney R.L. and K.L. Maheswari, Managerial Economics, Sultan Chand & Sons, 19/E,2009.
3. Siddiqui S.A. and Siddiqui A.S., Managerial Economics and Financial Analysis, New Age international, 2009.

REFERENCE BOOKS:

1. Gupta R.L., Financial Accounting, Volume I, Sultan Chand & Sons, New Delhi, 2001
2. James C. Van Horne, Financial Management policy, 12/E, PHI, 2001.
3. Joel Dean, Managerial Economics, PHI, 2001.

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	2	-	-	-	-	3	-	-	-	-
CO2	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	2	-	-	-	-	3	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO5			-			-	-	-	-		3				
Average	-	-	2	-	-	2	-	-	-	-	3	-	-	-	-
Level of Correlation	-	-	2	-	-	2	-	-	-	-	3	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech II Semester ECE

(20AEC11) ELECTRONIC CIRCUIT ANALYSIS LAB

L	T	P	C
0	0	3	1.5

Course Outcomes:

After the completion of the lab, the student will be able to

CO1 Analyze, and simulate various amplifier circuits, and power Amplifier circuits.

CO2 Design and analyze, simulate and test various feedback amplifier and oscillator circuits

LIST OF EXPERMENT(Minimum of 10 Experiments to conducted):

Design, Simulate and Testing of

1. Common Emitter Amplifier
2. Common Collector Amplifier
3. Common Source Amplifier
4. A Two Stage RC Coupled Amplifier
5. Current shunt and Voltage Series Feedback Amplifier
6. Wien Bridge Oscillator using BJT
7. RC Phase Shift Oscillator using BJT
8. Hartley Oscillator using BJT
9. Colpitts Oscillator using BJT
10. Class-A Power Amplifier (Transformer less)
11. Class-B Complementary Symmetry Amplifier
12. Class-C Power Amplifier

Note: Experiments should be implemented both in software and hardware

Tools Used: Multisim

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	3	3	-	-	3	3	3	-	-	3	3	-
CO2	3	3	-	3	3	-	-	3	3	3	-	-	3	3	-
Average	3	3	-	3	3	-	-	3	3	3	-	-	3	3	-
Level of Correlation	3	3	-	3	3	-	-	3	3	3	-	-	3	3	-

3- High mapping 2-Medium Mapping 1- Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech II Semester ECE

(20AEC12) LINEAR IC APPLICATIONS LAB

L	T	P	C
0	0	3	1.5

Course Outcomes:

After completion of the course students will be able to

CO1 Design the various applications using Opamp IC 741 and IC 555

CO2 Analyze performance of filters, waveform generators, oscillator circuits, A/D & D/A converters.

A minimum of 10 experiments to be conducted

LIST OF EXPERMENTS:

Using IC 741

1. Inverting and Non inverting amplifiers using opamps
2. Adder, Subtractor, Comparator Circuits
3. Integrator and Differentiator using Opamp
4. Active Filter Applications – LPF, HPF (first order).
5. Phase Shift Oscillator.
6. Wien Bridge Oscillator.
7. IC 741 wave form Generators: Sine, Square wave and Triangular waves
8. R-2R Ladder type 4-bit DAC using OP AMP.Using IC 555 Timers
9. Monostable Multivibrator.
10. Astable Multivibrator.
11. Schmitt Trigger.
12. Voltage regulator using IC 723
13. IC 565 PLL Applications

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	3	3	-	-	3	3	3	-	-	3	-	-
CO2	3	3	-	3	3	-	-	3	3	3	-	-	3	-	-
Average	3	3	-	3	3	-	-	3	3	3	-	-	3	-	-
Level of Correlation	3	3	-	3	3	-	-	3	3	3	-	-	3	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech II Semester ECE

(20AEC13) Analog Communications Lab

L	T	P	C
0	0	3	1.5

Course Outcomes:

After completion of the course students will be able to

CO1: Analyze the characteristics of different modulation and demodulation techniques

CO2: Analyze different pulse modulation and demodulation schemes

CO3: Analyze the spectrum characteristics and parameter of modulated signal

A minimum of 10 experiments to be conducted

1. Amplitude modulation and Demodulation
2. Frequency modulation and Demodulation
3. Characteristics of Mixer
4. Pre-emphasis & De-emphasis
5. Pulse Amplitude Modulation and Demodulation
6. Pulse Position Modulation and Demodulation
7. Pulse Width Modulation and Demodulation
8. Radio Receiver measurements – Sensitivity, Selectivity and Fidelity
9. Spectrum Analysis of Modulated signal using Spectrum Analyzer
10. Time division Multiplexing and demultiplexing
11. Frequency synthesizer

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO8	PO 9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
Average	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
Level of Correlation	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-

3- High mapping 2-MediumMapping 1- Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

II B.Tech II Semester ECE

(20AEC14) Arduino Programming

L	T	P	C
1	0	2	2

Course Outcomes:

After completion of the course students will be able to

CO1 Understand the fundamentals of Arduino Uno, Nano, Mega and Programming.

CO2 Analyze and design the interfacing of different Sensors and hardware-software for specific

List of Experiments

1. Introduction to Arduino Uno, Nano, Mega and Programming
2. Interfacing a Light Emitting Diode
3. Interfacing a Pushbutton
4. Interfacing a Light Dependent Resistor
5. Interfacing a Potentiometer
6. Interfacing a Thermistor
7. Interfacing a Servomotor
8. Interfacing a DC motor
9. Mini project.

Text Books:

1. RajeshSingh, AnitaGehlot, and Bhupendra Singh, "Arduino-Based Embedded Systems: Interfacing, Simulation, and Lab VIEWGUI", Taylor and Francis, CRCpress,2018.

2. Jeremy Blum, "EXPLORINGARDUINO®:Tools and Techniques for Engineering Wizardry", Wiley2nd Edition, 2020

3. Sudhakar Kumar, Manas Ranjan Das, Rajesh Kushalkar, Nirmala Venkat, Chandra shekhar Gourshete, Kannan M. Moudgalya, "Microcontroller Programming with Arduino and Python" June2021.

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	3	3	-	-	3	3	3	-	-	3	3	1
CO2	3	3	3	3	3	-	-	3	3	3	-	-	3	3	1
Average	3	3	3	3	3	-	-	3	3	3	-	-	3	3	1
Level of Correlation	3	3	3	3	3	-	-	3	3	3	-	-	3	3	1

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

II B.Tech - II Semester (Common to All Branches)

L T P C
2 0 0 0

20AHS15 QUANTITATIVE APTITUDE AND REASONING-II

Course Outcomes:

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

1. Develop the thinking ability to meet the challenges in solving Logical Reasoning problems.
2. Solve campus placements aptitude papers covering Quantitative Ability and Verbal Ability.
3. Apply different placement practice techniques.

UNIT-I **9 Hours**

QUANTITATIVE ABILITY III: Profit, Loss and Discount – Cost Price – Selling Price – Retail Price – Markup Price – Ratio and Proportion Antecedent – Consequent - Mean Proportion –Direct variation – Indirect Variation – Joint Variation Partnership – Mixture and Allegation – Problems on Ages – Surds and Indices

UNIT-II **9 Hours**

QUANTITATIVE ABILITY IV: Time Speed and Distance – Uniform and Variable speed – Conversion - Average Speed –Relative Speed – Effective speed - Problems on Trains – Stationary point and object – Moving Point and Object – Boats and Streams – Downstream and Upstream - Races and Games – Head start – Dead Heat – Escalator – Number of steps

UNIT-III **9 Hours**

REASONING ABILITY II: Syllogism – Statement and Conclusion - Data Sufficiency – Data Arrangement – Linear and Circular arrangement - Data Interpretation - Line Graph – Bar graph – Pie Chart -

UNIT-IV **9 Hours**

VERBAL II: Tense – Present Tense, Past Tense, Future Tense - Voice – Active voice, Passive voice and Active to Passive Voice Conversion Rules – Speech – Direct Speech, Indirect Speech and Direct to Indirect Speech Conversion Rules –Essay Writing – Types, Steps, Format.

UNIT V **9 Hours**

SOFT SKILL II: Time Management - Stress Management - Team Work - Accent and Voice Communication - Interview Skills.

Text Books:

1. Quantitative Aptitude, Logic Reasoning & Verbal Reasoning, R S Agarwal, S.Chand Publications.
2. Quantitative Aptitude for Competitive Examinations, R S Agarwal, S.Chand Publications.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	1	2	-	-	-	-	-	-	-	2	-	-	-	-	-
CO3	2	-	-	-	-	-	-	-	-	2	-	-	-	-	-
Average	2	2	-	-	-	-	-	-	-	2	-	-	-	-	-
Level of Correlation	2	2	-	-	-	-	-	-	-	2	-	-	-	-	-

3- High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. Tech I Semester ECE

Course Code: 20AEC17

DIGITAL COMMUNICATIONS

L	T	P	C
3	0	0	3

Course Outcomes:

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

- **CO1:** Understand the concepts of signal detection, probability of error and signal constellation.
- **CO2:** Apply the knowledge of sampling; Quantization in Digital Pulse Modulation Technique.
- **CO3:** Analyze Optimum filter, correlation coding and effect of ISI in base band Pulse Transmission.
- **CO4:** Analyze various coherent and Non-coherent Digital Modulation Techniques

UNIT- I SIGNAL SPACE ANALYSIS:

Introduction, Geometric representation of signals, Gram-Schmidt orthogonalization procedure, Conversion of the Continuous AWGN channel into a vector channel, Coherent detection of signals in noise, Correlation receiver, Equivalence of correlation and Matched filter receivers, Probability of error, Signalconstellation diagram.

UNIT- II SOURCE CODING SYSTEMS:

Introduction, Sampling process, Quantization, Quantization Noise, Pulse-Code Modulation (PCM), Line codes, Differential encoding, Regeneration, Decoding & Filtering, Noise considerations in PCM systems, Delta modulation (DM), Differential PCM (DPCM), Processing gain, Adaptive DPCM (ADPCM), Comparison ofthe above systems.

UNIT- III BASEBAND PULSE TRANSMISSION:

Introduction, Optimum Filter, Matched filter, Properties of Matched filter, Matched filter for rectangular pulse, Error rate due to noise, Inter-symbol Interference (ISI), Nyquist's criterion for distortion less baseband binary transmission, ideal Nyquist channel, Raised cosine filter & its spectrum, Correlative coding – Duo binary & Modified duo binary signaling schemes, Partial response signaling, Baseband M-array PAM transmission, Eye diagrams.

UNIT- IV PASSBAND DATA TRANSMISSION-I:

Introduction, Pass band transmission model, Coherent phase-shift keying – binary phase shift keying (BPSK), Quadrature shift keying (QPSK), Binary Frequency shift keying (BFSK), Error probabilities of BPSK, QPSK, BFSK, Generation and detection of Coherent BPSK, QPSK, & BFSK, Power spectra of above mentioned modulated signals

UNIT-V PASSBAND DATA TRANSMISSION-II:

M-ary PSK, M-ary quadrature amplitude modulation, Non-coherent orthogonal modulation schemes - Differential PSK, Binary FSK, Generation and detection of non-coherent BFSK, DPSK, Comparison of power bandwidth requirements for all the above schemes, Minimum shift keying(MSK), Prove that MSK is FSK, Values of f_H and f_L, MSKTransmitter, MSKReceiver.

Text Books:

1. Simon Hakin, "Communication Systems," WileyIndia Edition, 4thEdition, 2011.
2. Bruce Carlson A, & Paul B. Crilly, "Communication Systems – An Introduction to Signals &Noise in Electrical Communication", McGraw-Hill International Edition, 5th Edition, 2010.

Reference Books:

1. Sam Shanmugam, "Digital and Analog Communication Systems", John Wiley, 2005.
2. B.P. Lathi, & Zhi Ding, "Modern Digital & Analog Communication Systems", Oxford University Press, International 4th edition, 2010.
3. Bernard Sklar, "DigitalCommunications", Prentice-HallPTR, 2nd edition, 2001.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
Average	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
Level of Correlation	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech I Semester ECE

Course Code: 20AEC18

DIGITAL IC APPLICATIONS

L	T	P	C
3	0	0	3

Course Outcomes:

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

CO1: Interpret CMOS Logic behaviour under static and dynamic conditions

CO2: Demonstrate the basics of VHDL, Programming of combinational and Sequential circuits

CO3: Analyze, model, simulate, verify, and synthesize with hardware description languages

UNIT-I CMOS LOGIC ANDBIPOLAR LOGIC:

CMOS LOGIC: Introduction to logic families, CMOS logic, CMOS Steady-State Electrical behavior, CMOS Dynamic Electrical behavior and CMOS logic families.

BIPOLAR LOGIC AND INTERFACING: Bipolar logic-TTL families, CMOS/TTL Interfacing, Emitter Coupled Logic, Comparison of logic families, Familiarity with standard 74XX and CMOS 40XX series-ICs and its Specifications.

UNIT-II VHDL HARDWARE DESCRIPTION LANGUAGE:

HDL-Based Design Flow, Program Structure, Types, Constants and Arrays, Functions and Procedures, Libraries and Packages, Structural Design Elements, Data Flow Design Elements, Behavioral Design Elements, The Time Dimension, Simulation and Synthesis.

UNIT-III COMBINATIONAL LOGIC DESIGN PRACTICES:

Decoders, Encoders, Three-State Devices, Multiplexers and Demultiplexers, Exclusive-OR Gates and Parity Circuits, Comparators, Adders, Subtractors and ALUs, Barrel Shifter and their VHDL models for the above Standard ICs.

UNIT- IV SEQUENTIAL LOGIC DESIGN PRACTICES:

Latches and Flip-flops, Multibit Registers and Latches, Shift Registers-MSI Shift Registers, Counters-Ripple Counters, Synchronous Counters, MSI Counters and Applications, Ring Counters, Johnson counters, LFSR Counter and their VHDL models forthe above Standard ICs.

UNIT -V SEMICONDUCTOR MEMORIES:

ROMs: Internal Structure, Two-Dimensional decoding, Commercial ROM types, Timing and Applications.

Static RAM: Internal Structure, SRAM timing, Standard SRAMs, Synchronous SRAMs.

Dynamic RAMs: Internal Structure, Timing and standard DRAMs, Synchronous DRAMs.

TEXT BOOKS:

1. John F. Wakerly, "Digital Design Principles and Practices", PHI/Pearson Education, 4thEdition, 2009.

2. Charles H.Roth, Jr., "Fundamentals of Logic Design", 5thedition, CENGAGE Learning 2012.

REFERENCE BOOKS:

1. J. Bhasker, "A VHDL Primer", Pearson Education/PHI, 3rd Edition, 2010.

2. Stephen Brown and Zvonko Vranesic, "Fundamentals of Digital Logic with VHDL Design", McGrawHill, 2nd Edition, 2005.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	2	2	2	2	-	-	-	-	-	-	-	2	3	-
CO3	2	2	-	3	-	-	-	-	-	-	-	-	3	3	-
Average	2.6	2.3	2.5	2.5	2	-	-	-	-	-	-	-	2.6	3	-
Level of Correlation	3	3	3	3	2	-	-	-	-	-	-	-	3	3	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMUS)

III B. Tech I Semester (ECE)
III B.Tech II Semester (EEE)

20AEC19 MICROPROCESSORS AND MICROCONTROLLERS

L	T	P	C
3	0	0	3

Course Outcomes:

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

CO1: Understand the operation of microprocessors.

CO2: Apply the concepts of assembler directives, procedures, macros, Software interrupts for ALP

CO3: Explain the interfacing concepts and serial communication techniques

CO4: Describe 8051 Microcontrollers and low power RISC MSP430

UNIT- I 8086 MICROPROCESSORS

Evolution of microprocessors, memory segmentation,8086 Architecture, register organization, Flag Register, Pin Diagram of 8086- Minimum and Maximum mode 8086 systems, Timing Diagrams for Memory Read (MR), Memory Write (MW), IO Read (IOR) and IO Write (IOW) bus cycles.

UNIT- II INSTRUCTION SET AND ASSEMBLY LANGUAGE PROGRAMMING OF 8086:

Addressing Modes-Instruction Set, Assembler Directives-Macros and procedures, assembly language programs for addition, subtraction, multiplication, division, GCD and LCM of two numbers, Evaluation of arithmetic expressions, largest and smallest numbers in an array, sorting an array, searching for a number in anarray, programs using lookup tables.

UNIT-III I/O INTERFACING DEVICES:

8255 PPI, various modes of operation and interfacing to 8086, interfacing of key board display. Stepper motor interfacing, D/A &A/D converter, traffic light controller interfacing with advanced devices: Memory interfacing to 8086, Interrupts of 8086, Vector interrupt table, Interrupt service routine, Serial communication standards, serial data transfer schemes, 8251 USART architecture and Interfacing

UNIT-IV INTRODUCTION TO MICROCONTROLLERS:

Overview of 8051 microcontroller, Architecture, I/O ports, Memory organization, addressing modes and instruction set of8051, Simple programs.

UNIT -V LOW POWER RISC MSP430:

MSP block diagram, features and architecture, MSP430x5x series block diagram, addressing modes, Instruction set, Memory address space.

TEXT BOOKS:

1. A.K. Rayand K.M. Bhurchandi, “Advanced Microprocessors and Peripherals”, 3rd Edition, 2013 TMH Publications.
2. MSP430 microcontroller basics. John H. Davies, Newness Publication, I st Edition, 2008

REFERENCE BOOKS:

1. Douglas Hall, “Microprocessors and Interfacing”, 2nd Revised Edition 2005, TMH Publications.
2. Kenneth j. Ayala, Thomson, “The 8051 Microcontrollers”, 3ed 2004, Asia Pvt.Ltd

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	-	-	3	-
CO3	3	3	3	3	-	-	-	-	-	-	-	-	3	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	-	3	-	-
Average	3	3	3	3	-	-	-	-	-	-	-	-	3	3	-
Level of Correlation	3	3	3	3	-	-	-	-	-	-	-	-	3	3	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech – I Semester (EEE)
III B.Tech -I Semester ECE (Open Elective-1)

L	T	P	C
3	0	-	3

20AEE16 CONTROL SYSTEMS

Course outcomes:

After completion of the course student will be able to

1. Apply the Mathematical Modeling of Control System in analyzing the transfer function of the mechanical and electrical systems.
2. Apply the time response and frequency response in analyzing the stability of the system.
3. Analyze the response of first and second order characteristics using different test signals
4. Analyze systems using Transfer functions and state space models.
5. Create Lead, Lag and Lead-Lag compensators to design the electrical networks.

UNIT-1

Mathematical Modelling of Control Systems: Classification of control systems, Open Loop and closed loop control systems and their differences, Feed-Back Characteristics, transfer function of linear system, Differential equations of electrical networks, Translational and Rotational mechanical systems, Transfer Function of DC Servo motor - AC Servo motor- Synchro, transmitter and receiver - Block diagram algebra – Representation by Signal flow graph - Reduction using Mason's gain formula.

UNIT-II

Time Response Analysis Standard test signals: Time response of first and second order systems - Time domain specifications - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems.

UNIT-III

Stability and Root locus Technique: The concept of stability – Routh's stability criterion- limitations of Routh's stability – Root locus concept - construction of root loci (Simple problems)

UNIT-IV

Frequency Response Analysis: Introduction to Frequency domain specifications-Bode diagrams- transfer function from the Bode Diagram-Phase margin and Gain margin stability

Analysis from Bode Plots, Polar Plots, Nyquist Stability criterion, Lag, Lead, Lag-Lead compensators.

UNIT-V

State Space Analysis of LTI systems: Concepts of state, state variables and state model, state space representation of transfer function, Diagonalization- Solving the time invariant state equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability.

Text Books:

1. Control Systems principles and design, M. Gopal, Tata McGraw Hill education Pvt Ltd., 4th Edition.
2. Automatic control systems, Benjamin C. Kuo, Prentice Hall of India, 2nd Edition

Reference Books:

1. Modern Control Engineering, Kotsuhiko Ogata, Prentice Hall of India.
2. Control Systems, Manik Dhanesh N, Cengage publications.
3. Control Systems Engineering, I. J. Nagarath and M. Gopal, Newage International Publications, 5th Edition. 15. Control Systems Engineering, S. Palani, Tata McGraw Hill Publications.

Web Links: 1. http://engineering.electrical-equipment.org/panel-building/time-domain-analysis -of-control-systems.htm 2. http://www.cds.caltech.edu/~murray/amwiki/index.php/Frequency_Domain_Anal ysis 3. https://www.electrical4u.com/mathematical-modelling-of-various-system%20/ 4. https://www.electrical4u.com/state-space-analysis-of-control-system

Mapping:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	3	-	-	-	-	-	-	-	-
CO2	3	3	3	3	-	-	2	-	-	-	-	-	-	-	-
CO3	3	2	3	3	3	-	2	-	-	-	-	-	-	-	-
CO4	3	3	2	3	-	2	2	-	-	-	-	-	-	-	-
CO5	3	2	3	2	-	-	3	-	-	-	-	-	-	-	-
Average	3	2.6	2.8	2.8	3	2	2.4	-	-	-	-	-	-	-	-
Level of Correlation	3	3	3	3	3	2	2	-	-	-	-	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech I Semester (Common to ME, ECE)

IV B.Tech I Semester (Common to CSE, IT, CSE(DS), CSE(AIML))

20AME20	Total Quality Management & Reliability Engineering	L	T	P	C
	(OE/JOE - I)	3	0	0	3

Course Outcomes:

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

1. Develop action plans for customer centric business on the basis of various quality philosophies.
2. Select the best solution for problem solving using QC tools, QFD model, JIT method.
3. Solve industry problems with available sources, software tools, modern TQM techniques with system approach.
4. Establish quality management system and environmental management system for product and service industries.
5. Design systems with a focus on enhancing reliability and availability.

UNIT: I Introduction 10 hours

Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Contributions of Deming, Juran and Crosby - Barriers to TQM - Quality statements - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Costs of quality, Employee involvement, Quality Awards.

UNIT: II TQM Principles 10 hours

Quality circles - PDCA cycle, Control Charts - Process Capability – Problem solving - Quality Function Development (QFD) - Taguchi quality loss function – Total Productive Maintenance - Concepts, improvement needs - Performance measures. Poka-yoke, Kaizen , JIT, Terotechnology.

UNIT: III TQM Tools and Technique 10 hours

The seven traditional tools of quality - New management tools - Six sigma: Concepts, DMAIC, Methodology, applications to manufacturing, service sector including IT - Bench marking -Reason to bench mark, Bench marking process - FMEA - Stages, Fault tree analysis.

UNIT: IV Quality Systems 8 hours

Need for ISO 9000 - ISO 9001-2008 Quality System - Elements, Documentation, Accounting Systems, Quality Auditing - QS 9000 - ISO 14000 - Concepts, Requirements and Benefits - TQM Implementation in manufacturing and service sectors.

UNIT: V Fundamental concepts of Reliability 10 hours

Reliability definitions, failure, failure density, failure Rate, hazard rate, Mean Time To Failure (MTTF), Mean Time Between Failure (MTBF), maintainability, availability, safety and reliability, product liability, importance of reliability. Problem solving. Business process re-engineering (BPR) – principles, applications.

Textbooks

1. Dale H. Besterfiled, et at., "Total quality Management", Third Edition, Pearson Education Asia, Indian Reprint, 2006
2 Dr.K.C.Arora, "Total Quality Management", 4th Edition, S. K. Kataria & Sons, 2009.

Reference Books

1 James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8th Edition, First Indian Edition, Cengage Learning, 2012
2 Suganthi.L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd.,2006.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	3	3	-	-	-	1	-	-	-	-
CO2	3	3	-	-	-	3	3	-	-	-	1	-	-	-	-
CO3	3	3	-	-	-	3	3	-	-	-	1	-	-	-	-
CO4	3	-	-	-	-	3	3	-	-	-	1	-	-	-	-
CO5	3	-	-	-	-	3	3	-	-	-	1	-	-	-	-
Average	3	3	-	-	-	3	3	-	-	-	1	-	-	-	-
Level of Correlation	3	3	-	-	-	3	3	-	-	-	1	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

II B.Tech I Semester (Common to CSE, IT, CSE (DS) & CSE (AI &ML))
III B.Tech I Semester EEE, ECE (Open Elective-I)

L	T	P	C
3	-	-	3

20ACS07 - OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Course Outcomes:
After Completion of the course the student will be able to:
1. Demonstrate basic principles of OOP in java programming.
2. Apply the concepts of inheritance packages and interfaces in code reusability.
3. Apply the principles of exception handling in designing the customized exception to handle errors in application software.
4. Apply concepts of multithreading to solve problems in parallelism.
5. Apply concepts of Enumeration and Collections Framework in solving real time problems

UNIT-I **9 hrs**

Java History, Java Features, Object Oriented Features, Tokens-Constants, Identifiers, Keywords, Operators. Data types, type conversions, Statements-Expression, selection, Loop, Jump, Label and block statements. Arrays-one dimensional, two dimensional, String class, String Buffer class, StringBuilder.

UNIT –II **8 hrs**

Fundamentals, declaring objects, object references, Methods, Constructors-default, parameterized constructors, garbage collection, this keyword. Method Overloading, constructor overloading, static, nested and inner classes, command-line arguments.

Inheritance- Basics, Creating multilevel hierarchy, using super, method overriding, dynamic method dispatch, abstract classes, using final in inheritance.

UNIT-III **6 hrs**

Packages-definition, class path, Access protection, importing packages.

Interfaces- definition, implementing interfaces, nested interfaces, variables and methods in interfaces, recent advances in interfaces, multiple inheritance using interfaces.

UNIT-IV **9 hrs**

Exception Handling: Fundamentals, Exception types, uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws, finally, chained exceptions, custom exceptions.

Multithreading: Thread life cycle, Java Thread Model, Main thread, creation of child thread, creation of multiple child threads, isAlive(),join(), wait(),notify(),notifyAll(), synchronization, inter thread communication.

UNIT- V **9 hrs**

Enumerations, Wrapper classes, auto boxing, annotations.

Lambda expressions-introduction, Block lambda expressions, Generic functional interfaces, passing lambda expressions as arguments, lambda expressions and exceptions, lambda expressions and variable capture. Collections Framework: Collection interfaces and classes. Iterators, split Iterators, Map, comparators, Arrays, String tokenizer, Bitsets, Random, Scanner class.

Text Books:

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd.
2. Java How to Program, 10th Edition, Paul Dietel, Harvey Dietel, Pearson Education.

Reference Books:

1. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education.
2. Core Java Volume – 1 Fundamentals, Cay S. Horstmann, Pearson Education.
3. Java Programming for core and advanced learners, Sagayaraj, Dennis, Karthik and Gajalakshmi, University Press
4. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
5. Object Oriented Programming through Java, P. Radha Krishna, and University Press.
6. Programming in Java, S. Malhotra, S. Chaudhary, 2nd edition, Oxford Univ. Press.
7. Java Programming and Object-oriented Application Development, R.A. Johnson, Cengage Learning.

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	1	2	-	-	-	-	-	-	-	-	-	-
CO3	3	3	3	3	2	-	-	-	-	-	-	-	-	-	-
CO4	3	3	2	3	2	-	-	-	-	-	-	-	-	-	-
CO5	2	3	1	3	-	-	-	-	-	-	-	-	-	-	-
Average	2.8	3	2	2.5	2	-	-	-	-	-	-	-	-	-	-
Level of Correlation	3	3	2	3	2	-	-	-	-	-	-	-	-	-	-

3- High mapping 2-Medium Mapping 1- Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. Tech I Semester ECE

Course Code: 20AEC20

BIOMEDICAL INSTRUMENTATION
(OE/JOE-I)

L	T	P	C
3	0	0	3

Course Outcomes:

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

CO1: Understand the basic principle of medical instrumentation systems and Bio-medical recorders

CO2: Analyze the Performance of Cardiac Pacemaker, Defibrillators, Haemodialysis machine.

CO3: Understand various electric shock hazards and types of medical imaging systems

UNIT - IBIO-ELECTRIC SIGNALS AND ELECTRODES:

Basic medical instrumentation system and Performance requirements of medical Instrumentation systems, Origin of bioelectric signals, Recording electrodes, Silver-silver chloride electrodes, Electrodes for ECG, Electrodes for EEG, Electrodes for EMG, Electrical conductivity of electrode Jellies and Creams, Microelectrodes.

UNIT-II BIO-MEDICAL RECORDERS:

Electro Cardio Graph (ECG), Vector Cardio Graph (VCG), Phono Cardio Graph (PCG), Electro Encephalo Graph (EEG), and Electro Myo Graph (EMG), Other Bio- medical Recorders-BCG, Electro Retino Graphy(ERG) and Electro Oculo Graphy(EOG).

UNIT-III THERAPEUTIC AND PROSTHETIC DEVICES:

External and Implantable Pacemaker, Performance aspects of Implantable Pacemaker - Performance aspects of DC defibrillator, Modes of operation and electrodes, Implantable defibrillator, defibrillator analyzers, Schematic diagram of a Haemodialysis machine, High frequency heat therapy, Short-wave Diathermy, Microwave Diathermy.

UNIT-IV PATIENTSAFETY:

Electric shock hazards, Leakage currents, Safety codes for electro medical equipment, Electrical safety analyzer and Testing of biomedical equipment.

UNIT-V MEDICAL IMAGING SYSTEMS:

Basic principle and block diagram of X-ray machine, Principle and techniques of Computed Tomography (CT), Nuclear Magnetic Resonance (NMR), Positron Emission Tomography (PET), Single Photon Emission Computed Tomography (SPECT), Ultrasonography: A-Scan, M-Mode, B-Scanner and Real time ultrasonic imaging systems.

TEXT BOOKS:

1. R.S.Khandpur, “Handbook of Bio-Medical instrumentation”, Third Edition, TaTa Mc Graw Hill Education (India) Private Limited, 2014.

2. Leslie Cromwell, Fred J.Weibell, Erich A. Pfeiffer, “Bio-Medical Instrumentation and Measurements” Second Edition, Prentice HallofIndia, 2004.

REFERENCE BOOKS:

1. John G.Webster, “Medical Instrumentation Application and Design”, Forth Edition, John Wiley & Sons, 2009.

2. M.Arumugam, “Bio-Medical Instrumentation”, Anuradha Agencies, 2010.

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO 1	3	2	-	-	-	-	-	-	-	-	2	-	-
CO 2	2	-	2	-	1	-	-	-	-	-	-	-	-
CO 3	3	2	-	-	-	-	-	-	-	-	-	-	-
Average	2.66	2	2	-	1	-	-	-	-	-	2	-	-
Level of Correlation	3	2	2	-	1	-	-	-	-	-	2	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech I Semester ECE

Course Code: 20AEC21 **Computer Architecture**

L	T	P	C
3	0	0	3

Course Outcomes:

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

CO1: Gain knowledge to design the computer architecture of complex modern microprocessors.

CO2: Understand the concept of cache and memory technologies.

CO3: Understand about superscalar architecture and out-of-order processors.

Unit-I

Introduction, Instruction Set Architecture, Microcode and Pipelining: Description of architecture, micro-architecture and instruction set architectures. Concept of pipeline and two different types of hazards.

Unit-II

Cache Review and Superscalar 1: Control hazards in jumps, branch and others. Memory technologies and the motivation for caches. Cache characteristics and basic superscalar architecture. Basic Two-way In-order Superscalar. Fetch Logic and Alignment.

Unit-III

Superscalar2 & Exceptions: Baseline Superscalar and Alignment, Interrupts and Bypassing Interrupts and Exceptions, Introduction to Out-of-Order Processors.

Unit-IV

Superscalar 3: Review of out-of-order Processors, I2O2 Processors, I2O1 Processors, IO3 Processors, IO2I Processors.

Unit-V

Superscalar 4&VLIW 1: Speculation and Branch, Register Renaming Introduction, Register Renaming with Pointers to IQ and ROB, Register Renaming with Values in IQ and ROB, Memory Disambiguation. Limits of Out-of-Order Design Complexity, Introduction to VLIW, VLIW Compiler Optimizations, Classic VLIW Challenges Introduction to Predication

Text Books:

1. David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, Fifth Edition, Morgan Kaufmann / Elsevier, 2014.
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, Computer Organization and Embedded Systems, Sixth Edition, Tata McGraw Hill, 2012.

References Books:

1. William Stallings, Computer Organization and Architecture – Designing for Performance, Eighth Edition, Pearson Education, 2010.
2. 2. John P. Hayes, Computer Architecture and Organization, Third Edition, Tata McGraw Hill, 2012.

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	2	-	2	-	-	-	-	-	-	-	2	-	-
CO2	-	-	3	-	2	-	-	-	-	-	-	-	-	-	-
CO3	3	-	2	-	2	-	-	-	-	-	-	-	1	-	-
Average	3	-	2.33	-	2	-	-	-	-	-	-	-	1.5	-	-
Level of Correlation	3	-	3	-	2	-	-	-	-	-	-	-	2	-	-

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. Tech I Semester ECE

Course Code: 20AEC22

ELECTROMAGNETIC THEORY
(Professional Elective-I)

L	T	P	C
3	0	0	3

Course Outcomes:

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

CO1: Apply EM field concepts within the design and construction of electrical equipment.

CO2: Apply the wave propagation theories in the analysis and design of communication systems.

CO3: Design and construct Transmission Lines.

CO4: Describe importance of various stub matching techniques.

UNIT-I ELECTROSTATICS:

Introduction to EMT, Coulombs law, Vector analysis, Introduction to coordinate system, Rectangular coordinate system, Electric field, Cylindrical coordinate system, Transformation. Electric Potential, Spherical co-ordinate system, Gauss's law & its application, Divergence, Poisson's &Laplace's equation. Conductor & dielectric: Polarization, Boundary condition, Continuity equation, Conductors & Capacitor, Equipotential Surfaces. Solution of Laplace's equation, method of images.

UNIT-II MAGNETO STATICS:

Biot savart law & its application, Magnetic vector potential, Magnetic force, torque & dipole, Magnetic force , Magnetic materials& Magnetic moment, Boundary condition for Magnetic fields Inductor and calculation of inductance for different shapes.

UNIT-IIIMAXWELL'S EQUATIONS & EM WAVE CHARACTERISTICS:

MAXWELL'S EQUATIONS: Faradays law and its application, Displacement current, Maxwell's equation, Wave propagation, Solution of Helmholtz equation

EM WAVE CHARACTERISTICS: Uniform plane waves, Polarization & Poynting Vector, Wave reflections (Normal incidence), Waves in imperfect dielectrics & Good conductors Skin depth/effect, Oblique incidence of waves.

UNIT-IV TRANSMISSION LINES-I:

Transmission line, Transmission line model, Steady state sinusoidal response of T-line & Smith chart, Application of smith chart, Impedance matching, Transients on Transmission line, Pulse on Transmission line, Capacitive termination in Transmission line.

UNIT-V TRANSMISSION LINES-II:

Rectangular waveguide: TM modes, Waveguide: Wavelength, Impedance and power calculation, Waveguide losses, Dielectric Waveguide.

Radiation and Antenna, Hertzian Dipole Antenna, Quasi-statistics, Long wire Antenna, Group velocity & Phase velocity, Numerical solution of Laplace's equation.

TEXT BOOKS:

1. Matthew N.O. Sadiku, "Elements of Electromagnetics," Oxford Univ. Press,4th ed.,2008.
2. WilliamH. Hayat Jr. and John ABuck, "Engineering Electromagnetics," TMH,7thed2006.
3. Y. Mallikarjuna Reddy, "Electromagnetic Waves and Transmission Lines" Universities Press.

Reference Books:

1. E.C. Jordanand K.G. Balmain, "Electromagnetic Waves and Radiating Systems" PHI, 2nd Ed. ,2000.
2. JohnD. Ryder, "Networks, Lines, and Fields," PHI publications, Second Edition,2012.

Couse Outcomes	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	-	3	-	-	3	-	-	-	-	-	2	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	-	2	-	-
CO3	3	3	1	3	-	-	1	-	-	-	-	-	2	-	-
CO4	3	1	-	3	-	-	-	-	-	-	-	-	-	-	-
Average	3	2.5	2	3	-	-	2	-	-	-	-	-	2	-	-
Level of Correlation	3	3	2	3	-	-	2	-	-	-	-	-	2	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. Tech I Semester ECE

Course Code: 20AEC23

INFORMATION THEORY AND CODING TECHNIQUES
(Professional Elective-I)

L	T	P	C
3	0	0	3

Course Outcomes:

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

CO1: Explain concepts of information theory.

CO2: Describe basics of block codes.

CO3: Analyze the error detection and correction in linear block codes

CO4: Identify the error detection and correction in convolutional codes.

UNIT-I INFORMATION THEORY:

Introduction, Unit of Information, Entropy, Rate of Information, Joint Entropy and Conditional Entropy, Mutual Information, Channel Capacity, Binary Symmetric Channel, Shannon's Theorem, Capacity of a Gaussian Channel: Shannon- Hartley theorem, Coding Efficiency, Shannon-Fano Coding, Huffman Coding.

UNIT-II BLOCK CODES:

Introduction to Block Codes, Single Parity Check Codes, Product Codes, Repetition Codes, Hamming Codes, Minimum Distance of Block Codes, Automatic-Repeat-Request Schemes.

UNIT-III LINEAR CODES:

Definition of Linear Codes, Generator Matrices, Parity Check Matrices, Error Syndromes, Error Detection and Correction.

UNIT-IV CYCLIC CODES:

Definition of Cyclic Codes, Polynomials, Generator Polynomials, Encoding Cyclic Codes, Decoding Cyclic Codes, Parity Check Polynomials, Polynomial- Division Register, Registers for Encoding, Registers for Error Detection and Correction.

UNIT-V CONVOLUTIONAL CODES:

Introduction, Encoder for Convolutional Codes, Code Tree, Trelli's Diagram, State Diagram, Decoding of Convolutional Code using Viterbi Algorithm.

TEXT BOOKS:

1. Salvatore Gravano, "Introduction to Error Control Codes", Oxford University Press,2007.
2. R.P.Singh & S.D.Sapre,"Communication Systems-Analog and Digital", TataMcGraw-Hill,3rd Edition,2012.

REFERENCE BOOKS:

1. ShuL in, Daniel J. Costello, Jr., "Error Control Coding," Pearson Publications, Second Edition,2011.
2. Bernard Sklar, Pabitra Kumar Ray, "Digital Communications-Fundamentals and Applications", Pearson Publications, SecondEdition,2009.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	1	3	-	-	-	-	-	-	-	-	-	-	2
CO2	3	3	3	3	-	-	-	-	-	-	-	-	-	-	3
CO3	3	3	3	3	-	-	-	-	-	-	-	-	-	-	3
CO4	3	3	3	3	-	-	-	-	-	-	-	-	-	-	3
Average	3	3	3	3	-	-	-	-	-	-	-	-	-	-	3
Level of Correlation	3	3	3	3	-	-	-	-	-	-	-	-	-	-	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech I Semester ECE (Professional Elective –I)
III B.Tech II Semester EEE (Open Elective-II)

20AEC24 NANOTECHNOLOGY AND APPLICATIONS

L	T	P	C
3	0	0	3

Course Outcomes:

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

CO1: Acquire knowledge on various nano materials and its applications.

CO2: Understand the role of nanotechnology in electronics and photonics field.

CO3: Use RF Based communication systems in RF MEMS.

CO4: Apply nanostructures and nano materials in fuel cell technology.

UNIT-I INTRODUCTION:

History and Scope, Classification of Nano structured Materials, Fascinating Nanostructures, Applications of Nano materials, Nature: The Best of Nanotechnologist, Challenges, and Future Prospects

UNIT-II NANOELECTRONICS:

Electronics and Nano electronics: Basic Electronic Terminology and symbols, Fundamental Types of Electronic Materials, Fundamental Kinds of Electronic Devices, The nano Perspective. Micro Electronics: Introduction to Band Structure, basic Conductor and Semiconductor Physics, transistors. Nano Scale Electronics: Back ground, The current State of Microelectronics and Extensions to the Nanoscale. Nano technology –based strategies: single-Electron tunneling, Molecular Wires.

UNIT-III NANO-OPTICS:

Introduction to optics: Interactions of light with matter, the nano perspective. The Surface Plasmon: The Surface Plasmon Resonance, Scattering, Color generation from Nano particles and Nano Structures, Applications of Nano plasmonic. Nano Photonics: Photonics, Photonic Structure in living Systems, Photonic Crystals. Fabrication of Nano Photonic Crystals.

UNIT - IV RADIO FREQUENCY (RF) MEMS:

RF – based communication systems, RF MEMS, MEMS inductors, varactors, tuner/filter, resonator, clarification of tuner, filter, resonator, MEMS switches, phase shifter.

UNIT- V. NANOMATERIALS IN FUEL CELL APPLICATIONS:

Use of nanostructures and nanomaterials in fuel cell technology - high and low temperature fuel cells, cathode and anode reactions, fuel cell catalysts, electrolytes, ceramic catalysts. Use of nano technology in hydrogen production and storage.

TEXT BOOKS:

1. Text Book of Nano Science and Nano Technology – B.S. Murthy, P. Shankar, Baldev Raj, B.B. Rath and James Munday, UniversityPress-IIM.
2. Fundamentals of nanotechnology – Gabor L. Hornyak, John J. Moore, H.F. Tibbals, Joydeep dutta, 1st Edition, CRC Press Dec 22,2008 (II & III unit)
3. Introduction to Nanotechnology– Charles P. Poole, Jr., and Frank J. Owens, WleyIndia Edition, 2012.

REFERENCES BOOKS:

1. Nano: The Essentials by T. Pradeep, Mc Graw- Hill Education. Nanomaterials, Nanotechnologies and Design byMichael F. Ashby, Paulo J. Ferreira and Daniel L. Schodek.
2. Transport in Nano structures- David Ferry, Cambridge University press 2000

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO2	2	-	2	-	1	-	-	-	-	-	-	-	3	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO4	3	2	-	-	1	-	-	-	-	-	-	-	3	-	-
Average	2.75	2	2	-	1	-	-	-	-	-	-	-	3	-	-
Level of Correlation	3	2	2		1	-	-	-	-	-	-	-	3	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B.Tech ISemesterECE (Professional Elective-I)
III B.Tech ISemester ME (Open Elective-I)
III B.Tech II Semester EEE (Open Elective-II)

20AEC25 MEMS and NEMS

L	T	P	C
3	0	0	3

Course Outcomes:

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

CO1: understand the fundamental concepts and background of MEMS and Microsystems.

CO2: understand construction and working principle of various sensors and actuators.

CO3: Identify various materials for Micro system designing.

CO4: Apply various micro and nano machining technologies for MEMS and NEMS production.

UNIT- I OVERVIEW OFMEMS ANDMICROSYSTEMS:

Introduction to MEMS and Microsystems, Typical MEMS and Microsystems products, Evolution of Microfabrication, Microsystems and Microelectronics, The Multidisciplinary nature of Microsystem design and manufacture, Microsystems and Miniaturization, Applications of Microsystems in the Automotive industry and Applications of Microsystems in other industries.

UNIT-II INTRODUCTION TO MICRO SENSORS AND ACTUATORS:

Microsensors: Acoustic wave sensors, Biomedical sensors and Biosensors, Chemical sensor, Optical Sensors, Pressure sensor, Thermal sensor, Gyro sensor, Flow sensor. Micro actuation: Actuation using Thermal forces, Shape-Memory Alloys, Piezoelectric crystals, Electrostatic forces, Micro-accelerometers and Microfluidics.

UNIT-III MATERIALS FOR MEMS AND MICROSYSTEMS:

Introduction, Substrates and Wafers, Active Substrate Materials, Silicon as a Substrate material, Silicon Compounds, Silicon Piezo resistors, Gallium Arsenide, Quartz, Piezoelectric crystals, Polymers and Packaging materials.

UNIT-IV MICROMACHINING TECHNOLOGIES:

Overview of silicon processes techniques, Photolithography, Ion Implantation, Diffusion, Chemical Vapor Deposition, Physical vapor Deposition, Epitaxy, Etching, Bulk micromachining, Surface Micromachining, LIGAand other techniques.

UNIT-V NANO ELECTRO MECHANICAL SYSTEMS: (NEMS)

Nano machining of NEMS via electron beam lithography, Nano electromechanical systems fabrication, nano imprint lithography, focused ion beam doping and wet chemical etching, stencil lithography and sacrificial etching, large scale integration, future challenges and applications.

TEXT BOOKS:

1. Tai-Ran Hsu, "MEMS & Microsystems Design and Manufacture", Tata McGraw Hill edition, 2008.
2. Chang Liu, "Foundations of MEMS" PearsonEducation India Limited, 2009.

REFERENCES:

1. Marc Madou, "Fundamentals of Microfabrication" CRC press 2002.
2. Stephen D. Senturia, "RFMicroelectronics", Kluwer Academic Publishers, 2001.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	3	3	-	-	-	-	-	-	-	-	2	-	-
CO2	3	3	3	2	-	-	-	-	-	-	-	-	-	-	-
CO3	3	1	3	3	-	-	-	-	-	-	-	-	2	-	-
CO4	3	3	3		-	-	-	-	-	-	-	-	2	-	-
Average	2.75	2.25	3	2.66	-	-	-	-	-	-	-	-	2	-	-
Level of Correlation	3	2	3	3	-	-	-	-	-	-	-	-	2	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. Tech I Semester ECE

Course Code: 20AEC26

TELEVISION AND VIDEO ENGINEERING
(Professional Elective-1)

L	T	P	C
3	0	0	3

Course Outcomes:

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

CO1: Understand the various elements of Monochrome T.V Systems and synthesis of T.V Picture tube

CO2: Understand the principles involved in TV broadcasting system

CO3: Analyze the various blocks of Color TV, CCTV, transmission and reception.

CO4: Understand Video Engineering and advanced topics in Television systems

UNIT- I CAMERA TUBE:

Elements of T. V. System, Analysis and synthesis of T. V. Picture, Composite video signal, Monochrome Camera tubes, image orthicon, Vidicon, Plumbicon, Comparison between one another.

UNIT- II TV BROADCASTING:

Block diagram of T. V. Transmission, Principle of operation, T. V. Signal propagation, Antennas used for transmission, Antenna used for reception, Reciver-Classification, Block diagram, Different sections, tuners

UNIT- III COLOUR TELEVISION:

Compatibility, Three colour theory, Colour Camera, Colour receiver tubes, Colour T. V. Transmitter and receiver block diagram, Colour signal transmission and reception, PAL system details.

UNIT- IV DIGITAL VIDEO & STANDARDS:

Digitizing Video, Chroma Sub sampling, Basics of Video Compression (MPEG-x, H.26x), Digital VTR, Non-Linear Editing, 4:3 Vs 16:9 for DigitalVideo.

Television Systems and Standards: ATSC, ISDB-T & DTMB, Overview of DVB-T, DVB-S, DVB-C & DVB-IP, DVB-H, Cable Television Network

UNIT -V ADVANCES IN TV TECHNOLOGY:

HDTV, Display Technologies (CRT, LCD, Plasma, LED, Projection), Introduction to 3D TV, Video Interfaces (Composite, Component, S-Video, DV, SDI, HDMI, DVI)

TEXT BOOKS:

1. R.R.Gulati“Monochrome and colour television “, New age International Publisher, 2003
2. A.M Dhake, “Television and Video Engineering", Second edition, TMH, 2003.
3. R.R. Gulati, “Modern Television Practice” 3rd edition, New age International Publisher, 2007

REFERENCES:

1. R.R.Gulati, “ Monochrome Television Practice, Principles, Technology and servcing , Second edition, New age International Publishes, 2004
2. S.P.Bali, “Colour Television, Theoryand Practice", TMH, 1994

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	-	-	-	-	-	-	-	-	-	-	2
CO2	2	3	-	2	-	-	-	-	-	-	-	-	-	-	2
CO3	3	3	2	1	-	-	-	-	-	-	-	-	-	-	2
CO4	3	3	1	1	-	-	-	-	-	-	-	-	-	-	-
Average	2.75	3	1.66	1.5	-	-	-	-	-	-	-	-	-	-	2
Level of correlation	3	3	2	2	-	-	-	-	-	-	-	-	-	-	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMUS)

III B.Tech I Semester (ECE)
III B.Tech II Semester(EEE)

20AEC27 MICROPROCESSORS AND MICROCONTROLLERS LAB

L	T	P	C
0	0	3	1.5

Course Outcomes:

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

CO1: Use 8086 Assembly Language Programs.

CO2: Use 8086 Microprocessor for various applications.

CO3: Generate any type of waveforms.

CO4: Apply8051 Assembly Language Programs.

CO5: Use built-in timer of8051 Microcontroller

List of Experiments

Part - A (Minimum 7 Experiments to be conducted)

8086 Microprocessor Programs using MASM/TASM Software
By using Arithmetic & Logical instructions:

1. Study of MASM/TASM Software
2. ALPs (8086) for addition and subtraction.
3. ALPs (8086) for multiplication and Division.
4. ALPs (8086) to determine GCD and LCM of two 16-bit numbers.
5. ALPs (8086) to evaluate arithmetic expresses
6. ALPs (8086) for sorting and searching.
7. Logic Operations-Shift and rotate, converting packed BCD to unpacked BCD, BCD to ASCII conversion.
8. String Operations-Move block, Reverse string, String comparison, Length of string.
9. ALPs (8086) for (i) DOS interrupts (ii) BIOS interrupts

Part - B (Minimum 2 Experiments to be conducted)

Interfacing Programs using 8086:

1. ALPs (8086) for generating ramp wave, triangular wave, and stair case wave forms using DAC.
2. ALP (8086) fortraffic light controller.
3. ALP (8086) for stepper motor control.

Part - C (Minimum 3 Experiments to be conducted)

8051 Microcontroller:

1. (a) ALP (8051) to determine the addition

   (b) ALP (8051) to determine the subtraction
2. (a) ALP (8051) to determine the largest ofN bytes

(b) ALP (8051) to determine the smallest of N bytes.

3. (a) ALP (8051) to multiplya 16-bit number byan 8-bit number.

   (b) ALP (8051) to find square root of an 8-bit number.

4. (a) ALP (8051) to determine LCM oftwo 8- bit numbers.

   (b) ALP (8051) to determine GCD of two 8- bit numbers.

5. (a) ALP (8051) to generate evennumbers.

   (b) ALP (8051) to generate odd numbers.

6. Timer/Counters(8051) in different modes.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	3	-	-	-	-	-	-	-	-	3	-
CO2	3	3	3	3	-	-	-	-	-	-	-	-	-	3	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	-	3	-
CO4	3	3	3	3	3	-	-	-	-	-	-	-	-	3	-
CO5	3	3	3	3	-	-	-	-	-	-	-	-	-	3	-
Average	3	3	3	3	3	-	-	-	-	-	-	-	-	3	-
Level of Correlation	3	3	3	3	3	-	-	-	-	-	-	-	-	3	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. Tech I Semester ECE

Course Code: 20AEC28

DIGITAL COMMUNICATIONS LAB

L	T	P	C
0	0	3	1.5

Course Outcomes:

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

CO1: Analyze different coding techniques in digital communications.

CO2: Demonstrate sampling theorem and different modulation, demodulation techniques.

List of Experiments
(Minimum Ten Experiments has to be conducted)

1. Generation of Various Encoding Schemes
2. Pulse Code Modulation and Demodulation
3. Sampling Theorem– Verification
4. Delta modulation and Demodulation
5. Amplitude shift keying - Modulation and Demodulation.
6. Phase shift keying - Modulation and Demodulation.
7. Frequency shift keying - Modulation and Demodulation.
8. Differential Phase shift keying – Modulation and Demodulation
9. QPSK– Modulation and Demodulation
10. DQPSK– Modulation and Demodulation
11. Binary Phase shift keying – Modulation and demodulation
12. Differentially Encoded Phase shift keying – Modulation and Demodulation

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
Average	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
Level of Correlation	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. Tech I Semester ECE
Course Code: 20AEC29

VHDL PROGRAMMING

L	T	P	C
1	0	2	2

Course Outcomes:

After successful completion of course the student will be able to

CO1: Understand the fundamentals of digital systems through VHDL language.

CO2: Analyze the RTL attributes and gate level verification using VHDL.

CO3: Design top level systems.

LIST OF EXPERIMENTS
(Minimum Ten Experiments has to be conducted)

1. Basic Logic GATES
2. Half adder & Full adder
3. Half Subtractor & Full Subtractor
4. 3-8 Decoder
5. 8-3 Encoder
6. 8X1 multiplexer
7. 1X4 De multiplexer
8. 4-Bit Comparator
9. JK Flip Flop
10. 4-Bit Synchronous BinaryCounter
11. 4-Bit Universal shift Register
12. 4-Bit ALU

TEXT BOOKS:
1. Douglas L.Perry “VHDL Programming byExample” 4/e Edition, McGraw Hill 2001.
2. J. Bhasker, VHDLPrimer, 3/e, Addison Wesley, 1999.

REFERENCE BOOKS:
1. Peter.J. Ashenden, The Designer's Guide to VHDL-AMS,
2. Charles.H. Roth, Digitalsystem Design using VHDL, Thompson Publishers, 2/e Edition, 2007.

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	3	-
CO2	2	-	2	-	1	-	-	-	-	-	-	-	-	3	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
Average	2.66	2	2	-	1	-	-	-	-	-	-	-	3	3	-
Level of Correlation	3	2	2	-	1	-	-	-	-	-	-	-	3	3	-

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

III B. Tech I Semester (Common to all branches)

L T P C
2 0 0 0

20AHS21 INDIAN CONSTITUTION

Course Outcomes:

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

1. Understand the historical background of the constitution making and its importance for building a democratic India.
2. Examine the importance of Preamble of the Indian Constitution and Parliamentary Structure.
3. Analyze decentralization of power among central, state and local self-government.
4. Demonstrate functioning of judiciary system, fundamental rights and duties of all India Services and international institutions.

UNIT-I **5 Hours**

PREAMBLE AND ITS PHILOSOPHY: Introduction to Indian Constitution, Evolution of Indian Constitution, preamble and its philosophy.

UNIT-II **5 Hours**

UNION LEGISLATURE: The Parliament, Parliamentary Structure, Process of Legislation, President of India - Powers and Functions; Prime Minister and Council of Ministers; Constitution Amendment Procedure.

UNIT-III **6 Hours**

FEDERALISM IN INDIA: Centre-State Administrative Relationship; Governors - Powers and Functions; State Legislature - Composition and powers; Chief Ministers - Powers and Functions; The Election Commission - Powers and Functions.

UNIT-IV **6 Hours**

JUDICIARY AND PUBLIC SERVICES: The Union Judiciary - Supreme Court and High Court; Fundamental Rights and Duties All India Services - Central Civil Services -State Services - Local Services.

UNIT-V **6 Hours**

INTERNATIONAL PARTICIPATION: Foreign Policy of India; International Institutions Influence: UNO, WTO, WHO, SAARC, International Summits: BRICS, NSS, UNEP - India's Role in International Negotiations; Environmentalism in India.

TEXT BOOK:

1. Briji Kishore Sharma, Introduction to the Constitution of India, Prentice Hall of India, 2005.

REFERENCE BOOKS:

1. Mahendra Pal Singh, V. N. Shukla, Constitution of India, Eastern Book Company, 2011.

2. J. N. Pandey, Constitutional Law of India - Central Law Agency, 1998

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	3	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	3	-	3	-	-	-	-	-	-	-
Average	2	-	-	-	-	3	-	3	-	-	-	-	-	-	-
Level of Correlation	2	-	-	-	-	3	-	3	-	-	-	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

III B.Tech - I Semester (Common to All Branches)

L	T	P	C
2	0	0	0

20AHS17 QUANTITATIVE APTITUDE AND REASONING-III

Course Outcomes:

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

1. Develop the thinking ability to meet the challenges in solving Logical Reasoning problems.
2. Solve campus placements aptitude papers covering Quantitative Ability and Verbal Ability.
3. Apply different placement practice techniques

UNIT-I **9 Hours**

QUANTITATIVE ABILITY V: Time and Work – Equal Efficiency – Different Efficiency – Combined work – Alternate work – Partial work – Negative work - Pipes and Cistern – Simple Interest – Compound Interest - Year Zero – Difference between SI and CI – Clocks – Angle of the Clock –Minutes hand Loss or Gain – Calendars – Leap Year – Non Leap year – Odd days – Days of the week

UNIT-II **9 Hours**

QUANTITATIVE ABILITY VI: Mensuration 2D – Area and Perimeter - Mensuration 3D – Volume - Total Surface area – Lateral Surface Area – Statistics- Mean - Mean Deviation – Median – Mode - Range – Variance - – Standard Deviation - Set theory

UNIT-III **9 Hours**

REASONING ABILITY III: Puzzles – Cubes & Dices – Algebra – Selection Decision table – Visual reasoning – Inequalities

UNIT-IV **9 Hours**

VERBAL III: Vocabulary - Synonyms, Antonyms, One Word Substitution, and Spelling - Sentence Correction - Sentence Selection, Error Identification, Sentence Improvement, Sentence completion – Cloze Test, Types, Strategies - Para jumbles- Types, Strategies.

UNIT-V **9 Hours**

SOFT SKILLS III: Written Communication - Listening Skills - Mentoring & Coaching - Decision Making - Competitiveness - Inspiring & Motivating.

Text Books:

1. Quantitative Aptitude, Logic Reasoning & Verbal Reasoning, R S Agarwal, S. Chand Publications.
2. Quantitative Aptitude for Competitive Examinations, R S Agarwal, S. Chand Publications

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	2	-	-	-	-	-	-	-	2	-	-	-	-	-
CO3	2	-	-	-	-	-	-	-	-	2	-	-	-	-	-
Average	2	1.5	-	-	-	-	-	-	-	2	-	-	-	-	-
Level of Correlation	2	2	-	-	-	-	-	-	-	2	-	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

III B. Tech I Semester (Common to all Branches)

L	T	P	C
2	0	0	0

20AHS18 FRENCH LANGUAGE

Course Outcomes:

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

1. Understand basic knowledge of French language and analyze several core competencies.
2. Develop and improve comprehensive capabilities and apply simple phrases & sentences in real-life conversation.
3. Analyze ability to ask and answer questions about the self, personal interest, everyday life, and the immediate environment.
4. Demonstrate knowledge of tenses in making sentences for day-to-day conversations indifferent time frame.

UNIT-I **10 Hours**

INTRODUCTION & PRESENTATION: Conversation, Introduction, Alphabets & Accents Culture, Formal & Informal – Use of 'tu' and 'vous', Map of France: Geographical, Administrative Greeting, Presenting oneself & others, Asking & giving identity, Days of the week, Months of the year, Numbers, Nationality, Profession, Making a visiting card salutations, Gestures & Handshakes.

UNIT-II **8Hours**

RENDEZVOUS: Conversation, approaching someone, Tele conversation, Buying a train ticket, Numbers the formula to write a post card, Culture and Life in France.

UNIT-III **9 Hours**

AGENDA & INVITATION: Conversation, Time, Fixing a meeting, Alimentation, Moments of the day (from morning to night), Punctuality, Good moments of the day, Inviting someone, Accepting & Refusing Invitations, Family tree, Describing a house interior.

UNIT-IV **8 Hours**

VACATION & SHOPPING: Describing an event, Reservations at a Hotel, Describing a person, Expressing opinion, Indication of time: Depuis & pendant, Gestures: Polite & Impolite, A French vacation, Culture, Making a purchase, Choosing & Paying, Trying a dress on, Talking about weather, Understanding a Weather Bulletin, Comparison, Dress & weather, Dialogue between a client and an employee of a store and Money in everyday life in France: Parking ticket / telephone card.

UNIT-V **10 Hours**

ITINERARY, EXCURSION & WEEKEND: Asking for & giving directions, Giving order / advice / prohibition, Reservation at a restaurant, Taking an order , Asking for bill at a Restaurant, Expression of Quantity, Alimentation: Shopping list (portions), Making Suggestion & Proposal, Going for an outing, Acceptance & Refusal of an invitation, Giving arguments: favor & against, A French Weekend.

Text Books:

1. CAMPUS 1 Method de Francais, Jacques Pecheur et Jacky Girardet, CLEInternational Paris 2002.
2. La France de toujours, Nelly Mauchamp; CLE international.
3. Sans Frontireres - Vols. 1, 2, & 3 – Hachette.

Reference Books:

1. Declic 1; Jacques Balnc, Jean-Michel Cartier, Pierre Lederlion; CLE International.
2. Nouveau Sans Frontieres – Vols. 1, 2 & 3.
3. Cours de langue et de civilisation Francaise – Hachette.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	3	3	-	-	-	-	-
CO2	2	-	-	-	-	-	-	-	3	3	-	-	-	-	-
CO3	2	-	-	-	-	-	-	-	3	3	-	-	-	-	-
CO4	2	-	-	-	-	-	-	-	3	3					
Average	2.25	-	-	-	-	-	-	-	3	3	-	-	-	-	-
Level of Correlation	2	-	-	-	-	-	-	-	3	3	-	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

III B. Tech I Semester (Common to all Branches)

L	T	P	C
2	0	0	0

20AHS19 GERMAN LANGUAGE

Course Outcomes:

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

1. Understand fundamental knowledge to learn German language, sounds, pronunciations, sentence structures and the verb conjugation.
2. Comprehend and apply the knowledge of vocabulary and phrases in day-to-day real-life conversation.
3. Analyze various sentence structures by examining the rules of grammar in speaking and writing.
4. Demonstrate various verb structures of English and German language effectively in professional writing.

UNIT-I **10 Hours**

GERMAN SOUNDS: Vowels, consonants, diphthongs, umlaut, the nouns, gender distinctions, cases, definite and indefinite articles, conjugation of verbs, verbs with separable and inseparable prefixes, modal verbs, personal pronouns, possessive pronouns, reflexive pronouns, cases nominative, accusative and dative.

UNIT-II **8 Hours**

SENTENCE FORMATION: Infinite sentences, use of conjunctive-I and conjunctive-II, plusquam perfect, modal verb, Conjunction, temporal, subordinate clauses & complex sentences.

UNIT-III **9 Hours**

GERMAN BASIC GRAMMAR: Verbs: Different forms, past tense and present perfect tense, adjectives and their declension, degrees of comparison; Prepositions, genitive case conjunctive. Different conjunctions (coordinating and subordinating), simple, complex and compound sentences, active and passive voice, relative pronouns.

UNIT-IV **8 Hours**

PURPOSE OF LANGUAGE STUDY: Pictures and perceptions, conflicts and solutions, change and the future, the purpose of the study of the German language, listening, understanding, reacting, speaking, communicating, use of language, pronunciation and intonation, reading, reading and understanding, writing, text writing, text forming, use of language, language reflection, building up the language, language comparison, culture reflection, other cultures and cultural identity.

UNIT-V **10 Hours**

GERMAN ADVANCED COMMUNICATION LEVEL – 1: The significance of language study, Speaking and thinking, Self – discovery, Communication, Language Competence, Language and culture, Language changes, Connection with other areas of study, The mother language and the other languages.

Text Books:

1. Korbinian, Lorenz Nieder Deutschals Fremdsprache IA. Ausländer, "German Language", Perfect Paperback Publishers, 1st Edition, 1992.
2. Deutschals Fremdsprache, IB, Erganzungskurs, "German Language", Front Cover. Klett, Glossar Deutsch-Spanisch Publishers, 1st Edition, 1981.

Reference Books:

1. Griesbach, "Moderner Gebrauch der deutschen Sprache", Schulz Publishers, 10th Edition, 2011.
2. Anna Quick, Hermann Glaser U.A, "Intermediate German: A Grammar and workbook", Paperback, 1st Edition, 2006.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	1	-	-	-	3	-	-	-	-	-
CO2	2	-	-	-	-	-	-	-	-	3	-	-	-	-	-
CO3	3	-	-	-	-	2	-	-	-	3	-	-	-	-	-
CO4	2	-	-	-	-	-	-	-	-	3	-	-	-	-	-
Average	2.25	-	-	-	-	1.5	-	-	-	3	-	-	-	-	-
Level of Correlation	2	-	-	-	-	2	-	-	-	3	-	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

III B. Tech I Semester (Common to all Branches)

L	T	P	C
2	0	0	0

20AHS20 JAPANESE LANGUAGE

Course Outcomes:

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

1. Remember and understand Japanese alphabet and demonstrate basic structures of sentences in reading and writing.
2. Examine the limitations of language by examining pronouns, verbs form, adjectives and conjunctions.
3. Analyze the skills of vocabulary and apply it to learn time and dates and express them in Japanese.
4. Demonstrate the formation of simple questions and answers in Japanese to know the Japanese culture and etiquette.

UNIT-I **8 Hours**

INTRODUCTION TO JAPANESE SYLLABLES AND GREETINGS: Introduction of Japanese language, alphabets; Hiragana, katakana, and Kanji Pronunciation, vowels and consonants. Hiragana – writing and reading; Vocabulary: 50 Nouns and 20pronouns, Greetings.

UNIT-II **10 Hours**

DEMONSTRATIVE PRONOUNS, VERBS AND SENTENCE FORMATION: Grammar: N1 wa N2 desu, Japanese Numerals, Demonstrative pronoun - Kore, Sore, Are and Dore (This, That, Over there, which) Kono, sono, Ano and Dono (this, that, over there, which) Kochira, Sochira, Achira and Dochira. This way....) Koko, Soko, Asoko and Doko (Here, There,...location), Classification of verbs Be verb desu Present and Present negative Basic structure of sentence (Subject+ Object+ Verb) Katakana-reading and writing.

UNIT-III **8 Hours**

CONJUNCTION, ADJECTIVES, VOCABULARY AND ITS MEANING: Conjunction-Ya…..nado Classification of Adjectives ‘I’ and ‘na’-ending Set phrase – Onegaishimasu – Sumimasen, wakarimasen Particle –Wa, Particle-Ni ‘Ga imasu’ and ‘Gaarimasu’ for Existence of living things and non-living things Particle- Ka, Ni, Ga, Days/ Months /Year/Week (Current, Previous, Next, Next to Next); Nation, People and Language Relationship of family (look and learn); Simple kanji recognition.

UNIT-IV **10 Hours**

FORMING QUESTIONS AND GIVING ANSWERS: Classification of Question words (Dare, Nani, Itsu, Doyatte, dooshite, Ikutsu, Ikura); Classification of Te forms, Polite form of verbs.

UNIT-V **9 Hours**

EXPRESSING TIME, POSITION AND DIRECTIONS: Classification of question words (Doko, Dore, Dono, Dochira); Time expressions (Jikan), Number of hours, Number of months, calendar of a month; Visiting the departmental store, railway stations, Hospital (Byoki), office and University.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	-	-	-	-	3	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	3	-	-	-	-	-
CO3	3	-	-	-	-	-	-	-	-	3	-	-	-	-	-
CO4	3	-	-	-	-	-	-	-	-	3	-	-	-	-	-
Average	2.75	-	-	-	-	-	-	-	-	3	-	-	-	-	-
Level of Correlation	3	-	-	-	-	-	-	-	-	3	-	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B. Tech I Semester ECE

Course Code: 20AEC30/20AECB6

SUMMER INTERNSHIP/COMMUNITY SERVICE PROJECT

L	T	P	C
0	0	0	1.5

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech II Semester (ECE)
IV B.Tech I Semester EEE (Open Elective-IV)

20AEC32 VLSI DESIGN

L	T	P	C
3	0	0	3

Course Outcomes:

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

CO1: Understand the fabrication steps in IC processing technology and Electrical properties of MOS& Bi CMOS circuits

CO2: Apply the design rules for IC fabrication

CO3: Design various subsystems

CO4: Understand various testing techniques.

UNIT-I INTRODUCTION:

Introduction to IC technology, MOS and related technology, basic MOS transistors, Fabrication of NMOS, CMOS (P-well, N-well and Twin-tub process) and Bi-CMOS process, IC process Oxidation, Lithography, Diffusion, Ion implantation, Metallization and Encapsulation.

BASIC ELECTRICAL PROPERTIES OFMOS AND BICMOS CIRCUITS: Ids–Vds relationships, MOS transistor threshold Voltage, gm, gds, figure of merit ω0; Pass transistor, NMOS Inverter, Various pullups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

UNIT-II BASIC CIRCUIT CONCEPTS:

Sheet Resistance Rs and its concepts to MOS, Area Capacitance calculations, Inverter Delays, Driving large Capacitive Loads, Propagation delay, Wiring Capacitances and Choice of layers.

GATE LEVEL DESIGN: Logic gates and other complex gates, Switch logic, Alternate gate circuits.

UNIT-III VLSI CIRCUIT DESIGN PROCESSES:

VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, 2μm CMOS Design rules for wires, Contacts and Transistors, Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits, Limitations of Scaling.

VLSI DESIGN STYLES: Full-custom, Standard Cells, Gate-arrays, FPGAs and CPLDs

UNIT-IV SUB SYSTEM DESIGN:

Shifters, Adders- Carry select adder, carry skip adder, carry look ahead adder, ALU, Multipliers-Serial- Parallel multiplier, Braun array, Pipelined multiplier, modified Booth's algorithm, Parity generators, Comparators, Counters, High Density Memory Elements

UNIT-V VHDL SYNTHESIS:

VHDL Synthesis, Circuit Design Flow, Circuit Synthesis, Simulation, Layout, Design capture tools, Design Verification Tools.

CMOS TESTING: Need for testing, test principles, design strategies for test, chip level test techniques, system-level test techniques

TEXT BOOKS:

1. Kamran Eshraghian, Eshraghian Douglas and A. Pucknell, "Essentials of VLSI circuits and systems", PHI, 2013 Edition.
2. Westeand Eshraghian, "Principles ofCMOS VLSI Design", PearsonEducation, 2012.

REFERENCE BOOKS:

1. Wayne Wolf, "ModernVLSI Design", PearsonEducation, 3rd Edition, 2004.
2. JohnP. Uyemura, "Introductionto VLSI Circuits and Systems", John Wiley, 2003.
3. M.J.Smith, "Application specific Integrated circuits", Addisson Wesley1997

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	2	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	-	2	1	-	-	-	-	-	-	-	-	-	2	-
CO3	3	2	3	1	-	-	-	-	-	-	-	-	-	3	-
CO4	3	1	1	-	-	-	-	-	-	-	-	-	-	2	-
Average	3	1.33	2	1	-	-	-	-	-	-	-	-	3	2.33	-
Level of correlation	3	1	2	1	-	-	-	-	-	-	-	-	3	2	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B.Tech II Semester (ECE)

IV B.Tech I Semester EEE (Open Elective –III)

20AEC33 DIGITAL SIGNAL PROCESSING

L	T	P	C
3	0	0	3

Outcomes:

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

1. Analyze the discrete-time signals and systems using basic signal processing algorithms.
2. Apply different realization methods to implements digital filters with different structures.
3. Design and analyze digital filters to suit specific requirements
4. Explain the concept of multi-rate digital signal processing and DSP Processors.

UNIT I DISCRETE TIME SYSTEMS:

System function H(Z), Stability analysis using system function, Response of a digital system using Z-transforms-Natural response, Forced response and total response, Frequency spectrum of discrete time systems.

DISCRETE FOURIER TRANSFORM AND FAST FOURIER TRANSFORM: Discrete Fourier Transforms (DFT)- DFT from DTFT, IDFT, Properties of DFT, Direct Computation of DFT and IDFT, circular convolution, Linear convolution using circular convolution.

Fast Fourier transforms (FFT)-Radix2 decimation in time and decimation in frequency FFT algorithms, computation of IDFT through FFT.

UNIT II REALIZATION OF DIGITAL FILTERS:

IIR Filter structures: Direct form- I realization, Direct form - II realization, Transposed forms, Cascade form structure, Parallel form structure, Lattice structure for first and second order IIR systems. FIR Filter structures: Direct form, Transposed form and Cascade form structures, Minimum multiplier structure for linear phase FIR filters, Lattice structure for first order and second order FIR systems.

UNIT III DESIGN OF IIR FILTERS:

Analog filter approximations-Butter worth and Chebyshev, Analog frequency transformation to transform low pass to high pass, band pass and band stop filters, Design of IIR filters from analog filters: Backward difference method, Impulse invariant technique and Bi linear transformation, Illustrative Problems.

UNIT IV DESIGN OF FIR FILTERS:

Design of FIR digital Filters-Fourier series method, Windowing method – Rectangular window, Bartlett window, Hamming window, Hamming window, Blackman window, Frequency sampling method, comparison of IIR and FIR filters, Illustrative Problems.

UNIT V MULTIRATE DIGITAL SIGNAL PROCESSING:

Introduction, Decimation by a Factor D, Interpolation by a Factor I, Sampling rate conversion by a Rational Factor I/D.

INTRODUCTION TO DSP PROCESSORS: Introduction to programmable DSPs: Multiplier and Multiplier Accumulator, modified bus structures and memory access schemes in P-DSPs, Multiple Access Memory, Multi ported memory, VLIW architecture, Pipelining, Special addressing modes, On-Chip Peripherals.

Text Books:

1. John G. Proakis, Dimitris G. Manolakis, Digital signal processing, principles, Algorithms and applications, Pearson Education/PHI, 4^{th} ed., 2007.
2. Anand Kumar. A, Digital Signal Processing, PHI Learning Private Limited, 2013.

Reference Books:

1. Sanjit K.Mitra, Digital Signal Processing, A computer base approach, Tata McGraw Hill, 3^{rd} edition, 2009.
2. A.V.Oppenheim and R.W. Schaffer, & J R Buck, "Discrete Time Signal Processing," 2nd ed., Pearson Education, 2012.
3. Digital Signal Processing – Avtar Singh and S. Srinivasan, Thomson Publications, 2004.

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	-	-	-	-	-	-	-	-	2	-	2
CO2	3	3	3	-	-	-	-	-	-	-	-	-	2	-	2
CO3	3	3	3	3	-	-	-	-	-	-	-	-	2	-	2
CO4	3	3	3	3	-	-	-	-	-	-	-	-	2	-	2
Average	3	3	2.5	2.33	-	-	-	-	-	-	-	-	2	-	2
Level of correlation	3	3	3	2	-	-	-	-	-	-	-	-	2	-	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. Tech II Semester ECE

Course Code: 20AEC34

DIGITAL DESIGN THROUGH VERILOG HDL

L	T	P	C
3	0	0	3

Course Outcomes:

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

CO1: Demonstrate knowledge of Verilog HDL

CO2: Analyze the functionality of digital systems using Verilog HDL

CO3: Apply Verilog constructs for designing combinational logic circuits and sequential logic circuits

UNIT-I INTRODUCTION TO VERILOG:

Verilog as HDL, Levels of Design Description, Concurrency, Simulation and Synthesis, Functional Verification, System Tasks, Programming Language Interface (PLI), Module, Simulation and Synthesis Tools and Test Benches.

LANGUAGE CONSTRUCTS AND CONVENTIONS: Introduction, Keywords, Identifiers, Whitespace Characters, Comments, Numbers, Strings, Logic Values, Data Types, Scalars and Vectors, Parameters, Memory, Operators and System Tasks.

UNIT-II GATELEVELMODELLING:

Introduction, AND Gate Primitive, Module Structure, Other Gate Primitives, Tri-state Gates, Array of instances of Primitives, Design of flip-flops with Gate Primitives, Delays, Strengths and Contention Resolution, Net Types and Design ofbasic circuits.

SWITCH LEVEL MODELLING: Introduction, Basic Transistor Switches, CMOS Switch, Bidirectional gates, Time Delays with Switch Primitives, Instantiations with Strengths and Delays, Strength Contention with Tri-regents.

UNIT- III BEHAVIORALMODELLING:

Introduction, Operations and Assignments, Functional Bifurcation, Initial Construct, always Construct, Examples, Assignments with delays, wait Construct, Multiple always blocks, Designs at Behavioral Level, Blocking and Non-blocking Assignments, case Statement, Simulation Flow, if and if-else Constructs, Assignand De-assign Construct, Repeat Construct, for loop, The Disable

Construct, while loop, forever loop, Parallel blocks, force-release Construct and Event.

MODELLING AT DATA FLOW LEVEL: Introduction, Continuous Assignment Structures, Delays and Continuous Assignments, Assignment to Vectors and Operators

UNIT-IV SYSTEM TASKS, FUNCTIONS ANDCOMPILER DIRECTIVES:

Introduction, Parameters, Path Delays, Module Parameters, System Tasks and Functions, File Based Tasks and Functions, Compiler Directives and Hierarchical Access.

FUNCTIONS, TASKS, AND USER-DEFINED PRIMITIVES: Introduction, Function, Tasks, User-Defined Primitives (UDP), FSM Design (Moore and Mealy Machines).

UNIT-V SEQUENTIAL CIRCUIT DESCRIPTION:
Sequential Models - Feedback Model, Capacitive Model, Implicit Model, Basic Memory Components, Functional Register, Static Machine Coding, Sequential Synthesis.

COMPONENTS TEST AND VERIFICATION: Test Bench - Combinational Circuits Testing, Sequential Circuit Testing, Test Bench Techniques, Design Verification, Assertion Verification.

TEXT BOOKS:

1. T.R. Padmanabhan and B. Bala Tripura Sundari, “Design through Verilog HDL", WSE, IEEE Press, 2004.
2. Samir Palnitkar, “Verilog HDL”, PearsonEducation, 2nd Edition,2003.

REFERENCE BOOKS:

1. Stephen. Brownand Zvonko Vranesic, “Fundamentals of Logic Design with Verilog”, TMH, 2005.
2. MichaelD. Ciletti, “Advanced DigitalDesign with Verilog HDL”, PHI, 2005.
   J. Bhasker, “AVerilog Prime”, BSP, 2008.

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	3	3	-	-	-	-	-	-	-	-	-	3	-
CO2	1	3	3	3	-	-	-	-	-	-	-	-	-	3	-
CO3	1	1	3	3	-	-	-	-	-	-	-	-	3	-	-
Average	1	2	3	3	-	-	-	-	-	-	-	-	3	3	-
Level of Correlation	1	2	3	3	-	-	-	-	-	-	-	-	3	3	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B.Tech II Semester

Course Code: 20AEC35

MICROWAVE ENGINEERING AND ANTENNAS
(Professional Elective-II)

L	T	P	C
3	0	0	3

Course Outcomes:

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

CO1: Understand harmonic signals, fields and transmission lines

CO2: Explain lumped elements, distributed elements, combiners and filters

CO3: Analyze parameters, various antennas

UNIT- I Introduction:

General introduction, Applications, Time-harmonic signals and fields, Transmission lines.

UNIT- II Passive Microwave Circuits:

Microwave networks, Power combiners, Wilkinson combiners, Smith chart, Matching with lumped elements, Matching with distributed elements, Microwave filters.

UNIT- III Antenna Introduction:

Introduction, Antenna parameters, Link budget, Antenna impedance, Phased arrays introduction.

UNIT- IV Fields and Antennas:

Radiated fields: general case, far-field case, Electric dipole, Wire antennas, Loop antennas, Magnetic sources and Equivalence principle, Horn antennas, Reflector antennas, Microstrip antennas, Phased arrays with real antennas, Method of Moments.

UNIT –V Active Microwave Circuits:

Power Gain, Noise, Stability, Impedance matching, Constant gain circles.

TEXT BOOKS:

1. Samuel Y. Liao, Microwave Devices and Circuits, Pearson, 3rd Edition, 2008.
2. John D. Kraus and Ronald J. Marhefka and Ahmad S.Khan, “Antennas and wave propagation”, TMH, New Delhi, 4th Ed., (special Indian Edition), 2010.

REFERENCE BOOKS:

1. M. Kulkarni, Microwave and RADAR Engineering, Umesh Publications, 3rd Edition,
2. K.D. Prasad, Satya Prakashan, “Antennas and Wave Propagation”, Tech. India Publications, New Delhi, 2001.

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	3	3	1	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	1	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-		-	3
Average	3	3	1.66	-	-	-	-	-	-	-	-	-	3	-	3
Level of Correlation	3	3	2	-	-	-	-	-	-	-	-	-	3	-	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B. Tech II Semester ECE

Course Code: 20AEC36

MEDICAL ELECTRONICS
(Professional Elective-II)

L	T	P	C
3	0	0	3

Course Outcomes:

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

CO1: Describe the basic medical instrumentation system and its requirements

CO2: Use various electrodes biomedical recorders

CO3: Analyze the therapeutic and prosthetic devices and to understand the electrical safety

CO4: Demonstrate the working principle of X-ray machine, X-ray CT and Nuclear Magnetic Resonance system

UNIT-I FUNDAMENTALS OF MEDICAL INSTRUMENTATION:

Anatomy and Physiology, Physiological systems of the body, Sources of Biomedical signals, Basic Medical Instrumentation System, Performance requirements of medical instrumentation system, Intelligent medical instrumentation system and general constraints in design of medical instrumentation system.

UNIT- II ELECTRODES AND BIOMEDICAL RECORDERS:

Recording Electrodes, Silver-silver Chloride electrodes, Electrodes for ECG, Electrodes for EEG, Electrodes for EMG, PCG typical waveforms and signal characteristics, Electrical Conductivity of Electrode Jellies and Creams and Microelectrodes. Electrocardiograph, Vector cardiograph, Phonocardiograph, Electroencephalograph and Electromyography.

UNIT-III THERAPEUTIC AND PROSTHETIC DEVICES:

Cardiac Pacemakers: Need for Cardiac Pacemaker, External Pacemakers, Implantable Pacemakers and Recent developments in Implantable Pacemakers. Cardiac Defibrillators: Need for a Defibrillator, DC Defibrillator and Implantable Defibrillators. Schematic Diagram of a Hemodialysis Machine, High frequency Heat Therapy, Short-wave Diathermy and Microwave

Diathermy.

UNIT-IV ELECTRICAL SAFETY:

Physiological effects of Electricity, Important Susceptibility parameters, Distribution of electric power, Macro shock and Micro shock Hazards, Electrical safety codes and standards, Basic approaches to protection against shock, Protection: Power distribution and Equipment design, Electrical safety analyzers, Testing the electric system and Testsof electric appliances.

UNIT-V MEDICAL IMAGINGSYSTEMS:

Basic Principle and Block diagram of X-ray machine, Basic Principle and Technique of X- ray Computed Tomography, Basic Nuclear Magnetic Resonance components, Positron Emission Tomography, Ultrasonography: A-Scan, M-Mode, B-Scanner and Real Time Ultrasonic Imaging Systems.

TEXT BOOKS:

1. R.S. Khandpur, 'Handbook of Bio-Medical instrumentation', Third Edition, McGraw HillEducation (India) Private Limited,2014.
2. John G. Webster, 'Medical Instrumentation Application and Design', Third Edition, John Wiley & Sons,2009.

REFERENCE BOOKS:

1. Leslie Cromwell, Fred J. Weibell, Erich A. Pfeiffer, 'Bio-Medical Instrumentation and Measurements', Second Edition, Prentice Hallof India,2004.
2. Joseph J.Carr and John M.Brown, 'Introductionto Biomedical Equipment Technology', Fourth Edition, PHI,2001.

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	1	3	-	-	-	-	-	-	-	-	2	-	-
CO2	3	3	2	3	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	2	1	-	-	-	-	-	-	-	-	2	-	-
CO4	3	-	3	3	-	-	-	-	-	-	-	-	-	-	-
Average	3	2.66	2	2.5	-	-	-	-	-	-	-	-	2	-	-
Level of Correlation	3	3	2	3	-	-	-	-	-	-	-	-	2	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. Tech II Semester ECE

Course Code: 20AEC37

WIRELESS COMMUNICATION SYSTEMS

(Professional Elective-II)

L	T	P	C
3	0	0	3

Course Outcomes:

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

CO1: Demonstrate the functioning of wireless communication system and evolution different wireless communication systems and standards.

CO2: Analyze the Mobile radio propagation, fading and diversity.

CO3: Apply the multiple access techniques i.e. TDMA, CDMA, FDMA

CO4: Use the knowledge of design considerations, architecture, design challenges, constraints and security issues to develop different wireless communication systems

UNIT-I INTRODUCTION TO WIRELESS COMMUNICATION SYSTEM:

Advancement of mobile communications, Comparison of common wireless systems, Recent trends in Cellular radio and personal communication. Types of Technologies: Second Generation (2G), Third Generation (3G), Fourth Generation (4G) Wireless Networks.

UNIT-II PROPAGATION MODEL, SMALL SCALE FADING AND DIVERSITY:

Study of indoor and outdoor propagation models, Small scale fading and multi-path Small-scale multi-path propagation, parameter of multi-path channels, types of small-scale fading, Raleigh and Ricean distribution.

UNIT-IIIMULTIPLE ACCESS TECHNIQUES:

Introduction to spread spectrum, TDMA, CDMA, FDMA, OFDM, ALOHA, CSMA Protocols and comparison.

UNIT-IV WIRELESSSYSTEMS:

Introduction to GSM system architecture, Protocols, Localization and calling, Handover, Authentication and security in GSM, GSM speech coding, Architecture of IS-95 CDMA system, Air interface, CDMA forward channels & reverse channels, Architecture of IMT-2000/UMTS, air Interface, forward and reverse channels in W-CDMAand CDMA 2000

UNIT-V: RECENT TRENDS IN WIRELESS COMMUNICATION SYSTEMS

Introduction to Wi-Fi, WiMAX, Bluetooth, ZigBee, Software Defined Radio, UWB Radio, Ad-hoc Network, Sensor Networks, Security issues, challenges and applications.

TEXT BOOKS:

1. Wireless Communication, Theodore S. Rappaport, Prentice Hall
2. Wireless Communications and Networking, Vijay Garg, Elsevier
3. Adhoc Mobile Wireless network, C.K.Toh Pearson

REFERENCE BOOKS:

1. Wireless digital communication, Kamilo Feher, PHI
2. Mobile Communications Engineering, WilliamC. Y. Lee, Mc Graw Hill Publications
3. Mobile and personal Communication system and services by Rajpandya, IEEE press (PHI). Wireless Communications-T.L. Singh-TMH
4. Young Kyun Kimand Ramjee Prasad, ―4 G Roadmap and Emerging Communication Technologies ―, Artech house.

Course Outcome	Program Outcomes											Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	1	1	-	-	-	-	-	-	-	-	-	-	3
CO2	3	3	2	1	-	-	-	-	-	-	-	-	-	-	3
CO3	3	3	3	1	-	-	-	-	-	-	-	-	-	-	3
CO4	3	3	3	1	-	-	-	-	-	-	-	-	-	-	3
Average	3	3	2.25	1	-	-	-	-	-	-	-	-	-	-	3
Level of Correlation	3	3	2	1	-	-	-	-	-	-	-	-	-	-	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B. Tech II Semester ECE

Course Code: 20AEC38

ELECTRONIC MEASURING INSTRUMENTS

(Professional Elective-II)

L	T	P	C
3	0	0	3

Course Outcomes:

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

CO1: Demonstrate the performance characteristics of instruments and basic principles involved in the meters

CO2: Explain the basic features of oscilloscope and different types of oscilloscopes

CO3: Analyze the performance of waveform generators, waveform analyzers and different Bridges

CO4: Apply the knowledge of various electronics transducers to measure the physical quantities in the field of science, engineering and technology

UNIT-I PERFORMANCE CHARACTERISTICS OF INSTRUMENTS:

Performance characteristics, Static characteristics, Errors in Measurement, types of static error, sources of error, dynamic characteristics, statistical analysis. DC ammeters, Multirange ammeters, Universal shunt, Extending of Ammeter ranges, DC voltmeter- Multirange, Extending voltmeter ranges, Loading, Transistor voltmeter, AC voltmeters using halfwave and full wave rectifier, Multirange AC voltmeter, Series type and Shunt type ohmmeter, multimeter for voltage, current and resistance measurements.

UNIT-II OSCILLOSCOPES:

Basic principle, CRT features, Block diagram of Oscilloscope, Vertical amplifier, Horizontal deflecting system, sweep, Trigger pulse circuit, Delay line, sync selector circuits, simple CRO, trigger sweep CRO, Dual Beam CRO, Dual Trace oscilloscope, Sampling and Storage oscilloscope -

Digital readout oscilloscope, Measurement of amplitude, frequency and phase (Lissajous method) and principle of Digital storage oscilloscope. standard specifications of CRO, probes for CRO- Active & Passive, attenuator type.

UNIT-III SIGNAL GENERATORS:

Fixed and variable AF oscillators, Standard signal generator, Square Pulse, Random noise and sweep generator- principles of working (Block diagram approach). ANALYZERS: Introduction, Basic Wave analyzers, Frequency selective wave analyzer, heterodyne wave analyzer, Harmonic distortion analyzers, Spectrum analyzers. Digital Fourier Analyzers.

UNIT- IV DC BRIDGES:

Wheatstone bridge, Kelvin's Bridge and precautions to be taken when using bridges. AC BRIDGES: Capacitance comparison bridge, Inductance Comparison Bridge, Maxwell's, Hay's, Schering Wien's and Resonance Bridge. Errors and precautions inusing bridges.

UNIT-V TRANSDUCERS:

Introduction, Classification of transducers, Active and passive transducers, Resistive transducer, Strain gauges, LVDT, Pressure Inductive transducer, Capacitive transducer, Piezo electrical and Photo Electric transducer, Temperaturetransducers: RTD, Thermistors and Thermocouple.

TEXT BOOKS:

1. H.S.Kalsi, "Electronic instrumentation", Third Edition, Tata McGraw Hill, 2015.
2. A.D. Helfrick and W.D. Cooper, "Modern Electronic Instrumentation and Measurement Techniques", PHI, 5th Edition, 2002.

REFERENCE BOOKS:

1. Ernest O Doebelin and Dhanesh N Manik, "Measurement Systems Application Design",TMH, 5th Edition, 2009.
2. Robert A.Witte, "Electronic Test Instruments, Analog and Digital Measurements", Pearson Education, 2nd Ed., 2004.
3. David A. Bell, "Electronic Instrumentation & Measurements", PHI, 2nd Edition, 2003.

Course Outcome	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	1	1	-	-	-	-	-	-	-	-	2	-	-
CO2	3	2	1	1	-	-	-	-	-	-	-	-	2	-	-
CO3	3	2	1	1	-	-	-	-	-	-	-	-	2	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-	2	-	-
AVG	3	2	1	1	-	-	-	-	-	-	-	-	2	-	-
Level of Correlation	3	2	1	1	-	-	-	-	-	-	-	-	2	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. Tech II Semester ECE

Course Code: 20AEC39

COGNITIVE RADIO NETWORKS

(Professional Elective-II)

L	T	P	C
3	0	0	3

Course Outcomes:

After successful completion of course the student will be able to

CO1: Explain design principles on software defined radio and cognitive radio.

CO2: Develop the ability to design and implement algorithms for cognitive radio spectrum sensing and dynamic spectrum access

CO3: Apply the knowledge of advanced features of cognitive radio for real-world applications

UNIT-I INTRODUCTION TO SOFTWARE- DEFINED RADIO AND COGNITIVE RADIO:

Evolution of Software Defined Radio and Cognitive radio: goals, benefits, definitions, architectures, relations with other radios, issues, enabling technologies, radio frequency spectrum and regulations.

UNIT-II COGNITIVE RADIO ARCHITECTURE:

Cognition cycle – orient, plan, decide and act phases, Organization, SDR as a platform for Cognitive Radio – Hardware and Software Architectures, Overview of IEEE 802.22 standard for broadband wireless access in TV bands.

UNIT-III SPECTRUM SENSING AND DYNAMIC SPECTRUM ACCESS:

Introduction – Primary user detection techniques – energy detection, feature detection, matched filtering, cooperative detection and other approaches, Fundamental Tradeoffs in spectrum sensing Spectrum Sharing Models of Fundamental Tradeoffs in spectrum sensing, Spectrum Sharing Models of Dynamic Spectrum Access - Unlicensed and Licensed Spectrum Sharing, Fundamental Limits of Cognitive Radio.

UNIT- IV MAC AND NETWORK LAYER DESIGN FOR COGNITIVE RADIO:

MAC for cognitive radios – Polling, ALOHA, slotted ALOHA, CSMA, CSMA/ CA, Network layer design – routing in cognitive radios, flow control and error control techniques

UNIT -V ADVANCED TOPICS IN COGNITIVE RADIO:

Overview of security issues in cognitive radios, auction-based spectrum markets in cognitive radio networks, public safety and cognitive radio, cognitive radio for Internet ofThings.

TEXT BOOKS:

1. Alexander M. Wyglinski, Maziar Nekovee, Thomas Hou, —Cognitive Radio Communications and Networks, Academic Press, Elsevier, 2010. (Unit Ito IV)

2. Huseyin Arslan (Ed.), —Cognitive Radio, Software Defined Radio, and Adaptive Wireless Systems, Springer, 2007. (Unit V)

REFERENCES:

1. Bruce Fette, —Cognitive Radio Technology, Newnes, 2006.
2. Kwang-Cheng Chen, Ramjee Prasad, — Cognitive Radio Networks, John Wiley and Sons,2009
3. Ezio Biglieri, Professor Andrea J. Goldsmith, Dr LarryJ. Greenstein, Narayan B. Mandayam, H. Vincent Poor, —Principles of Cognitive Radio, Cambridge UniversityPress, 2012

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO 1	3	2	-	-	-	-	-	-	-	-	-	-	2
CO 2	2	-	2	-	1	-	-	-	-	-	-	-	2
CO 3	3	2	-	-	-	-	-	-	-	-	-	-	2
Average	2.66	2	2	-	1	-	-	-	-	-	-	-	2
Level of Correlation	3	2	2	-	1	-	-	-	-	-	-	-	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

II B.Tech I Semester (Common to CSE, IT, CSE (DS) & CSE (AI &ML))
III B.Tech II Semester EEE, ECE (Open Elective-II)

L	T	P	C
3	-	-	3

20ACS08 - RELATIONAL DATABASE MANAGEMENT SYSTEMS

Course Outcomes:
At the end of the course the student will be able to:

1. Demonstrate the basic elements of a relational database management system.
2. Design entity relationship model and convert entity relationship diagrams into RDBMS and formulate SQL queries.
3. Apply the concepts of ER-modelling and normalization to design practical data models
4. Analyze transaction processing, concurrency control and storage methods for database management.

UNIT –I **8 hrs**

Introduction to Databases: Introduction, Characteristics of database approach, Advantages of using the DBMS approach, History of database applications. Overview of Database Languages and Architectures: Data Models, Schemas, and Instances. Three schema architecture and data independence, database languages, and interfaces, The Database System environment. Conceptual Data Modelling using Entities and Relationships: Entity types, Entity sets, attributes, roles, and structural constraints, Weak entity types, ER diagrams, examples, Specialization and Generalization.

UNIT-II **9 hrs**

Relational Model: Relational Model Concepts, Relational Model Constraints and relational database schemas, Update operations, transactions, and dealing with constraint violations. Relational Algebra: Unary and Binary relational operations, additional relational operations (aggregate, grouping, etc.) Examples of Queries in relational algebra. Mapping Conceptual Design into a Logical Design: Relational Database Design using ER-to-Relational mapping. SQL: SQL data definition and data types, specifying constraints in SQL, retrieval queries in SQL, INSERT, DELETE, and UPDATE statements in SQL, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active data bases.

UNIT-III **9 hrs**

SQL: Advances Queries: More complex SQL retrieval queries, Specifying constraints as assertions and action triggers, Views in SQL, Schema change statements in SQL. Schema Refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, FIRST, SECOND, THIRD normal forms, BCNF, lossless join decomposition, multi-valued dependencies, FOURTH normal form, FIFTH normal form.

UNIT-IV **9 hrs**

Normalization Algorithms: Inference Rules, Equivalence, and Minimal Cover, Properties of Relational Decompositions, Algorithms for Relational Database Schema Design, Nulls, Dangling tuples, and alternate Relational Designs, Further discussion of Multivalued dependencies and 4NF, Other dependencies and Normal Forms.

Transactions: Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability, Concurrency: Concurrency control, Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity, Recovery and Atomicity, Log–Based Recovery, Recovery with Concurrent Transactions.

UNIT-V **8 hrs**

Indexing And Hashing: File Organization, Organization of Records in Files, Ordered Indices, B+ Tree Index Files, B,Tree Index Files, Multiple Key Access, Static Hashing, Dynamic Hashing, Comparison of Ordered Indexing and Hashing, Bitmap Indices.

Text Books:

1. Ramez Elmasri and Shamkant B. Navathe, "Fundamentals of Database Systems", 7th Edition, 2017, Pearson.
2. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Fifth Edition, Tata McGraw Hill, 2006.

Reference Books:

1. Ivan Bayross,"SQL, PL/SQL programming language of Oracle", BPB Publications 4th edition, 2010.
2. Raghurama Krishnan, Johannes Gehrke, "Data base Management Systems", TATA McGraw,Hill 3rd Edition,2007.
3. Coronel, Morris, and Rob, Database Principles Fundamentals of Design, Implementation and Management, Cengage Learning 2012.

4. S.K.Singh, “Database Systems Concepts, Design and Applications”, First edition, Pearson Education, 2006.

CO-PO’s Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	--	-	-	-	-	-	-	-	-	-
CO2	3	3	3	2	3		-	-	-	-	-	-	-	-	-
CO3	3	3	3	2	2	-	-	-	-	-	-	-	-	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	3	3	3	2	2.5	-	-	-	-	-	-	-	-	-	-
Level of Correlation	3	3	3	2	3	-	-	-	-	-	-	-	-	-	-

3- High mapping 2-Medium Mapping 1- Low Mapping

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SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

20AEE33 NEURAL NETWORKS AND FUZZY LOGIC

L	T	P	C
3	0	-	3

Course Outcomes:

1. Analyze the basic concepts of neural networks to understand the different learning strategy
2. Apply different training algorithms to analyse the single and multilayer feed forward neural networks
3. Analysis of mathematical concepts and its associative memories
4. Apply the concepts of associative memories for different applications
5. Design a fuzzy network using fuzzification and defuzzification

UNIT – I

Introduction &Essentials to Neural Networks: Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Hodgkin-Huxley Neuron Model, Integrate-and-Fire Neuron Model, Spiking Neuron Model, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Potential Applications of ANN. Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity, Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules, Types of Application

UNIT – II

Single & Multi-Layer Feed Forward Neural Networks: Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, Training Algorithms: Discrete and Continuous Perceptron Networks, Perceptron Convergence theorem, Limitations of the Perceptron Model, Applications. Credit Assignment Problem, Generalized Delta Rule, and Derivation of Back-propagation (BP) Training, Summary of Back-propagation Algorithm, Kolmogorov Theorem, Learning Difficulties, and Improvements.

UNIT - III

Associative Memories – I: Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts of Associative Memory (Associative Matrix, Association Rules, Hamming Distance, The Linear Associator, Matrix Memories, Content Addressable Memory).

UNIT - IV

Associative Memories-II: Bidirectional Associative Memory (BAM) Architecture, BAM Training Algorithms: Storage and Recall Algorithm, BAM Energy Function, Proof of BAM Stability Theorem. Architecture of Hopfield Network: Discrete and Continuous versions, Storage and Recall Algorithm, Stability Analysis, Capacity of the Hopfield Network Summary and Discussion of Instance/Memory Based Learning Algorithms, Applications.

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UNIT – V

Fuzzy Logic Classical & Fuzzy Sets: Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions.

Fuzzy Logic System Components: Fuzzification, Membership value assignment, development of rule base and decision-making system, De-fuzzification to crisp sets, De-fuzzification methods.

TEXT BOOKS:

1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications, Rajasekharan and Pai, PHI.
2. Neural Networks and Fuzzy Logic, C. Naga Bhaskar, G. Vijay Kumar, BS Publications.

REFERENCE BOOKS:

1. Artificial Neural Networks, B. Yegnanarayana, PHI.
2. Artificial Neural Networks, Zaruda, PHI.
3. Neural Networks and Fuzzy Logic System, Bart Kosko, PHI.
4. Neural Networks, James A Freeman and Davis Skapura, Pearson Education.
5. Neural Networks, Simon Hakins, Pearson Education.

Mapping:

Course Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	3	3	--	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	3	--	-	-	-	-	-	-	-	-	-	-
CO3	3	2	3	3	3	-	-	-	-	-	-	-	-	-	-
CO4	3	3	2	3	1	-	-	-	-	-	-	-	-	-	-
CO5	3	2	3	2	1	-	-	-	-	-	-	-	-	-	-
Average	3	2.6	2.8	2.8	1.66	-	-	-	-	-	-	-	-	-	-
Level of Correlation	3	3	3	3	2	-	-	-	-	-	-	-	-	-	-

3-High Mapping　　2- Medium Mapping　　1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

II B.Tech II Semester (CSE (AI&ML))
II B.Tech II Semester (CSE Minor Degree [Industry relevant Track])
III B.Tech II Semester (ECE - Open Elective/ Job Oriented Elective –II)
IV B.Tech I Semester (CE-Open Elective Course / Job Oriented Elective Course – IV)

L	T	P	C
3	0	0	3

20ACM02 - ARTIFICIAL INTELLIGENCE FOR ENGINEERS

Course Outcomes:

After Completion of the course the student will be able to

1. Summarize and formulate appropriate logics and AI methods for problem solving.
2. Apply various searching, game playing, and knowledge representation techniques to solve the real-world problems.
3. Analyze different expert systems and its applications.
4. Explain the concepts of probability theory.

UNIT I: 9 hrs.

Introduction to artificial intelligence: Introduction, history, intelligent systems, foundations of AI, applications, tic-tac-toe game playing, development of AI languages, current trends in AI.

Problem solving: state - space search and control strategies: Introduction, general problem-solving characteristics of problem.

UNIT II: 9 hrs.

Search Strategies: exhaustive searches, heuristic search techniques: A* Algorithm and Hill Climbing, constraint satisfaction.

Problem reduction and game playing: Introduction, problem reduction, game playing, alpha -beta pruning.

UNIT III: 9 hrs.

Logic concepts: Introduction, propositional calculus, proportional logic, natural deduction system, axiomaticsystem, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic.

UNIT IV: 9 hrs.

Knowledge representation: Introduction, approaches to knowledge representation, knowledge Representation using semantic network, extended semantic networks for KR, knowledge representation using frames.

Advanced knowledge representation techniques: Introduction, conceptual dependency theory, script structure, cyc theory.

UNIT V: 9 hrs.

Expert system and applications: Introduction phases in building expert systems, expert system versus traditional systems, rule- based expert systems blackboard systems truth maintenance systems, application of expert systems, list of shells and tools.

Uncertainty measure: probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster- shafer theory, Case Study.

Text Books:

1. Artificial Intelligence by Saroj Kaushik, CENGAGE Learning.
2. Artificial intelligence, A modern Approach, by Stuart Russel and Peter Norvig Second Edition, PEA.
3. Artificial Intelligence by Rich, Kevin Knight, Shiv Shankar B Nair, 3rd edition, TMH.
4. Introduction to Artificial Intelligence by Patterson, PHI.

Reference Books:

1. Artificial intelligence, structures and Strategies for Complex problem solving, -George F Lugar, 5th ed, PEA.
2. Introduction to Artificial Intelligence, Ertel, Wolf Gang, Springer.
3. Artificial Intelligence, A new Synthesis, Nils J Nilsson, Elsevier.

Online Courses:

1. NPTEL Course: Fundamentals of Artificial Intelligence,https://nptel.ac.in/courses/112/103/112103280/
2. NPTEL Course: Introduction to Artificial Intelligence,https://nptel.ac.in/courses/106/102/106102220/

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	3	2.5	1.25	-	-	-	-	-	-	-	-	-	-	-	-
Level of Correlation	3	3	1	-	-	-	-	-	-	-	-	-	-	-	-

3-High Mapping 2-Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. Tech II Semester ECE

Course Code: 20AEC40

CONSUMER ELECTRONICS (OE/JOE-II)

L	T	P	C
3	0	0	3

Course Outcomes:

After successful completion of course the student will be able to

CO1: Explain electronics engineering concepts used in consumer electronics systems.

CO2: Analyze different electronic appliances and their power supplies

CO3: Acquire knowledge on various product safety, compliance standards

UNIT- I AUDIO SYSTEM:

Microphones, loudspeakers baffle and enclosure, Acoustics, mono, stereo, Quad, Amplifying System, Equalizers and Mixers Synthesizers, Commercial Sound, Theatre Sound System.

UNIT- II VIDEO SYSTEMS AND DISPLAYS:

Monochrome, Color TV standards, TFT, Plasma, HDTV, LCD, LED TV, Direct-To Home (DTH- Set Top Box), Video Telephone and Video Conferencing.

UNIT- III DOMESTIC & CONSUMER APPLIANCES:

Washing machines, Microwave ovens, Air-conditioners and Refrigerators, Computers office System, Telephone & Mobile Radio System

UNIT- IV POWER SUPPLIES

SMPS/UPS and Preventive Maintenance and others systems such as Remote controls, Bar codes, RFID Product

UNIT- V COMPLIANCE

Product safety and liability issues; standards related to electrical safety and fire hazards, EMI/EMC requirements, design techniques for ESD, RF interference and immunity, line current harmonics and mains voltage surge.

TEXT BOOKS:

1. Consumer Electronics; SP Bali; PearsonEducation.
2. Television and video Engineering; Dhake. A.M, McGraw-Hill, New Delhi, India 2006. ISBN: 0-07-460105-9.

REFERENCES:

1. Audio video systems principles, maintenance and troubleshooting; Gupta.R. G, Mc graw Hill, New Delhi, India 2010, ISBN: 9780070699762.

2. Modern Television Practice: Transmission, Reception and Applications; Gulati.R. R, New Age International, New Delhi Year 2015. ISBN: 978-81-224-3784-3.

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	3	3	3	2	3	-	-	-	-	-	-	-	2	-	-
CO2	3	3	3	3	3	-	-	-	-	-	-	-	2	-	-
CO3	3	3	3	2	3	-	-	-	-	-	-	-	-	-	-
Average	3	3	3	2.33	3	-	-	-	-	-	-	-	2	-	-
Level of Correlation	3	3	3	2	3	-	-	-	-	-	-	-	2	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B. Tech II Semester
Course Code: 20AEC41

RF INTEGRATED CIRCUITS
(OE/JOE-II)

L	T	P	C
3	-	-	3

Course Outcomes:

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

CO1: Understand the concepts of RF IC Design and High Frequency model of MOS and importance of Impedance Matching.

CO2: Classify and comprehend the design of Power Amplifiers.

CO3: Realize VCOs and Frequency synthesizers and their applications to transceiver design.

CO4: Analyze the various transceiver and radio architectures.

UNIT- I Introduction to RF Systems:
RF systems – basic architectures, Transmission media and reflections, Maximum power transfer, Passive RLC Networks, Parallel RLC tank, Q, Series RLC networks, matching, Pi match, T match, Passive IC Components, Interconnects and skin effect, Resistors, capacitors, Inductors, Review of MOS Device Physics, MOS device review

UNIT-II High Frequency Model of RF Transistors and Matching Networks: Distributed Systems, Transmission lines, reflection coefficient, The wave equation, examples, Lossy transmission lines, Smith charts – plotting gamma, High Frequency Amplifier Design, Bandwidth estimation using open-circuit time constants, Bandwidth estimation using short-circuit time constants, Risetime, delay and bandwidth, Zeros to enhance bandwidth, Shunt-series amplifiers, tuned amplifiers, Cascaded amplifiers, Noise, Thermal noise, flicker noise review, Noise figure, LNA Design, Intrinsic MOS noise parameters, Power match versus noise match, Large signal performance, design examples & Multiplier based mixers

UNIT-III RF Power Amplifiers

RF Power Amplifiers, Class A, AB, B, C amplifiers, Class D, E, F amplifiers, RF Power amplifier design examples.

UNIT-IV Voltage controlled oscillators and Frequency Synthesizers:

Voltage controlled oscillators, Resonators, Negative resistance oscillators, Phase locked loops, Linearized PLL models, Phase detectors, charge pumps, Loop filters, PLL design examples, Frequency synthesis and oscillators, Frequency division, integer-N synthesis, Fractional frequency synthesis, Phase noise.

UNIT-V Radio Architectures:

GSM radio architectures, CDMA, UMTS radio architectures.

Text Books

1. B. Razavi, RF Microelectronics, Pearson Education Limited, Second Edition, 2013.
2. Hooman Darabi, Radio-Frequency Integrated Circuits and Systems, Cambridge University Press, First Edition, 2015.

Reference Books

1. Gu, Qizheng, RF System Design of Transceivers for Wireless Communications, Springer, 2010.
2. Bosco Leung, VLSI for Wireless Communication, Springer, Second Edition, 2011.

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	3	2	-	-	2	-	-	-	-	-	-	-	-	-	-
CO3	2	-	2	-	-	-	-	-	-	-	-	-	2	-	-
CO4	2	-	2	-	2	-	-	-	-	-	-	-	2	-	-
Average	2.25	2.5	2	-	2	-	-	-	-	-	-	-	2	-	-
Level of Correlation	2	3	2	-	2	-	-	-	-	-	-	-	2	-	-

SRIVENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B. Tech II Semester ECE

Course Code: 20AEC42

DIGITAL SIGNAL PROCESSING LAB

L	T	P	C
0	0	3	1.5

Course Outcomes:

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

CO1: Apply Fourier Transform to analyze discrete time system and signals.

CO2: Analyze Frequency response Characteristics of Analog and digital filters.

CO3: Implement basic signal processing algorithms like convolution, correlation, DFT, FFT with TMS320C6713 floating point Processor.

CO4: Design DSP based real time processing systems to meet desired needs of the society

LIST OF EXPERIMENTS

Minimum of 6 experiments are to be conducted from each part

Part A (Experiments using MATLAB)

1. Generation of different time sequences.
2. Linear and Circular Convolutions using DFT.
3. Spectrum analysis using DFT.
4. To find Frequency Response of a given System.
5. Magnitude and Phase response of FIR Low Pass Filter using different window techniques.
6. Magnitude and Phase response of Butterworth and Chebyshev Low Pass and High Pass filters
7. Interpolation and Decimation of a sequence.

Part B **(Experiments using CCS)**

8. Generation of a sinusoidal signal.
9. Linear Convolution of discrete time sequences
10. Circular Convolution of discrete time sequences.

11. Implementation of FFT of given Sequence.
12. Auto Correlation and Cross Correlation.
13. Determination of Power Spectrum of a given Signal.
14. Implementation of FIR Filter.
15. Implementation of IIR Filter.

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	2	2	-	-	-	-	-	-	-	-	3	-
CO2	3	3	3	3	3	-	-	-	-	-	-	-	-	3	-
CO3	3	3	3	3	3	-	-	-	-	-	-	-	-	-	3
CO4	3	3	3	3	3	-	-	-	-	-	-	-	-	-	3
Average	3	3	2.5	2.75	2.75	-	-	-	-	-	-	-	-	3	3
Level of correlation	3	3	3	3	3	-	-	-	-	-	-	-	-	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B.Tech II Semester
Course Code: 20AEC43

MICROWAVE LAB

L	T	P	C
0	0	3	1.5

Course Outcomes:

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

CO1: Analyze the practical behavior of different microwave components

CO2: Test the various parameters of microwave communications

LIST OF EXPERIMENTS

Minimum Ten Experiments to be conducted

1. Study of Microwave Components and Instruments
2. Reflex Klystron Characteristics.
3. Gunn Diode Characteristics.
4. Attenuation Measurement.
5. Directional Coupler Characteristics.
6. VSWR Measurement.
7. Impedance Measurement of given load.
8. Unknown Impedance Measurement using Smith Chart
9. Waveguide parameters measurement.
10. Circulator characteristics.
11. Scattering parameters of Magic Tee.

Course Outcome	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PSO3
CO1	1	1	-	3	-	-	-	-	-	-	-	-	2	-	-
CO2	1	1	-	3	-	-	-	-	-	-	-	-	-	-	2
Average	1	1	-	2	-	-	-	-	-	-	-	-	2	-	2
Level of correlation	1	1	-	2	-	-	-	-	-	-	-	-	2	-	2

SRIVENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. Tech II Semester ECE

Course Code: 20AEC44

VLSI LAB

L	T	P	C
0	0	3	1.5

Course Outcomes:

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

CO1: Design and Simulate Various Combinational Circuits.

CO2: Design and Simulate Various Sequential Circuits.

List of Experiments

(Minimum 10 Experiments to be conducted)

1. Design of logic Gates: AND, OR, NOT, NAND, NOR, XOR, XNOR.
2. Design of half adder & half subtractor
3. Design of full adder & full subtractor
4. Designof8-bit Carry select adders.
5. Designof8x1 Multiplexer
6. Design of1X8 Demultiplexer.
7. Design of Array Multiplier.
8. Designof2-bit Comparator.
9. Design of3 to 8 Decoder.
10. Design of binary to gray code converter.
11. Design of Flip-Flops (SR Flip-Flop, DFlip-Flop, JKFlip-Flop, T-Flip-Flop)
12. Design of 4-bit Shift registers.
13. Design of Ripple counter.
14. Design of ALU.

Note: Required software tools

i) Model Sim-Simulation

ii) Xilinx -Synthesis

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	-	-	3	-
CO2	3	3	3	3	-	-	-	-	-	-	-	-	-	3	-
Average	3	3	3	3	-	-	-	-	-	-	-	-	-	3	-
Level of correlation	3	3	3	3	-	-	-	-	-	-	-	-	-	3	-

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

III B. Tech I Semester (EEE, CSE, IT, CSE (DS) & CSE (AI & ML))
III B. Tech II Semester (CE, ME, ECE, CAI, CSC & CSO)

L	T	P	C
1	0	2	2

20AHS16 ADVANCED ENGLISH COMMUNICATION SKILLS

Course Outcomes:

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

1. Understand language fluency through conversational practices and demonstrate appropriate body language during communication.
2. Apply synonyms, antonyms, one-word substitutes, prefixes and suffixes to develop vocabulary to comprehend oral and written communication.
3. Analyze reading and writing techniques in preparing letters, resumes and technical reports by examining and applying guessing meaning, scanning, skimming and interfering meaning.
4. Demonstrate ability to function effectively as an individual and as a member in diverse teams examining and applying skills in Oral presentations, Interviews and Group Discussions.

UNIT-I **9 Hours**

INTER-PERSONAL COMMUNICATION AND BUILDING VOCABULARY: Starting a conversation, Responding appropriately and relevantly, Using appropriate Body language, Role play in Different situations, Synonyms and antonyms, One-word substitutes, Prefixes and suffixes, Idioms & Phrases and Collocations.

UNIT-II **9 Hours**

READING COMPREHENSION: General vs. Local Comprehension, Reading for Facts, Guessing meanings from Context, Skimming, Scanning and inferring meaning.

UNIT-III **9 Hours**

WRITING SKILLS: Structures and Presentation of different types of writing – Letter writing, Resume writing, e-correspondence and Technical report writing.

UNIT-IV **9 Hours**

PRESENTATION SKILLS: Oral Presentations (individual or group) through JAM Sessions/Seminars/PPTs and Written Presentations through Posters/Projects/Reports/e-mails/Assignments, etc

UNIT-V **9 Hours**

GROUP DISCUSSION AND INTERVIEW SKILLS: Dynamics of Group discussion, Intervention, Summarizing, Modulation of voice, Body Language, Relevance, Fluency and organization of ideas and rubrics of evaluation, Concept and Process of interviews, Pre-interview planning, opening strategies, Answering Strategies, Interview through Tele-conference & Video-conference and Mock Interviews.

Suggested Software:

- Sky Pronunciation
- Pro-power 2
- Globarena Software

References:

1. Kumar Sanjay, Pushpa Lata. English for Effective Communication,Oxford University Press, 2015.
2. Konar Nira**,** English Language Laboratories – A Comprehensive Manual,PHI Learning Pvt. Ltd., 2011.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	2	-	-	-	3	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	3	-	-	-	-	-
CO3	2	2	-	-	-	-	-	-	-	3	-	-	-	-	-
CO4	2	-	-	-	-	-	-	-	3	3					
Average	2.25	2.5	-	-	-	2	-	-	3	3	-	-	-	-	-
Level of Correlation	2	3	-	-	-	2	-	-	3	3	-	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

III B. Tech II Semester (Common to all Branches) **L T P C**
2 0 0 0

20AHS23 ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

Course Outcomes:

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

1. Identify various aspects of Traditional knowledge and its importance.
2. Explain briefly to understand the needs and importance of protecting traditional knowledge.
3. Analyze the various systems, concepts and strategies of traditional knowledge.
4. Apply the concepts of traditional knowledge in different sectors.

UNIT-I **5 Hours**

INTRODUCTION TO TRADITIONAL KNOWLEDGE: Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, Indigenous Knowledge (IK), characteristics, traditional knowledge vis-a- vis indigenous knowledge, traditional knowledge Vs western knowledge.

UNIT-II **5 Hours**

PROTECTION OF TRADITIONAL KNOWLEDGE: The need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.

UNIT-III **6 Hours**

LEGAL FRAMEWORK AND TRADITIONAL KNOWLEDGE: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act); The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016.

UNIT-IV **6 Hours**

TRADITIONAL KNOWLEDGE AND INTELLECTUAL PROPERTY: Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge.

UNIT-V **6 Hours**

TRADITIONAL KNOWLEDGE IN DIFFERENT SECTORS: Traditional knowledge and engineering, Traditional medicine system, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK.

Text Book:

1. Traditional Knowledge System in India, by Amit Jha, 2009.

Reference Books:

1. Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002.
2. "Knowledge Traditions and Practices of India" Kapil Kapoor1, Michel Danino2.

Web Links:

1. https://www.youtube.com/watch?v=LZP1StpYEPM
2. http://nptel.ac.in/courses/121106003/

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	3	3	-	-	-	-	-	-	-	-
CO2	2	-	-	-	-	3	3	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	3	3	-	-	-	-	-	-	-	-
CO4	3	-	-	-	-	3	3	-	-	-	-	-	-	-	-
Average	2.67	-	-	-	-	3	3	-	-	-	-	-	-	-	-
Level of Correlation	3	-	-	-	-	3	3	-	-	-	-	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B. Tech I Semester ECE

Course Code: 20AEC46

CELLULAR AND MOBILE COMMUNICATION

Professional Elective-III

L	T	P	C
3	0	0	3

Course Outcomes:

After successful completion of course the student will be able to

CO1: Define basic concepts of cellular mobile radio systems and their elements.

CO2: Explain Co-channel and Non-Co-channel interferences.

CO3: Define concepts of cell coverage for signal and traffic.

CO4: Analyze frequency management, channel assignment, handoffs and dropped calls

UNIT-I CELLULAR MOBILE RADIO SYSTEMS:

Introduction to Cellular Mobile system, performance criteria, uniqueness of mobile radio environment, operation of cellular systems, Hexagonal shaped cells, Analog and Digital Cellular systems.

ELEMENTS OF CELLULAR RADIO SYSTEM DESIGN:

General description of the problem, concept of frequency reuse channels, Co-channel Interference Reduction Factor, desired C/I from a normal case in a Omni directional Antenna system, Cell splitting, consideration of the components of cellular system.

UNIT- II INTERFERENCE:

Introduction to Co-channel interference, real time co-channel interference, Co-channel measurement, design of Antenna system, Antenna parameters and their effects, diversity receiver, non-co-channel interference-different types. Non-Co-Channel Interference: Adjacent Channel Interference, Near End Far End Interference, Cross Talk, Effects on Coverage and Interference by

Power Decrease, Antenna Height Decrease, Effects of Cell Site Components.

UNIT- III 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 antenna height gain, form of a point-to-point model.

UNIT- IV FREQUENCY MANAGEMENT AND CHANNEL ASSIGNMENT:

Numbering and grouping, setup access and paging channels channel assignments to cell sites and mobile units, channel sharing and borrowing, sectorization, overlaid cells, non-fixed channel assignment.

UNIT- V HANDOFF AND DROPPED CALLS:

Handoff Initiation, Types of Handoffs, Delaying Handoff, Advantages of Handoff, Power Difference Handoff, Forced Handoff, Mobile Assisted and Soft Handoff, Intersystem Handoff, Introduction to Dropped Call Rates and their Evaluation.

TEXT BOOKS:

1. W.C. Y. Lee, Mobile Cellular Telecommunications, Tata Mc-Graw Hill, 2nd Edition, 2006.
2. Theodore. S. Rappaport, Wireless Communications, Pearson Education, 2nd Edition, 2002.
3. JonW.Mark and Weihua Zhqung, Wireless communications and Networking, PHI, 2005.

REFERENCE BOOKS:

1. Gordon L. Stuber, Principles of Mobile communications, Springer International 2nd Edition, 2007.
2. R.Blake, Wireless Communication Technology, Thompson Asia Pvt. Ltd., 2004.

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	2	-	-	-	-	-	-	-	-	-	-	3
CO2	3	3	3	3	-	1	1	-	-	-	-	-	-	-	3
CO3	3	3	1	1	-	-	-	-	-	-	-	-	-	-	-
CO4	3	1	3	2	-	-	-	-	-	-	-	-	-	-	-
Average	3	2.25	2.5	2	-	1	1	-	-	-	-	-	-	-	3
Level of correlation	3	2	3	2	-	1	1	-	-	-	-	-	-	-	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B. Tech I Semester ECE

Course Code: 20AEC47 TRANSDUCER ENGINEERING

Professional Elective-III

L	T	P	C
3	0	0	3

Course Outcomes:

After successful completion of course the student will be able to

CO1: Perform transducer measurements and their performance characteristics

CO2: Explain about various transducers such as resistance, Inductance and capacitance.

CO3: Define the properties and application of MEMS and Nano Sensors.

UNIT-I SCIENCE OFMEASUREMENTS AND CLASSIFICATION OF TRANSDUCERS

Units and standards – Calibration methods – Static calibration – Classification of errors: - Limiting error and probable error – Error analysis: – Statistical methods – Odds and uncertainty– Classification of transducers – Selection of transducers.

UNIT-II CHARACTERISTICS OF TRANSDUCERS

Static characteristics: – Accuracy, precision, resolution, sensitivity, linearity, span and range -Dynamic characteristics: – Mathematical model of transducer – Zero, I and II order transducers – Response to impulse, step, ramp and sinusoidal inputs.

UNIT-III VARIABLE RESISTANCE TRANSDUCERS

Principle of operation, construction details, characteristics and applications of potentiometer, strain gauge, resistance thermometer, Thermistor, hot-wire anemometer, piezo resistive sensor and humidity sensor

UNIT- IV VARIABLE INDUCTANCE AND VARIABLE CAPACITANCE TRANSDUCERS

Induction potentiometer – Variable reluctance transducers – EI pick up – Principle of operation, construction details, characteristics and applications of LVDT –Capacitive transducer and types – Capacitor microphone – Frequency response.

UNIT-V OTHER TRANSDUCERS

Piezoelectric transducer – Hall Effect transducer – Magneto elastic sensor- Digital transducers -Smart sensors – Fibre optic sensors- Thin Film sensors-Introduction to MEMS and Nano sensors

TEXTBOOKS:

1. Neubert H.K.P., Instrument Transducers – An Introduction to their Performance and Design, Oxford University Press, Cambridge, 2003
2. Murthy, D.V.S., Transducers and Instrumentation, 2nd Edition, Prentice Hall of India Pvt. Ltd., New Delhi, 2010.

REFERENCE BOOKS:

1.S. Vijaya Chaitra Transducer Engineering- PHI Learning Private Limited-Delhi, 2016

2.D. Patranabis, Sensors and Transducers, 2nd edition, Prentice Hall of India, 2010. E.A.

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	3	-	-	-	-	-	-	-	-	2	-	-
CO2	3	3	2	3	-	-	-	-	-	-	-	-	2	-	-
CO3	3	3	2	2	-	-	-	-	-	-	-	-	2	-	-
Average	3	3	2	2.66	-	-	-	-	-	-	-	-	2	-	-
Level of Correlation	3	3	2	3	-	-	-	-	-	-	-	-	2	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B. Tech I Semester ECE

Course Code: 20AEC48 DATA COMMUNICATION NETWORKS

Professional Elective-III

L	T	P	C
3	0	0	3

Course Outcomes:

After successful completion of course the student will be able to

CO1: Explain various components and topologies of computer networks

CO2: Apply the network reference model layered structure for real time applications.

CO3: Apply various routing protocols for different layers.

CO4: Design, and test different routing algorithms.

CO5: Analyse network security mechanics and other issues in the application layer.

UNIT-I

Introduction: Uses of Computer Networks, Network Hardware, Network Topologies, Network Software, References Models. Examples of Networks: Internet, ARPANET, Third Generation Mobile Phone Networks.

The Data Link Layer: Data link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols and Sliding Window Protocols.

UNIT-II

The Medium Access Control Sub layer: The Channel allocation Problem, Multiple Access Protocols, Ethernet- Ethernet Cabling, The Ethernet MAC Sub layer Protocol. The Binary Exponential Back off Algorithm, Ethernet Performance, Wireless LANs- the 802.11 Protocol Stack, The 802.11 Physical Layer, The 802.11 MAC Sub layer Protocol, The 802.11 Frame Structure, Broad Band Wireless.

UNIT-III

The Network Layer: Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, Inter networking, the Network Layer in the Internet.

UNIT-IV

The Network Layer: Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, Inter networking, the Network Layer in the Internet.

UNIT-V

The Application Layer: DNS-The Domain Name System, Electronic Mail. The World Wide web, Network Security: Cryptography, Symmetric-Key Algorithms, Public-Key Algorithms.

TEXTBOOKS:

1. Computer Networks, Fifth Edition, Andrew S. Tanenbaum, David J Wetherall Pearson Education, 2011.
2. Data Communications and Networking, Fifth Edition, Behrouz A. Forouzan Tata McGraw Hill.

REFERENCEBOOKS:

1. Computer Communications and Networking Technologies, Michael A. Gallo, William M. Hancock, Cengage Learning.
2. Computer Networking: A Top-Down Approach Featuring the Internet, Six Edition, James F. Kurose, K.W.Ross, PearsonEducation,2013.

Course Outcome	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	-	-	2
CO5	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	3	3	-	-	-	-	-	-	-	-	-	-	-	-	2
Level of correlation	3	3	-	-	-	-	-	-	-	-	-	-	-	-	2

.

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

IV B. Tech I Semester ECE

Course code: 20AEC49 **ADHOC NETWORKS**

Professional Elective-III

L	T	P	C
3	0	0	3

Course Outcomes:

After successful completion of course the student will be able to

CO1: Explain basic concepts of ad hoc networks.

CO2: Define and use protocols used at the MAC layer and scheduling mechanisms.

CO3: Analyze various types of protocols and routing mechanism.

UNIT- I Introduction to Adhoc Networks

Adhoc wireless networks and MAC Protocol Adhoc Wireless Networks Introduction, Issues in Adhoc Wireless Networks, Adhoc Wireless Internet; Cellular and Adhoc wireless networks, Applications, Issues in Adhoc wireless networks.

UNIT- II MAC Protocol

MAC Protocols for Ad-hoc wireless networks: MAC Protocols for Ad-hoc Wireless Networks: Introduction, Issues in Designing a MAC Protocol, Design Goals of MAC Protocols, Classification of MAC protocols, Contention-Based Protocols, Contention-Based Protocols with Reservation Mechanisms, Contention-Based Protocols with Scheduling Mechanism

UNIT- III Routing Protocols

Introduction, Issues in designing a routing protocol for ad hoc wireless networks, Classification of routing protocols, Table driven protocols :-DSDV, WRP, CGSR; On-Demand Hybrid routing protocols:-DSR, AODV, LAR, ABR, SSA, ZRP, ZHLS

UNIT- IV Multicast Routing for Ad hoc wireless networks

Introduction, Issues in designing a multicast routing protocol, Operation of multicast routing protocols, An architecture reference model for multicast routing protocols, Classification of multicast routing protocols, Tree-based Multicast Routing Protocols:-BEMR, MZRP, MAODV ; Mesh-based multicast routing protocols:-NSMP, CAMP

UNIT- V Transport Layer and Security Protocols for Ad-hoc Networks

Introduction, Issues in Designing a Transport Layer Protocol; Design Goals of a Transport Layer Protocol TCP over adhoc wireless networks:-TCP-F, Adhoc TCP, Split TCP; Security in ad hoc wireless networks: Network security requirements, Issues and challenges in security provisioning, Network security attacks, Secure routing protocol- SAR, Security- Aware AODV Protocol.

TEXT BOOKS:

1. C. Siva Ram Murthy& B. S. Manoj: Ad-hoc Wireless Networks, 2nd Edition, Pearson Education, 2011
2. Sarkar, Basavaraju and Puttamadappa, “Ad Hoc Mobile Wireless Networks: Principles, Protocols, and Applications”, Auerbach Publications.

REFERENCES BOOKS:

1. C.K. Toh: Ad-hoc Mobile Wireless Networks -Protocols and Systems, Pearson Education, 2002
2. Ozan K. Tonguz and Gianguigi Ferrari: Ad-hoc Wireless Networks, John Wiley, 2007.

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	-	-	-	-	-	-	-	-	-	-	-	-	2
CO2	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	2	-	-	-	-	-	-	-	-	-	-	-	-	2
Average	1.66	1.66	-	-	-	-	-	-	-	-	-	-	-	-	2
Level of correlation	2	2	-	-	-	-	-	-	-	-	-	-	-	-	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B. Tech I Semester ECE

Course Code: 20AEC50 ADVANCED MICROPROCESSORS

Professional Elective-III

L	T	P	C
3	0	0	3

Course Outcomes:

After successful completion of course the student will be able to

CO1: Define Pentium and ARM architecture

CO2: Analyze various interrupt handling schemes and memory management of ARM

CO3: Explain the properties of Motorola & PIC microcontrollers

UNIT- I HIGH PERFORMANCECISC ARCHITECTURE–PENTIUM

CPU Architecture – Bus Operations – Pipelining – Brach predication–floating point unit - Operating Modes – Paging – Multitasking – Exception and Interrupts – Instruction set–addressing modes – Programming the Pentium processor.

UNIT- II HIGH PERFORMANCE RISC ARCHITECTURE–ARM

Arcon RISC Machine – Architectural Inheritance – Core & Architectures – Registers – Pipeline – Interrupts – ARM organization – ARM processor family – Co-processors – ARM instruction set-Thumb Instruction set – Instruction cycle timings – The ARM Programmer's model – ARM Development tools – ARM Assembly Language Programming – C programming – Optimizing ARM Assembly Code –Optimized Primitives

UNIT- III ARM APPLICATIONS

Introductionto DSP on ARM – FIR filter – IIR filter – Discrete fourier transform– Exception handling – Interrupts – Interrupt handling schemes – Firmware and boot loader – Embedded Operating systems – Integrated Development Environment – STDIO Libraries – Peripheral Interface – Application of ARM

Processor - Caches –Memoryprotection Units – Memory Management units – Future ARM Technologies.

UNIT- IV MOTOROLA 68HC11 MICROCONTROLLERS

Instruction set addressing modes – operating modes – Interrupt system - RTC-Serial Communication Interface – A/D Converter PWM and UART.

UNIT- V PIC MICROCONTROLLER

CPU Architecture – Instruction set – interrupts – Timers - I2C Interfacing – UART - A/D Converter – PWM and introduction to C - Compilers.

TEXT BOOK:

1. Andrew N.Sloss, Dominic Symes and Chris Wright "ARM System Developer's Guide: Designing and Optimizing SystemSoftware", First edition, Morgan Kaufmann Publishers,2004.
2. JamesL.Antonakos, "The Pentium Microprocessor", Pearson Education,1997

REFERENCE BOOKS:

1. Steve Furber, "ARM System–On–Chip architecture", AddisonWesley,2000.
2. Daniel Tabak, "Advanced Microprocessors", McGraw Hill.Inc.,1995

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	-	-	-	-	-	-	-	2	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	-	2	-	-
CO3	3	3	3	3	3	-	-	-	-	-	-	-	2	-	-
Average	3	3	3	3	3	-	-	-	-	-	-	-	2	-	-
Level of Correlation	3	3	3	3	3	-	-	-	-	-	-	-	2	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B. Tech I Semester ECE (Professional Elective-IV)

IV B. Tech I Semester CSE, IT, CSE (DS), CSE (AI & ML) (Open Elective-IV)

Course Code:20AEC51

DIGITAL IMAGE PROCESSING

L	T	P	C
3	0	0	3

Course Outcomes:

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

CO1: Explain fundamentals of Digital Image Processing

CO2: Analyze image transforms and enhancement

CO3: Apply various Image processing techniques for image Recognition

UNIT-I FUNDAMENTALS OF DIGITAL IMAGE PROCESSING

Introduction, Image Digitization, Pixel Relationships, Basic Transformations, Camera Model and Imaging Geometry, Camera Calibration and Stereo Imaging, Interpolation and Re sampling

UNIT-II IMAGE TRANSFORMS

Image Transformation, Fourier Transformation, Discrete Cosine Transform, K-L Transform

UNIT-III IMAGE ENHANCEMENT

Image Enhancement, Image Enhancement in Frequency Domain, Image Restoration, Colour Image Processing

UNIT-IV IMAGE SEGMENTATION & MORPHOLOGY

Image Segmentation, Detection of discontinuities, edge detecting and boundary detection, thresholding, reason-based segmentation, Mathematical Morphology, preliminaries, dilation and erosion, opening and closing, the Hit-or-Miss, transformation, some basic morphological algorithms.

UNIT-V OBJECT REPRESENTATION & RECOGNITION

Representation, bounded descriptors, regional descriptors, use of principle components for description, relational descriptors. Object Recognition, patterns and pattern classes, recognition based on decision-theoretic methods, structural methods.

TEXT BOOKS:

1. R. C .Gonzalez & R.E. Woods, “Digital Image Processing”, Addison Wesley/Pearson education, 3rd Edition, 2010.
2. A.K. Jain, “Fundamentals ofDigital Image processing”, PHI.

REFERENCE BOOKS:

1. RafaelC. Gonzalez, Richard E woods and Steven L.Eddins, “Digital Image processing using MATLAB”, Tata McGraw Hill, 2010.
2. S Jayaraman, S Esakkirajan, T Veerakumar, “Digital Image processing”,Tata McGraw Hill. 2010.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	1	-	-	-	-	-	-	-	-	-	-	-	2
CO 2	2	1	2	2	-	-	-	-	-	-	-	-	-	-	2
CO 3	3	1	-	-	-	-	-	-	-	-	-	-	-	-	2
Average	2.6	1.33	1.5	2	-	-	-	-	-	-	-	-	-	-	2
Level of Correlation	3	1	2	2	-	-	-	-	-	-	-	-	-	-	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B. Tech I Semester ECE

Course code: 20AEC52 **ANALOG IC DESIGN**

Professional Elective-IV

L	T	P	C
3	0	0	3

Course Outcomes:

After successful completion of course the student will be able to

CO1: Apply different Interpolating, Folding and pipelining techniques.

CO2: Design different Sample and Hold Switched Capacitor Circuits.

CO3: Analyze the various CMOS, operational amplifiers.

CO4: Demonstrate operation of Oversampling Converters and Filters.

UNIT- IMOS TRANSISTORS, MODELLING AND CURRENT MIRROR:

MOS Transistors- Modeling in Linear and Saturation Regions, Advanced MOS Modeling, Simple CMOS Current Mirror, Common-Source Amplifier, Source-Follower or Common-Drain Amplifier, Common-Gate Amplifier, Source-Degenerated Current Mirrors, Cascade Current Mirrors and Cascade Gain Stage.

UNIT-II OPERATIONAL AMPLIFIER DESIGN, COMPENSATION AND COMPARATORS:

Two-Stage CMOS Opamp, Opamp Compensation, Advanced Current Mirrors, Folded-Cascade Opamp, Current Mirror Opamp, Fully Differential Opamps, Common-Mode Feedback Circuits. Comparator Specifications, Charge-Injection Errors, Latched Comparators and Examples of CMOS and Bi-CMOS Comparators.

UNIT- III SAMPLE AND HOLDS AND SWITCHED CAPACITOR CIRCUITS:

Performance of Sample-and-Hold Circuits, MOS Sample-and-Hold Basics, Examples of CMOS S/H Circuits, Bipolar and Bi-CMOS Sample and Holds. Switched Capacitor Circuits: Basic Building Blocks, Basic Operation and Analysis, Noise in Switched-Capacitor Circuits, First-Order Filters, Biquad Filters, Charge Injection and Switched- Capacitor Gain Circuits.

UNIT- IV DATA CONVERTERS:

Quantization Noise, Signed Codes, Decoder-Based D/A Converters, Binary-Scaled D/A Converters, Thermometer-Code D/A Converters and Hybrid D/A Converters Successive-Approximation A/D Converters, Algorithmic (or Cyclic) A/D Converter, Pipelined A/D Converters, Flash Converters, Two-Step A/D Converters, Interpolating A/D Converters and Folding A/D Converters.

UNIT- V OVERSAMPLING CONVERTERS AND FILTERS:

Over sampling without Noise Shaping, Oversampling with Noise Shaping, System Architectures, Digital Decimation Filters, Higher-Order Modulators, Band pass Oversampling Converters and Practical Considerations.

TEXT BOOKS:

1. Tony Chan Carusone, David A. Johns & Ken Martin, "Analog Integrated Circuit Design", 2nd Edition, John Wiley, 2012.
2. Behzad Razavi, "Designof Analog CMOS Integrated Circuit" Tata-Mc GrawHill,2006.

REFERENCES:

1. Philip Allen & Douglas Holberg, "CMOS Analog Circuit Design", Oxford University Press, 2006.
2. Gregolian &Temes, "Analog MOS Integrated Circuits", John Wiley, 2004.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	3	3	3	2	3	-	-	-	-	-	-	-	-	-
CO 2	3	3	3	3	2	3	-	-	-	-	-	-	3	-	-
CO 3	3	3	3	2	2	3	-	-	-	-	-	-	3	-	-
CO 4	3	3	3	3	2	3							2		
Average	3	3	3	2.75	2	3	-	-	-	-	-	-	2.66	-	-
Level of Correlation	3	3	3	3	2	3	-	-	-	-	-	-	3	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B. Tech I Semester ECE
Course Code: 20AEC53

SEMICONDUCTOR TESTING

(Professional Elective-IV)

L	T	P	C
3	0	0	3

Course Outcomes:

After successful completion of course the student will be able to

CO1: Define different types of memories.

CO2: Design various fault models for memory testing.

CO3: Design reliable memories with efficient architecture

CO4: Apply different advanced memory technologies

UNIT-I RANDOM ACCESS MEMORY TECHNOLOGIES:

SRAM – SRAM Cell structures, MOS SRAM Architecture, MOS SRAM cell and peripheral circuit operation, Bipolar SRAM technologies, SOI technology, Advanced SRAM architectures and technologies, Application specific SRAMs, DRAM – DRAM technology development, CMOS DRAM.

UNIT-II NON-VOLATILE MEMORIES:

Masked ROMs, High density ROM, PROM, Bipolar ROM, CMOS PROMS, EPROM, Floating gate EPROM cell, One-time programmable EPROM, EEPROM, EEPROM technology and architecture, Non-volatile SRAM, Flash Memories (EPROM or EEPROM)

UNIT-IIIMEMORY FAULTMODELING TESTING:

RAM fault modeling, Electrical testing, Pseudo Random testing, Megabit DRAM Testing, non-volatile memory modeling and testing, IDDQ fault modeling and testing, Application specific memory testing, RAM fault modeling, BIST techniques for memory.

UNIT-IV SEMICONDUCTOR MEMORY RELIABILITY AND RADIATION EFFECTS:

General reliability issues - RAM failure modes and mechanism, Non-volatile memory reliability, reliability modeling and failure rate prediction, Design for Reliability, Reliability Test Structures, Reliability Screening and qualification, Radiation effects, Single Event Phenomenon (SEP), Radiation Hardening techniques, Radiation Hardening Process and Design Issues, Radiation Hardened Memory characteristics, Radiation Hardness Assurance and Testing, Radiation Dosimetry, Water Level Radiation Testing and Test structures

UNIT- V ADVANCED MEMORY TECHNOLOGIES:

Ferroelectric RAMs (FRAMs), GaAs FRAMs, Analog memories, magneto resistive RAMs (MRAMs), Experimental memory devices, Memory Hybrids and MCMs (2D), Memory Stacks and MCMs (3D), Memory MCM testing and reliability issues, Memory cards.

TEXT BOOKS:

1. Semiconductor Memories Technology– Ashok K. Sharma, 2002, Wiley
2. Advanced Semiconductor Memories – Architecture, Design and Applications - Ashok K. Sharma- 2002, Wiley

REFERENCE BOOKS:

1. Modern Semiconductor Devices for Integrated Circuits – Chenming C Hu, 1st Ed., Pearson, 2009.
2. M. Burns and G. W. Roberts, An Introduction to Mixed-Signal IC Test and measurement, Oxford University, Press, 2000.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	3	3	-	3	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	-	3	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	2	-	-
Average	3	3	-	3	-	-	-	-	-	-	-	-	2	-	-
Level of Correlation	3	3	-	3	-	-	-	-	-	-	-	-	2	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B. Tech I Semester ECE

Course Code: 20AEC54 **SPEECH PROCESSING**

Professional Elective-IV

L	T	P	C
3	0	0	3

Course Outcomes:

After successful completion of course the student will be able to

CO1: Explain basic concepts of speech processing and different speech models.

CO2: Define phonetics and pronunciation processing.

CO3: Apply various speech identification and recognition models.

UNIT - I INTRODUCTION

Introduction, Knowledge in Speech and Language Processing, Ambiguity, Models and Algorithms, Language, Thought, Understanding, Regular Expression and Automata, Words &Transducers, N Grams.

UNIT-II SPEECH MODELLING

Word Classes and Part of Speech Tagging, Hidden Markov Model (HMM), Computing Likelihood: Forward Algorithm, Training Procedure for HMM, Maximum Entropy Model, Transformation Based Tagging, Evaluation and Error Analysis, Issues in Part of Speech Tagging, Noisy Channel Model for Spelling.

UNIT-III SPEECH PRONUNCIATION AND SIGNAL PROCESSING

Phonetics, Speech Sounds and Phonetic Transcription, Articulatory Phonetics, Phonological Categories and Pronunciation Variation, Acoustic Phonetics and Signals, Phonetic Resources, Articulatory and Gestural Phonology.

UNIT-IV SPEECH IDENTIFICATION

Speech Synthesis, Text Normalization, Phonetic Analysis, Prosodic Analysis, Diphone Waveform Synthesis, Unit Selection Waveform Synthesis, Evaluation.

UNIT-V SPEECH RECOGNITION

Automatic Speech Recognition, Architecture, Applying Hidden Markov Model, Feature Extraction: Mel Frequency Cepstral Coefficients (MFCC) Vectors, Computing Acoustic Likelihoods, Search and Decoding, Embedded Training, Multipass Decoding: N-Best Lists and Lattices, A* (Stack) Decoding , Context-Dependent Acoustic Models: Triphones, Discriminative Training, Speech Recognition By Humans.

TEXT BOOKS:

1. Daniel Jurafsky and James H. Martin, Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition, Person education,2013.

2. Kai-Fu Lee, Automatic Speech Recognition, the Springer International Series in Engineering and Computer Science, 1999.

REFERENCE BOOKS:

1. Himanshu Chaurasiya, Soft Computing Implementation of Automatic Speech Recognition, LAP Lambert Academic Publishing, 2010.

2. Ikrami Eldirawy, Wesam Ashour, Visual Speech Recognition‖, Wileypublications , 2011.

	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	-	2
CO2	2	-	2	-	2	-	-	-	-	-	-	-	-	-	-
CO3	3	2	2	-	2	-	-	-	-	-	-	-	-	-	2
Average	2.66	2	2	-	2	-	-	-	-	-	-	-	-	-	2
Level of correlation	3	2	2	-	2	-	-	-	-	-	-	-	-	-	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B. Tech I Semester ECE

Course Code: 20AEC55 ADVANCED DIGITAL SIGNAL PROCESSING

Professional Elective-IV

L	T	P	C
3	0	0	3

Course Outcomes:

After successful completion of course the student will be able to

CO1: Use IIR & FIR filters with different structures.

CO2: Apply parametric and non-parametric methods to estimate power spectrum.

CO3: Analyze the effect of word length in digital filter design and implementation.

CO4: Explain concept of multi-rate signal processing in various applications.

UNIT-I REVIEW OF DFT, FFT, IIR FILTERS AND FIR FILTERS:

Introduction to filter structures (IIR & FIR). Frequency sampling structures of FIR, Lattice structures, Forward prediction error, Backward prediction error, Reflection coefficients for lattice realization, Implementation of lattice structures for IIR filters, Advantages of lattice structures.

UNIT-II NON-PARAMETRIC METHODS:

Estimation of spectra from finite duration observation of signals, Non-parametric Methods: Bartlett, Welch & Blackman-Tukeymethods, Comparison of all Non-Parametric methods

UNIT-III PARAMETRIC METHODS:

Autocorrelation & Its Properties, Relation between auto correlation & model parameters, AR Models - Yule-Walker & Burg Methods, MA & ARMA models for power spectrum estimation, Finite word length effect in IIR digital Filters – Finite word-length effects in FFT algorithms.

UNIT-IV MULTI RATE SIGNAL PROCESSING:

Introduction, Decimation by a factor D, Interpolation by a factor I, Sampling rate conversion by arational factor I/D, Multistage Implementation of Sampling Rate Conversion, Filter design &Implementation for sampling rate conversion.

UNIT-V APPLICATIONS OFMULTI RATE SIGNAL PROCESSING:

Design of Phase Shifters, Interfacing of Digital Systems with Different Sampling Rates, Implementation of Narrow Band Low Pass Filters, Implementation of Digital Filter Banks, Sub band Coding of Speech Signals, Quadrature Mirror Filters, Trans multiplexers, Over Sampling A/D and D/AConversion.

TEXT BOOKS:

1. Digital Signal Processing: Principles, Algorithms & Applications - J.G.Proakis& D. G. Manolakis, 4th Ed., PHI.
2. Discrete Time signalprocessing - Alan V Oppenheim & Ronald WSchaffer, PHI.

REFERENCE BOOKS:

1. Modern spectralEstimation: Theory& Application – S. M.Kay, 1988, PHI.
2. MultiRate Systems and Filter Banks – P.P.Vaidyanathan – Pearson Education.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	-	2	-	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	2	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	2	-	-	-	-	-	-	-	-	-	-	-
CO4	3		-	2	-	-	-	-	-	-	-	-	2	-	-
Average	3	2	2	2	2	-	-	-	-	-	-	-	2	-	-
Level of correlation	3	2	2	2	2	-	-	-	-	-	-	-	2	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B. Tech I Semester ECE (Professional Elective-V)
IV B. Tech I Semester CSE, IT, CSE (DS) &CSE (AI &ML) (Open Elective-III)

Course Code: 20AEC56 **EMBEDDED SYSTEMS**

L	T	P	C
3	0	0	3

Course Outcomes:

After successful completion of course the student will be able to

CO1: Explain concept of embedded systems and its applications

CO2: Define various processors and explain their architecture

CO3: Design State machine and Concurrent Process Models

CO4: Identify embedded components, peripheral devices and apply various processor scheduling algorithms.

UNIT-I INTRODUCTION TO EMBEDDED SYSTEMS

Introduction to Embedded Systems: Definition of embedded system, history of embedded systems, classification of embedded systems, characteristics of embedded systems, major application areas of embedded systems, purpose of embedded systems , Embedded hardware units and devices in a system, Processor and OS trends in embedded systems, Core of the embedded system, memory, sensors and actuators, embedded software in a system and an overview of programming languages, examples of the embedded systems,

UNIT- II INTRODUCTION TO ASIP & DSP PROCESSORS:

Design challenge, processor technology, IC technology, Design Technology, Trade-offs. Custom Single purpose processors- RT-level combinational logic, sequential logic (RT-level), custom single purpose processor design (RT-level), optimizing custom single purpose processors. General Purpose Processors -

Basic architecture, operation- Pipelining, Programmer’s view, development environment, Application Specific Instruction-Set Processors (ASIPs) – Micro Controllers and Digital Signal Processors.

UNIT III STATE MACHINE AND CONCURRENT PROCESS MODELS:

Introduction, models Vs. languages, finite state machines with data path model (FSMD), using state machines, program state machine model (PSM), concurrent process model, concurrent processes, communication among processes, synchronization among processes, implementation, data flow model, real-time systems.

UNIT IV STANDARD SINGLE PURPOSE PROCESSORS: PERIPHERALS:
Timers, counters and watch dog timers, real time clock. Communication Interface - Need for communication interfaces, RS232 / UART, RS422/ RS485, USB, Infrared, IEEE 1394 Firewire, Ethernet, IEEE 802.11, Blue tooth.

UNIT V EMBEDDED / RTOS CONCEPTS:
REAL-TIMEOPERATING SYSTEMS – Operating System Overview, Operating System - Functions, Types and Services of Operating System, Architecture of the Kernel, Tasks and Task scheduler, Interrupt service routines, Semaphores, Mutex. Mailboxes, Message Queues, Event Registers, Pipes, Signals, Timers, Memory Management, Priority inversion problem.

TEXT BOOKS:

1. Frank Vahid, Tony D.Givargis,“Embedded System Design – A Unified Hardware/Software Introduction”, John Wiley, 2002.

2. KVKKPrasad, “Embedded / Real Time Systems”, Dreamtech Press, 2005.

REFERENCE BOOKS:

1. David E. Simon, “An Embedded Software Primer”, Pearson Ed., 2005.

2. Raj Kamal, “Introduction to Embedded Systems”, TMS, 2002.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	-	2	-	-	-	-	-	-	-	-	-	2	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-	2	-	-
Average	2.66	2	2	-	-	-	-	-	-	-	-	-	-	-	-
Level of correlation	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

IV B.Tech I Semester ECE

Course Code: 20AEC57 SATELLITE COMMUNICATIONS

Professional Elective-V

L	T	P	C
3	0	0	3

Course Outcomes:

After successful completion of course the student will be able to

CO1: Define basic concepts of satellite communication, laws associated with the motion of asatellite, various subsystems and link design.

CO2: Apply the basic concepts of satellite communication in tracking, coverage, delay, throughput of the satellite system.

CO3: Apply different multiple access methods and orbital model.

CO4: Apply GPS systems for various satellite applications

UNIT-I: INTRODUCTION:

communications capacity, Introduction & strengths of satellites, A variety of services, positioning in networks, space exploration, Economic elements, spacecraft operations, Internet by satellite.

UNIT II LINKS AND ORBITS:

Introduction and a matter of segment, A matter of links, System engineering, Laws of a space communication system, managing multiple access by terminals, Various types of orbits, Relationship between orbit and service, repeater for mesh architecture, Patricia Inigo Martinez, Nicolas Jacque

UNIT-III THE BASICS OF TRANSMISSION INFORMATION AND COMMUNICATIONS:

Introduction, Bit rate, Bit error rate, Bit rate / symbol rate, Concept of frequency, Bandwidth occupied by the signal, Bandwidth / rate relation, Carrier transmission, Free space propagation, Limited bandwidth, Noise.

UNIT IV COMMUNICATION TECHNIQUES

Introduction, BPSK modulation, QPSK modulation, QAM modulation, PSK modulation, Demodulation, Bit error rate (BER). **Research and development:** Bouchard Benmar, Mathieu Darvin, Internet by satellite, I/Q demodulator, APSK modulations, DVB-S2 carrier modulation, signal amplification

UNIT V HARDWARE AND EQUIPMENT:

Introduction, Light terminals, Portable, transportable and fixed terminals, Mobile terminals, functioning of an antenna with automatic pointing, Antennas, RF elements, Frequency conversion and modems, interconnection with Earth, Other aspects, **Networking and Services:** Introduction, Before the Internet, Internet and the notion of network, Interconnection and interoperability: a real issue, The notion of protocol, Going further: Internet Protocol and the hourglass, From analog to digital, DVB-S, Evolutions, Independent systems,

TEXT BOOKS:

1) Timothi Pratt, Charles Bosti anand Jeremy Allnutt, "Satellite communications", WSE, Wiley publications, 2ndEdition,2003.
2) Wilbur L. Prichard, Roberta. Nelson& Henry G. Suyder houd, "Satellite communications Engineering", PearsonPublications,2nd Edition,2003.

REFERENCE BOOKS:

1) Dennis Roddy, "Satellite communications", McGrawHill,2ndEdition,1996.
2) M. Richharia, "Satellite communications: Design principles", BS publications,2ndEdition, 2003.
3) K.N. Raja Rao, "Fundamentals ofSatellite communications", PHI,2004.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	-	-	-	3
CO2	3	3	3	3	-	-	-	-	-	-	-	-	-	-	3
CO3	3	3	3	3	-	-	-	-	-	-	-	-	-	-	3
CO4	3	3	3	3	-	-	-	-	-	-	-	-	-	-	3
Average	3	3	3	3	-	-	-	-	-	-	-	-	-	-	3
Level of Correlation	3	3	3	3	-	-	-	-	-	-	-	-	-	-	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B. Tech I Semester ECE

Course Code: 20AEC58

TELE COMMUNICATION SWITCHING SYSTEMS AND NETWORKS

Professional Elective-V

L	T	P	C
3	0	0	3

Course Outcomes:

After successful completion of course the student will be able to

CO1: Define concepts of telecommunication networks.

CO2: Demonstrate telecommunication traffic models.

CO3: Apply interconnection switching system to design problems.

CO4: Apply different signaling methods.

UNIT -I TELE COMMUNICATION SWITCHING SYSTEMS:

Switching Systems: Evolution of Telecommunications; Basics of a Switching System; Functions of a Switching System; Crossbar Switching-Principle of Crossbar Switching; Crossbar Switch Configurations; Cross-Point Technology; Crossbar Exchange Organization; A General Trunking; Electronic Switching; Digital Switching Systems.

UNIT- II TELECOMMUNICATIONS TRAFFIC:

Telecommunications Traffic: Introduction; The Unit of Traffic; Congestion; Traffic Measurement; A Mathematical Model; Lost-Call Systems-Theory; Traffic Performance; Loss Systems in Tandem; Use of Traffic Tables; Queuing Systems-The Second Erlang Distribution; Probability of Delay; Finite Queue Capacity; Some Other Useful Results; Systems with a Single Server; Queues in Tandem; Delay Tables; Applications ofDelay Formula.

UNIT- III SWITCHING NETWORKS:

Switching Networks: Single Stage Networks; Gradings-Principle; Two Stage Networks; Three Stage Networks; Four Stage Networks. Time Division Switching: Basic Time Division Space Switching; Basic Time Division Time Switching; Time Multiplexed Space Switching; Time Multiplexed Time Switching; Combination Switching; Three Stage Combination Switching.

UNIT- IV CONTROL OFSWITCHING SYSTEMS:

Control of Switching Systems: Call Processing Functions-Sequence of Operations; Signal Exchanges; State Transition Diagrams; Common Control; Reliability; Availability and Security; Stored Program Control.

UNIT -V SIGNALING:

Signaling: Introduction; Customer Line Signaling; Audio Frequency Junctions and Trunk Circuits; FDM Carrier Systems-Out band Signaling; in band (VF) Signaling; PCM Signaling.

TEXT BOOKS

1. J. E Flood, "Telecommunications Switching and Traffic Networks," Pearson Education, 2006.
2. Tyagarajan Viswanathan, "Telecommunications Switching Systems and Networks," Prentice Hall ofIndia Pvt. Ltd., 2006.

REFERENCE BOOKS

1. John C Bellamy, "Digital TelephonyJohn WileyInternational Student Edition,3rd Edition, 2000.
2. Behrouz A. Forouzan, "Data Communications and Networking," TMH, 2nd Edition, 2002

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-	-	-	2
Average	2.75	2	2	-	-	-	-	-	-	-	-	-	-	-	2
Level of Correlation	3	2	2	-	-	-	-	-	-	-	-	-	-	-	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B. Tech I Semester ECE

Course Code: 20AEC59

MILLIMETER WAVE COMMUNICATION NETWORKS

Professional Elective-V

L	T	P	C
3	0	0	3

Course Outcomes:

After successful completion of course the student will be able to

CO1: Define Millimeter wave characteristics, devices and circuits

CO2: Acquire knowledge of Millimeter wave technology

CO3: Analyze millimeter wave MIMO systems and Antennas

UNIT- I: INTRODUCTION

Millimeter wave characteristics- millimeter wave wireless, implementation challenges, Radio wave propagation for mm wave: Large scale propagation channel effects, small scale channel effects, Outdoor and Indoor channel models, Emerging applications of millimeter wave communications

UNIT- II: MILLIMETRE WAVE DEVICES AND CIRCUITS

Millimeter wave generation and amplification: Peniotrons, Ubitrons, Gyrotrons and Free electron lasers. HEMT, models for mm wave Transistors, transistor configurations, Analog mm wave components: Amplifiers, Mixers, VCO, PLL. Metrics for analog mm wave devices, Consumption factor theory, Trends and architectures for mm wave wireless, ADC's and DAC's.

UNIT- III: MILLIMETRE WAVE COMMUNICATION SYSTEMS

Modulations for millimeter wave communications: OOK, PSK, FSK, QAM, OFDM, Millimeter wave link budget, Transceiver architecture, Transceiver without mixer, Receiver without Oscillator, Millimeter wave calibration, production and manufacture, Millimeter wave design considerations.

UNIT- IV: MILLIMETRE WAVE MIMO SYSTEMS

Massive MIMO Communications, Spatial diversity of Antenna Arrays, Multiple Antennas, Multiple Transceivers, Noise coupling in MIMO system, Potential benefits for mm wave systems, Spatial, Temporal and Frequency diversity, Dynamic spatial, frequency and modulation allocation.

UNIT- V: ANTENNAS FOR MILLIMETRE WAVE SYSTEMS

Antenna beam width, polarization, advanced beam steering and beam forming, mm wave design consideration, On-chip and In package mm wave antennas, Techniques to improve gain of on-chip antennas, Implementation for mm wave in adaptive antenna arrays, Device to Device communications over 5G systems, Design techniques of 5G mobile.

TEXT BOOKS:

1. K.C. Huang, Z. Wang, "Millimeter Wave Communication Systems", Wiley-IEEE Press, March 2011.
2. Robert W. Heath, Robert C. Daniel, James N. Theodore S. Rappaport, Murdock, "Millimeter Wave Wireless Communication", Prentice Hall, 2014.

REFERENCE BOOKS:

1. Kai Yang, M Shi, H Yuan, Z Ni, “Millimeter wave communication system- Analysis and Hybrid Precoding design, Springer, 2022.
2. MG Sanchez, “Millimeter wave communications” Electronics, 2020.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	3	-	-	-	-	-	-	-	-	2	-	-
CO2	3	3	-	3	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	-	3	-	-	-	-	-	-	-	-	2	-	-
Average	3	3	-	3	-	-	-	-	-	-	-	-	2	-	-
Level of Correlation	3	3	-	3	-	-	-	-	-	-	-	-	2	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B. Tech I Semester ECE

Course Code: 20AEC60

RADAR SYSTEMS

Professional Elective-V

L	T	P	C
3	0	0	3

Course Outcomes:

After successful completion of course the student will be able to

CO1: Explain fundamentals of radar

CO2: Identify different types of radars and explain their operation

CO3: Apply signal detection in radar and use various radar signal detection techniques.

CO4: Know how radar detects Doppler Frequency hence velocity of target.

UNIT- I BASICS OF RADAR:

Introduction, Maximum Unambiguous Range, Simple form of Radar Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications, Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise, Modified Radar Range Equation, Illustrative Problems.

RADAR EQUATION:

SNR, Envelope Detector, False Alarm Time and Probability, Integration of Radar Pulses, Radar Cross Section of Targets (simple targets -sphere, cone-sphere), Transmitter Power Illustrative Problems.

UNIT-II CW RADAR:

Doppler Effect, CW Radar –Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW radar, Illustrative Problems.

FM-CW RADAR:

Introduction, Range and Doppler Measurement, Block Diagram and Characteristics FM-CW altimeter, Multiple Frequency CW Radar

UNIT-III MTI AND PULSE DOPPLER RADAR:

Introduction, Principle, MTI Radar with -Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers- Filter Characteristics. Blind Speeds, Double Cancellation, and Staggered PRFs. Range Gated Doppler Filters, MTI Radar Parameters, Limitations to MTI Performance.

UNIT- IV TRACKING RADAR:

Tracking with Radar, Sequential Lobing, Conical Scan, Mono pulse Tracking Radar – Amplitude Comparison Mono pulse (one-and two-coordinates), Phase Comparison Mono pulse, Tracking in Range, Acquisition and Scanning Patterns, Comparison of Trackers.

UNIT -V DETECTION OF RADAR SIGNALS IN NOISE:

Introduction, Matched Filter Receiver –Response Characteristics and Derivation, Correlation Function and Cross-correlation Receiver, Efficiency of Non-matched Filters, Matched Filter with Non-white Noise.

Radar Receiver: The Radar Receiver, Receiver Noise Figure, Super Heterodyne Receiver, Duplexers and Receivers Protectors, Radar Displays.

TEXT BOOKS:

1. Merrill I. Skolnik, Introduction to RADAR Systems, TMH Special Indian Edition, 2nd Edition, 2004.
2. Peebles Jr.P. Z, RADAR Principles, Wiley, New York, 2006.

REFERENCE BOOKS:

1. Merrill I. Skolnik, Introduction to RADAR Systems, 3rd Edition, Tata McGraw- Hill, 2010.
2. Byron Edde, RADAR Principles, Technology and Applications, Pearson Education, 2004.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-	3
CO2	3	3	-	3	-	-	-	-	-	-	-	-	-	-	3
CO3	3	3	-	3	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	-	3	-	-	-	-	-	-	-	-	-	-	3
Average	3	3	-	3	-	-	-	-	-	-	-	-	-	-	-
Level of Correlation	3	3	-	3	-	-	-	-	-	-	-	-	-	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B.Tech I Semester (Common to CSE, CSE (DS), CSE (AI&ML) & IT)
IV B.Tech I Semester ECE (Open Elective-III)

L	T	P	C
3	0	0	3

20ACS39 **CLOUD COMPUTING**
(Professional Elective Course-III)

Course outcome

After completion of this course, students will be able to:

1. Implement fundamental cloud computing concepts.
2. Implement classical algorithms, including Ricart- Agrawala's algorithm and Maekawa's algorithm
3. Ensure transactions commit correctly in spite of replication.
4. Perform operations on Hadoop distributed file systems and develop virtualization applications

UNIT I **6Hrs**

Introduction to Clouds, MapReduce: Introduction to Cloud Computing Concepts, Orientation Towards Cloud Computing Concepts, Some Basic Computer Science Fundamentals, Introduction, Why Clouds?, What is a Cloud?, History, What's New in Today's Clouds, Introduction to Clouds: New Aspects of Clouds, Introduction to Clouds: Economics of Clouds, A cloud IS a distributed system, What is a distributed system?, MapReduce Paradigm, MapReduce Examples, MapReduce Scheduling, MapReduce Fault-Tolerance.

UNIT II **10Hrs**

Gossip, Membership, and Grids: Introduction, Multicast Problem, The Gossip Protocol, Gossip Analysis, Gossip Implementations, What is Group Membership List?, Failure Detectors, Gossip-Style Membership, Which is the best failure detector?, Another Probabilistic Failure Detector, Dissemination and suspicion, Grid Applications, Grid Infrastructure

P2P Systems: Introduction, Napster, Gnutella, FastTrack and Bit Torrent, Chord, Failures in Chord, Pastry, Kelips, Blue Waters Supercomputer.

Key-Value Stores, Time, and Ordering: Why Key-Value/NOSQL?, Cassandra, The Mystery of X-The Cap Theorem, The Consistency Spectrum, HBase, Introduction and Basics, Cristian's Algorithm, NTP, Lamport Timestamps, Vector Clocks.

UNIT III **8Hrs**

Classical Distributed Algorithms: What is Global Snapshot?, Global Snapshot Algorithm, Consistent Cuts, Safety and Liveness, Multicast Ordering, Implementing Multicast Ordering, Implementing Multicast Ordering, Reliable Multicast, Virtual Synchrony, The Consensus Problem, Consensus In Synchronous Systems, Paxos, Simply, The FLP Proof, Orientation Towards Cloud Computing Concepts: Some Basic Computer Science Fundamentals, Introduction, The Election Problem, Ring Leader Election, Election in Chubby and ZooKeeper, Bully Algorithm, Introduction and Basics, Distributed Mutual Exclusion, Ricart-Agrawala's Algorithm, Maekawa's Algorithm and Wrap-Up.

UNIT IV **8Hrs**

Concurrency and Replication Control: RPCs, Transactions, Serial Equivalence, Pessimistic Concurrence, Optimistic Concurrency Control, Replication, Two-Phase Commit.

Emerging Paradigms: Stream Processing in Storm, Distributed Graph Processing, Structure of Networks, Single-processor Scheduling, Hadoop Scheduling, Dominant-Resource Fair Scheduling, Storm Demo, Apache Spark by Faria Kalim.

UNIT V **7Hrs**

Classical Systems: Introduction, File System Abstraction, NFS and AFS, Distributed Shared Memory, Sensor and Their Networks.

Real-Life Behaviors: Introduction, Basic Security Concepts, Basic Cryptography Concepts, Implementing Mechanism using Cryptography, What Causes Disasters?, AWS Outage, Facebook Outage, The Planet Outage, Wrap-Up.

Text book

1. https://www.coursera.org/learn/cloud-computing
2. https://www.coursera.org/learn/cloud-computing-2
3. Kobusińska, A., Leung, C., Hsu, C. H., Raghavendra, S., & Chang, V. (2018). Emerging trends, issues and challenges in Internet of Things, Big Data and cloud computing. Future Generation computer systems, 87, 416-419.
4. Dyer, J. (2018). Secure computation in the cloud using MapReduce. The University of Manchester (United Kingdom).

Reference Book

1.“Grid Computing a Research Monograph” by D. Janakiram, Tata McGraw hill publications

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	2	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	-	-	-	-	-	1	-	-	-	-	-	-	-
CO4	3	3	3	3	3	-	-	-	-	-	-	-	-	-	-
Average	3	3	2.66	2.33	3	-	-	1	-	-	-	-	-	-	-
Level of Correlation	3	3	3	3	3	-	-	1	-	-	-	-	-	-	-

3- High mapping 2-Medium Mapping 1- Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech I Semester (Common to ME, CSE, EEE, IT, CSE(DS), CSE(AI &ML))

IV B.Tech - I – Semester (ECE)

20AME18	Robotics and Artificial Intelligence (OE/JOE- III)	L T P C
		3 0 0 3

Course Outcomes:

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

1. Demonstrate the knowledge in an application of AI, and select strategies based on application requirement.
2. Describe the basic concepts of robotics and its importance in the modern world and classification of robots and its end effectors for typical manufacturing industry and service sector.
3. Summarize the perception about robot components, actuators, sensors and machine vision.
4. Analyze the manipulator kinematics, dynamics for typical robots which will be used for complex operations and analyze the path planning for typical robots.
5. Choose a program that the robot can integrate with the manufacturing system to produce quality products with minimum cost with optimum usage of resources.

UNIT: I Introduction of AI **10 hours**

Artificial Intelligence: Introduction to Artificial Intelligence (AI), History. AI techniques, LISP programming, AI and Robotics, LISP in the factory, sensoring and digitizing function in machine vision, image processing and analysis, training and vision system. Intelligent Agents: Agents and Environments, the Concept of Rationality, the Nature of Environments, the Structure of Agents.

UNIT: II Introduction to Robotics **10 hours**

Automation versus Robotic technology, Laws of robot, Progressive advancements in Robots, Robot Anatomy, Classification of robots-coordinate method, control method; Specification of robots. Classification of End effectors – Tools as end effectors, Mechanical-adhesive -vacuum-magnetic-grippers.

UNIT: III Robot Actuators, Sensors and Machine Vision **12 hours**

Robot Actuators and Feedback Components: Actuators - Pneumatic and Hydraulic actuators, electric & stepper motors, comparison. Position sensors, resolvers, encoders, velocity sensors, tactile sensors, Proximity sensors, Slip Sensor, Range Sensor, Force Sensor.

Machine Vision: Camera, Frame Grabber, Sensing and Digitizing Image Data Signal Conversion, Image Storage, Lighting Techniques, Image Processing and Analysis-Data Reduction, Segmentation, Feature Extraction, Object Recognition, Other Algorithms, Applications, Inspection, Identification, Visual Serving and Navigation.

UNIT:4 Manipulator Kinematics and Trajectory Planning 10 hours

Mathematical representation of Robots - Position and orientation, Homogeneous transformations - D-H notation, Forward and inverse kinematics. Manipulator dynamics, Differential transformation, Jacobeans.

Trajectory planning and avoidance of obstacles, path planning, joint integrated motion – straight line motion, basics of trajectory planning, polynomial trajectory planning.

UNIT:5 Robot Applications and Programming 8 hours

Robot Application in Manufacturing: Material Transfer, Material handling, loading and unloading, Processing, spot and continuous arc welding & spray painting, Assembly and Inspection.

Robot Programming: Types, features of languages and software packages.

Textbook(s)

1. M.P. Groover, Industrial Robotics, Second Edition, New Delhi, Tata McGraw Hill, 2017.
2. R.K. Mittal & I.J.Nagrath, Robotics and Control, New Delhi, 3rdEdition, Tata McGraw Hill, 2017.
3. John J.Craig, Introduction to Robotics Mechanics and Control, Third edition, Pearson Education, 2009.

Reference Books

1. Ashitava Ghoshal, Robotics-Fundamental Concepts and Analysis', Oxford University Press, Sixth impression, 2010.
2. K.S. Fu, Robotics, New Delhi, 3rd Edition, Tata McGraw Hill, 2008.

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	-	-	-	-
CO5	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	3	3	3	3	-	-	-	-	-	-	-	-	-	-	-
Level of Correlation	3	3	3	3	-	-	-	-	-	-	-	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

IV B.Tech I Semester

(Common to ECE, CSE, IT, CSE(AI&ML), CSE(DS), CAI, CSC & CSO)

L	T	P	C
3	0	0	3

20AMB10 INDUSTRIAL MARKETING

(OE/JOE-III)

COURSE OUTCOMES:

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

1. Describe key concepts of industrial marketing.
2. Prepare proper segmentation and positioning for various industrial products.
3. Formulate robust marketing strategies for variety of situations in Indian and global context.
4. Apply and integrate Business-to-Business marketing theory with practice in a business context.
5. Explain the industrial marketing mix strategies apply this knowledge to real cases.

UNIT-I: The Industrial Marketing system and the Industrial Marketing concept, Industrial goods demand and product characteristics market levels and product types, the industrial customer, buyer motives business and institutional buyers.

UNIT-II: Organizational Buying: BUYGRID MODEL, phases in purchasing decision process & their marketing implications, Buying centers, value analysis & vendor analysis.

UNIT-III: Industrial market segmentation, bases for segmenting industrial market-macro and micro variables. Targeting the industrial product, positioning the industrial product. Industrial product life cycle, product mix, Service component the provision of parts, technical assistance, terms of sales.

UNIT – IV: The distribution channel component—Industrial distributors, Formulation of channel strategy-conditions influencing channel structure. Brief introduction to Marketing Logistics. The price component-conditions affecting price competition, cost factor, the nature of demand, pricing policies..

UNIT –V: The promotional component, advertising functions-establishing recognition, supporting and motivating salesmen and distributors measurement of advertising effectiveness. Personal selling-Personnel profiles selection and training, supervisions compensation sales promotion and public relations-Trade shows and exhibits, promotional novelties.

TEXT BOOKS:

1. Havaldar, K. K. (2005). Industrial Marketing: Text and Cases. India: Tata McGraw-Hill.
2. Phadtare, M. T. (2014). Industrial Marketing. India: PHI Learning.
3. Govindarajan, M. (2009). Industrial Marketing Management. India: Vikas Publishing House Pvt Limited.

REFERENCES:

1. Stacey, N., Wilson, A. (2014). Industrial Marketing Research (RLE Marketing): Management and Technique. United Kingdom: Routledge.
2. Chisnall, P. M. (1985). Strategic Industrial Marketing. United Kingdom: Prentice-Hall.
3. Brierty, E. G., Reeder, B. H., Reeder, R. R. (1991). Industrial Marketing: Analysis, Planning, and Control. United Kingdom: Prentice-Hall International.

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-
Average	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-
Level of Correlation	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B. Tech I Semester ECE

Course Code: 20AEC61

AUTOMOTIVE SENSORS AND NETWORKING

(OE/JOE-III)

L	T	P	C
3	0	0	3

Course Outcomes:

After successful completion of course the student will be able to

CO1: Identify automotive parts and various Power train sensors.

CO2: Explain about various sensors for vehicle body management, convenience & security systems.

CO3: A**pply** various technologies developed for passenger convenience systems.

CO4: Apply various communication standards and protocols in the automotive systems.

UNIT-I Introduction to Automotive Engineering, Automotive Management systems:

Power-train, Combustion Engines, Transmission, Differential Gear, Braking Systems, Introduction to Modern Automotive Systems and need for electronics in Automobiles, Application areas of electronics in the automobiles, Possibilities and challenges in the automotive industry, Enabling technologies and Industry trends.

UNIT-II Powertrain Sensors:

λ sensors, exhaust temperature sensor, NOx sensor, PM sensor, fuel quality sensor, level sensor, torque sensor, speed sensor, mass flow sensor, manifold pressure sensor.

UNIT-III Sensors for Chassis and Vehicle body management:

Wheel speed sensors/direction sensors, steering position sensor (multi turn), acceleration sensor (inertia measurement), ABS sensor, electronic stability sensor. Gas sensors (CO_2), Temperature/humidity sensor, air bag sensor, key less entering sensor, radar sensors. Tire pressure monitoring systems, Two-wheeler and Four-wheeler security systems, parking guide systems, anti-lock braking system, future safety technologies, Vehicle diagnostics and health monitoring.

UNIT-IV AirBag and Seat Belt Pre tensioner Systems:

Principal Sensor Functions, Distributed Front Air Bag sensing systems, Single-Point Sensing systems, Side-Impact Sensing, and Future Occupant Protection systems.

UNIT-VModern Trends and Technical Solutions:

Enabling Connectivity by Networking: -In vehicle communication standards (CAN & LIN), Telematic solutions, Portable or embedded connectivity- Endorsing Dependability in Drive-by wire systems: - Terminology and concepts, Why by-wire, FLEXRAY, Requirements on cost and dependability, Drive-by-wire case studies- prototype development-future of in vehicle communication.

TEXT BOOKS:

1. Automotive Electrics, Automotive Electronics: Systems & Components, 2014, 5thEdition, BOSCH.
2. John Turner, Automotive Sensors, 2010, 1st Edition, Momentum Press, New York.
3. Ernest O. Doebel in, “Measurement Systems – Application and Design”, 2017, 6th Edition, McGraw-Hill, New Delhi.

REFERENCE BOOKS:

1. Automotive Sensors Handbook, 8th Edition, 2011, BOSCH.
2. Jiri Marek, Hans-Peter Trah, Yasutoshi Suzuki, Iwao Yokomori, Sensors for Automotive Technology, 2010, 4th Edition, Wiley, New York.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	2	-	2	-	-	-	-	-	-	-	2	-	-
CO2	-	-	3	-	2	-	-	-	-	-	-	-	-	-	-
CO3	3	-	2	-	2	-	-	-	-	-	-	-	-	-	-
CO4	3	-	2	-	2	-	-	-	-	-	-	-	2	-	-
Average	3	-	2.25	-	2	-	-	-	-	-	-	-	2	-	-
Level of Correlation	3	-	2	-	2	-	-	-	-	-	-	-	2	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B. Tech I Semester ECE

Course Code: 20AEC62

PRINCIPLES OF PHOTOVOLTAIC CELLS AND METHODS (OE/JOE-III)

L	T	P	C
3	0	0	3

Course Outcomes:

After successful completion of course the student will be able to

CO1: Explain the principle of photovoltaic effect to generate power

CO2: Analyze the performance, structure, materials and constructional details of solar cells, and PV Modules.

CO3: Identify various PV systems, arrays and components

CO4: Use PV systems for various applications in socio-economic and environment.

UNIT-I SOLAR CELL FUNDAMENTALS:

Photovoltaic effect - Principle of direct solar energy conversion into electricity in a solar cell Semiconductor property, energy levels, basic equations. Solar cell, p-n junction, structure.

UNIT-II PV MODULE PERFORMANCE:

characteristics of a PV module, maximum power point, cell efficiency, fill factor, effect of irradiation and temperature. optoelectronic efficiency limiters: photon energy vs. bandgap; electronic efficiency limiters: open circuit voltage; strategies for improving solar cell efficiency; light trapping; bandgap engineering.

UNIT-III MANUFACTURING OF PV CELLS & DESIGN OF PV SYSTEMS:

Commercial solar cells - Production process of single crystalline silicon cells, multi crystalline silicon cells, amorphous silicon, cadmium telluride, copper indium gallium diselenide cells. Design of solar PV systems and cost estimation. Case study of design of solar PV lantern, standalone PV system - Home lighting and other appliances, solar water pumping systems.

UNIT-IV CLASSIFICATION OF PV SYSTEMS AND COMPONENTS:

Classification - Central Power Station System, Distributed PV System, Standalone PV system, Grid Interactive PV System, small system for consumer applications, Hybrid solar PV system, Concentrator solar photovoltaic. System components - PV arrays, inverters, batteries, charge controls, net power meters. PV array installation, operation, costs, reliability.

UNIT-V PV SYSTEM APPLICATIONS:

Building-integrated photovoltaic units, grid-interacting central power stations, standalone devices for distributed power supply in remote and rural areas, solar cars, aircraft, space solar power satellites. Socio-economic and environmental merits ofphotovoltaic systems.

TEXT BOOKS:

1. Chetan Singh Solanki., Solar Photovoltaic: “Fundamentals, Technologies and Application”, PHI Learning Pvt., Ltd., 2009
2. Jha .A.R, “Solar CellTechnology and Applications”, CRC Press, 2010

REFERENCE BOOKS:

1. John R. Balfour, Michael L. Shaw, Sharlave Jarosek., “Introduction to Photovoltaics”, Jones & Bartlett Publishers, Burlington, 2011.
2. Partain .L.D, Fraas L.M., “Solar Cells and Their Applications”, 2nd ed., Wiley, 2010.
3. Sukhatme .S.P, Nayak .J.K, “Solar Energy”, Tata McGraw Hill Education Private Limited, New Delhi, 2010.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	-	3	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	-	3	-	-	-	-	-	-	-	-	3	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	3	3	-	3	-	-	-	-	-	-	-	-	3	-	-
Level of Correlation	3	3	-	3	-	-	-	-	-	-	-	-	3	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY, (AUTONOMOUS)

L	T	P	C
3	0	0	3

20AEE69 DIGITAL CONTROL SYSTEMS

Course outcomes:

CO1: Analyze discrete time control systems and the "knowhow" of various associated accessories.
CO2: Understand z–transformations and their role in the mathematical analysis of different systems (like Laplace transforms in analog systems).
CO3: Interpret the mathematical concepts of Z transform to analyze the system in state space.
CO4: Analyze the stability criterion for digital systems and methods adopted for testing the system.
CO5: Design and develop feedback controller using conventional and state space methods for different applications

UNIT – I:
Introduction and signal processing
Introduction to analog and digital control systems – Advantages of digital systems – Typical examples – Signals and processing – Sample and hold devices – Sampling theorem and data reconstruction – Frequency domain characteristics of zero order hold.

UNIT–II:
z–transformations
z–Transforms – Theorems – Finding inverse z–transforms – Formulation of difference equations and solving – Block diagram representation – Pulse transfer functions and finding open loop and closed loop responses.

UNIT–III:
State space analysis and the concepts of Controllability and observability
State space representation of discrete time systems – State transition matrix and methods of evaluation – Discretization of continuous – Time state equations – Concepts of controllability and observability – Tests(without proof).

UNIT – IV:
Stability analysis
Mapping between the s–Plane and the z–Plane – Primary strips and Complementary strips – Stability criterion – Modified Routh's stability criterion and Jury's stability test.

UNIT – V:
Design of discrete–time control systems by conventional methods
Transient and steady state specifications – Design using frequency response in the w–plane for lag and lead compensators – Root locus technique in the z–plane.
State feedback controllers:
Design of state feedback controller through pole placement – Necessary and sufficient conditions – Ackerman's formula.

Text Book:

1. Discrete–Time Control systems – K. Ogata, Pearson Education/PHI, 2nd Edition.

2. Digital Control and State Variable Methods by M.Gopal, TMH, 4th Edition.

Reference Books:

1. Digital Control Systems, Kuo, Oxford University Press, 2nd Edition, 2003.

Mapping:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	--	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	2	--	-	-	-	-	-	-	-	-	-	-
CO3	3	2	2	2	3	-	-	-	-	-	-	-	-	-	-
CO4	3	3	2	3	1	-	-	-	-	-	-	-	-	-	-
CO5	3	2	1	2	1	-	-	-	-	-	-	-	-	-	-
Average	3	2.6	2.2	2.4	1.6	-	-	-	-	-	-	-	-	-	-
Level of Correlation	3	3	2	2	2	-	-	-	-	-	-	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

L	T	P	C
3	1	-	3

20AEE70 SENSORS AND TRANSDUCERS

Course outcomes

The students will be able to
CO1: Expertise in various calibration techniques and signal types for sensors.
CO2: Apply the various sensors in the Automotive and Mechatronics applications
CO3: Analyse the working of sensors for magneto static applications
CO4: Analyze the basic principles behind the working of various smart sensors.
CO5: Implement the DAQ systems with different sensors for real time applications

UNIT I
INTRODUCTION
Basics of Measurement – Classification of errors – Error analysis – Static and dynamic characteristics of transducers – Performance measures of sensors – Classification of sensors – Sensor calibration techniques – Sensor Output Signal Types.

UNIT II
MOTION, PROXIMITY AND RANGING SENSORS
Motion Sensors – Potentiometers, Resolver, Encoders – Optical, Magnetic, Inductive, Capacitive, LVDT – RVDT – Synchro – Microsyn, Accelerometer.,– GPS, Bluetooth, Range Sensors – RF beacons, Ultrasonic Ranging, Reflective beacons, Laser Range Sensor (LIDAR).

UNIT III
FORCE, MAGNETIC AND HEADING SENSORS
Strain Gage, Load Cell, Magnetic Sensors –types, principle, requirement and advantages: Magneto resistive – Hall Effect – Current sensor Heading Sensors – Compass, Gyroscope, Inclinometers.

UNIT IV
OPTICAL, PRESSURE AND TEMPERATURE SENSORS
Photo conductive cell, photo voltaic, Photo resistive, LDR – Fiber optic sensors – Pressure – Diaphragm, Bellows, Piezoelectric – Tactile sensors, Temperature – IC, Thermistor, RTD, Thermocouple. Acoustic Sensors – flow and level measurement, Radiation Sensors - Smart Sensors - Film sensor, MEMS & Nano Sensors, LASER sensors.

UNIT V

SIGNAL CONDITIONING and DAQ SYSTEMS

Amplification – Filtering – Sample and Hold circuits – Data Acquisition: Single channel and multi channel data acquisition – Data logging - applications - Automobile, Aerospace, Home appliances, Manufacturing, Environmental monitoring.

TEXT BOOKS:

1. Ernest O Doebelin, "Measurement Systems – Applications and Design", Tata McGraw-Hill, 2009.

2. Sawney A K and Puneet Sawney, "A Course in Mechanical Measurements and Instrumentation and Control", 12th edition, Dhanpat Rai & Co, New Delhi, 2013.

REFERENCES

1. Patranabis D, "Sensors and Transducers", 2nd Edition, PHI, New Delhi, 2010.

2. John Turner and Martyn Hill, "Instrumentation for Engineers and Scientists", Oxford Science Publications, 1999.

3. Richard Zurawski, "Industrial Communication Technology Handbook" 2nd edition, CRC Press, 2015.

Mapping:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	1	-	-	-	-	-	-	-	-
CO2	3	3	2	3	-	-	2	-	-	-	-	-	-	-	-
CO3	3	2	2	3	-	-	3	-	-	-	-	-	-	-	-
CO4	3	3	2	3	-	2	-	-	-	-	-	-	-	-	-
CO5	3	2	1	2	-	-	2	-	-	-	-	-	-	-	-
Average	3	2.6	2	2.8	-	2	2	-	-	-	-	-	-	-	-
Level of Correlation	3	3	2	3	-	2	2	-	-	-	-	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B.Tech II Semester (Common to CSE, IT),
IV B Tech I Sem Professional Elective-V CSE(DS),CSE(AI& ML)
IV B Tech I Sem ME,ECE(Open Elective-IV)

L	T	P	C
3	-	-	3

20ACS28 **INTERNET OF THINGS**

Course Outcomes:

At the end of the course students will be able to:
1. Understand the fundamentals of IoT, its applications.
2. Understand and analyze various tools for design of IoT system.
3. Analyze the Raspberry Pi tool and its features.
4. Deploy an IoT application and connect to the cloud.

UNIT-I 10 Hrs

Introduction And Concepts: Introduction to Internet of Things , Physical Design of IoT, Logical Design of IoT – IoT Enabling Technologies – IoT levels & Deployment Templates.

Domain Specific IoTs: Introduction – Home Automation – Cities, Environment – Energy – Retail, Logistics – Agriculture, Industry, Health & Lifestyle.

UNIT-II 13 Hrs

IOT and M2M: Introduction – M2M, Difference between IoT and M2M, SDN and NFV for IoT, IoT System management with NETCONF,YANG , Need for IoT Systems Management –Simple network Management protocol(SNMP) – Network operator requirements, NETCONF,YANG, IOT systems management with NETCONF,YANG – NETOPEER.

UNIT-III 9 Hrs

Developing Internet Of Things: IoT Platforms Design Methodology, Introduction, IoT Design Methodology, Case Study on IoT System for Weather Monitoring – Motivation for Using Python – IoT Systems, logical Design using Python, installing Python, Python Data Types & Data Structures, Control flow, functions, Modules, Packages, File Handling, Data/Time Operations, Classes, Python Packages of Interest for IoT.

UNIT-IV 9 Hrs

Iot Physical Devices & Endpoint: What is an IOT devices, Exemplary Devices: Raspberry Pi, About the Board, Linux on Raspberry Pi, Raspberry Pi Interfaces, Programming Raspberry Pi with Python – Other IoT Devices.

UNIT-V 8 Hrs

Iot Physical Servers & Cloud Offerings: Introduction to Cloud Storage Models & Communication APIs, WAMP, AutoBahn for IoT, Xively Cloud for IoT, Python Web Application Framework, Django, Designing a RESTful Web API, Amazon Web services for IoT, SkyNet IoT Messaging Platform.

TEXT BOOK:

1. Arshdeep Bahga, Vijay K.Madisetti, “Internet of Things”, A HANDS ON APPROACH, Universities Press, 2014

REFERENCE BOOKS:

1. Adrian Mcewen, Hakin Cassimally, "Designing The Internet of Things", WEILEY Publications, 2015
2. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, David Boyle, Stamatis Karnouskos, "From Machine-to-Machine to the Internet of Things", Academic Press, 2014

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	-	1	-	-	-	-	-	-	-	-	-	-
CO3	3	3	3	-	2	-	-	-	-	-	-	-	-	-	-
CO4	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-
Average	3	3	3	-	1.5	-	-	-	-	-	-	-	-	-	-
Level of Correlation	3	3	3	-	2	-	-	-	-	-	-	-	-	-	-

3-High Mapping 2- Medium Mapping 3-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B. Tech I Semester ECE

Course Code: 20AEC63

MACHINE LEARNING AND APPLICATIONS
(OE/JOE-IV)

L	T	P	C
3	0	0	3

Course Outcomes:

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

CO1: Differentiate between various machine learning approaches

CO2: Apply specific supervised, unsupervised, semi-supervised machine learning algorithms for a particular problem

CO3: Analyze and suggest the appropriate machine learning approach for the various types of problems.

CO4: Design case studies on the advanced machine learning algorithms and make modifications to existing machine learning algorithms to suit an individual application.

UNIT- IMACHINE LEARNING AND THE MACHINE LEARNING PIPELINE:
Introduction, The Data Science Pipeline, Data Ingestion and Exploration, Data Ingestion and Exploration, Supervised Learning, Linear Models, and Least Squares, Linear Regression

UNIT -II LEAST SQUARES AND MAXIMUM LIKELIHOOD ESTIMATION:
Linear Regression and least squares, Linear Regression on the Prostate Cancer Dataset, Maximum Likelihood Estimation, Linear Regression and Maximum Likelihood Estimation

UNIT -III BASIS FUNCTIONS AND REGULARIZATION:
Basis Functions, Features and Basis Functions, Regularization and the Bias-Variance Trade-off, Linear Regression: Regularization

UNIT- IV MODEL SELECTION AND LOGISTIC REGRESSION:
Model Selection and cross validation, Model Selection and Pipelines, Logistic Regression, Lab Walkthrough: Logistic Regression. **SVMs and Naive Bayes:** Support Vector Machines, Naive Bayes Classification, Naive Bayes Classification Example

UNIT -V TREE-BASEDMODELS, ENSEMBLE METHODS, AND EVALUATION:
Ensembles, Bagging, and Boosting, Trees and Forests, Evaluation Metrics,

Clustering Methods: Clustering (KDE, Mean shift, DBSCAN), Density and Distribution-Based Clustering. **Dimensionality Reduction and Temporal Models:** Principal Component Analysis, Temporal Models and Hidden Markov Models, Hidden Markov Models. Deep Learning: Feed Forward Neural Networks, Convolutional NeuralNetworks

TEXT BOOKS:

1. TomM. Mitchell, "Machine Learning", McGraw-Hill Education (India) Private limited, 2013.
2. Stephen Marsland, "Machine Learning: An AlgorithmPerspective", CRC Press, 2009.
3.

REFERENCE BOOKS:

1. Mohssen Mohammed, Muhammad Badruddin Khan, Eihab Bashier Mohammed Bashier,"Machine Learning Algorithms and Applications", CRC Press.
2. Ethem Alpaydin, "Introduction to Machine Learning (Adaptive Computation and Machine Learning)", The MIT Press2004.

	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	3	-	-	-	-	-	-	-	-	-	-	2
CO3	3	3	-	3	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	-	-	2
Average	3	3	-	3	-	-	-	-	-	-	-	-	-	-	2
Level of Correlation	3	3	-	3	-	-	-	-	-	-	-	-	-	-	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B. Tech I Semester ECE

Course Code: 20AEC64

ARM BASED SYSTEM DESIGN

OE/JOE-IV

L	T	P	C
3	0	0	3

Course Outcomes:

After successful completion of course the student will be ableto

CO1: Define system design using ARM Microcontroller.

CO2: Explain about various ARM instruction set.

CO3: Apply architectural and programming concepts of ARM Microcontroller.

CO4: Analyze memory management concepts in system design

UNIT-1 ARM EMBEDDED SYSTEMS:

An Embedded System-Definition, Embedded System Design and Development, Life Cycle, Embedded system Architecture, Embedded Systems classification, The RISC Design Philosophy, The ARM Design Philosophy, Embedded System Hardware, Embedded System Software, ARM processor Families, Core extensions, Architecture Revisions.

UNIT-IIARM INSTRUCTION SET:

Data Processing Instructions, Branch, Load, Store Instructions, Software interrupt instruction, PSR Instructions, Conditional Instructions.

UNIT-III ARM THUMB INSTRUCTION SET:

Register Usage, ARM – thumb interworking, Other Branch Instructions, Data Processing Instructions, Single Register and Multi Register Load-Store Instructions, Stack, Software Interrupt Instructions.

UNIT-IV ARM PROGRAMMING:

Simple C Programs using Function Calls, Pointers, Structures, Integer and Floating-Point Arithmetic, Assembly Code using Instruction Scheduling, Register Allocation, Conditional Execution and Loops.

UNIT-V

Memory Management Cache Architecture, Polices, Flushing and Caches, MMU, Page Tables, Translation, Access Permissions, Content Switch, coprocessors 15 and write buffer.

TEXT BOOKS:

1. Andrew N. Sloss, Dominic Symes, Chris Wright, "ARM Systems Developer's Guide- Designing & Optimizing SystemSoftware", 2008, Elsevier.
2. Jonathan W. Valvano – Brookes / Cole, 1999, "Embedded Microcomputer Systems, RealTime Interfacing", Thomas Learning.

REFERENCES:

1. Inteland ARM Data Bookson Microcontrollers.
2. Embedded SystemDesign-Frank Vahid/TonyGivargis, John Willey, 2005.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	-	2	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	-	2	-	-	-	-	-	-	-	2	-	-
CO3	3	3	3	-	2	-	-	-	-	-	-	-	2	-	-
CO4	3	3	3	-	2	-	-	-	-	-	-	-	-	-	-
Average	3	3	3	-	2	-	-	-	-	-	-	-	2	-	-
Level of Correlation	3	3	3	-	2	-	-	-	-	-	-	-	2	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

	L	T	P	C
III B.Tech II Semester(EEE)	**3**	**0**	**0**	**3**

IV B.Tech I Semester(Common to CE, ME, ECE, CSE, IT, CSE (AI&ML) & CSE (DS), CAI, CSC & CSO)

20AMB04 CREATIVITY AND INNOVATION

COURSE OUTCOMES:

After the completion of the course student will be able to

1. Explain innovation and creativity management from the perspective of obtaining a sustainable competitive advantage and integrating innovation into the business strategy.
2. Explain the attributes of successful innovation strategies including an in-depth understanding of the dynamics of innovation
3. Identify the role that innovation plays in the competitive dynamics of industries and how these innovations affect society.
4. Explain the factors and drivers that predict creativity and innovation of individuals, groups, and organizations
5. Design a creative business concept and develop a business plan.

Unit I: Creativity: Concept - Convergent and Divergent Thinking -Creative Intelligence - Enhancing Creativity Intelligence -Determinants of Creativity - Creativity Process - Roots of Human Creativity - Biological, Mental, Spiritual and Social -Forms of Creativity - Essence, Elaborative and Expressive -Existential, Entrepreneurial and Empowerment.

Unit II: Creative Personality: Creative Personality Traits Congenial to Creativity - Motivation and Creativity - Strategies for changing Motivation - Creativogenic Environment - Formative Environment and Creativity - Adult Environment - Environmental Stimulants - Blocks to Creativity-Strategies for unblocking Creativity.

Unit III: Organizational Creativity: Creative Manager - Techniques of Creative Problem Solving -Creative Encounters and Creative Teams - Perpetual Creative Organizations - Creative Management Practices – Human Resource Management, Marketing Management, Management of Operations, Management of Product Design and Growth Strategies-Issues and Approaches to the Design of Creative Organizations Policy frameworks - Organizational Design for Sustained Creativity - Mechanism for Stimulating Organizational Creativity - Creative Diagnosing - Creative Societies - Necessity Model of a Creative Society

Unit IV: Management of Innovation: Nature of Innovation- Concept of Innovation- Historic Retrospective-Typology of Innovations-Innovation Process- Macroeconomic View of Innovation

Approaches to Innovations-Assumptions and Barriers to Innovations-Innovation Sources, -Technological Innovations and their Management-Training for Innovation - Management of Innovation-Agents of Innovation -Skills for Sponsoring Innovation.

Unit V: Innovation & Entrepreneurship: Concept of Entrepreneurship- Entrepreneurial opportunities, attitude, traits and tendencies-Design of a Successful Innovative Entrepreneurship-Idea generation & Prototype Development- Social Innovation and Entrepreneurship-Intellectual Property Right (IPR)-Commercialization of Innovations-Startup and Venture development-Pre-incubation and Incubation Stages-Govt. Schemes and funding support to ideas, innovations, and startup-Current trends, development and general awareness on Innovation and startup.

Text Books:

1. Kandwalla, P. N. (2004). Lifelong creativity : an unending quest. Tata Mcgraw-Hill..
2. Khandwalla, P. N. (2022). Corporate Creativity: The Winning Edge (1st ed.). Mc Graw Hill India.
3. Lalitha Krishnamacharyulu.(2010).- Innovation Management, Himalaya Publishing House, Edition: 2, 2010

Reference Books:

1. Rastogi, P. N. (2009). Management of technology and innovation: Competing through technological excellence. SAGE Publishing India.
2. Plucker, J. A. (2021). Creativity and innovation: Theory, research, and Practice. Routledge.

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	2	-	2	-	-	-	-	-	-	-	-	-	-
CO2	-	-	2	-	2	-	-	-	-	-	-	-	-	-	-
CO3	-	-	2	-	2	-	-	-	-	-	-	-	-	-	-
CO4	-	-	2	-	2	-	-	-	-	-	-	-	-	-	-
CO5	-	-	2	-	-	2	-	-	-	-	2	-	-	-	-
Average	-	-	2	-	2	2	-	-	-	-	2	-	-	-	-
Level of Correlation	-	-	2	-	2	2	-	-	-	-	2	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

L	T	P	C
3	0	0	3

IV B. Tech I Semester
(Common to CE, ME, EEE, ECE, CSE, IT, CSE (AI&ML), CSE (DS),CAI, CSC & CSO)

20AMB05 LEADERSHIP ESSENTIALS

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

1. Identify the concepts and theories of leadership and analyse its relevance to the organizations.
2. Analyze various sources of power, politics and conflict management.
3. Adapt theories of leadership to cases and contexts in organisation.
4. Interpret change, sustainable development and implications of cultural factors in organizations.
5. Develop leadership potential and practices in organizations.

Unit I- Overview and Introduction of Leadership: concepts and functions of leadership; Leadership, Role and Functions of a Leader, Leadership Motives Characteristics of an Effective Leader, Leadership as a Process - the Complexities of Leadership - Effective Leadership Behaviours and Attitudes –Emerging Approaches of leadership.

Unit II- Leadership and Power: Sources of Power, The link between Politics, Power and Conflict, Power and Conflict; Coercion, Trait Approach, Ohio State Leadership Study, The University of Michigan Study, Blake and Mouton's Managerial Grid.

Unit III- Leadership theories and styles: Contingency Theories of Leadership -, The Path-Goal Theory, Transactional Leadership Style Charismatic Leadership. Servant Leadership, Leadership Ethics.

Unit IV- Fostering Organizational Culture and Climate: Vision Building; Developing Strategic Thinking; strategies in developing a culture conducive to change; handling change; Cultural Factors Influencing Leadership Practice.

Unit V- Developing Future Leaders: Strategic Leadership Competencies; 360º Leadership Assessment; The Myers–Briggs Type Indicator (MBTI); developing global leaders in organization.

TEXTBOOKS:

1. Peter Guy Northouse. (2021). Introduction to leadership : concepts and practice (5th ed.). Sage.
2. Humphrey, R. H. (2014). Effective leadership : theory, cases, and applications. Sage.

REFERENCES BOOKS:

1. Bratton, J., Grint, K., & Nelson, D. L. (2005). Organizational leadership. Thomson/South-Western.

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO2	-	-	-	-	-	-	-	-	3	-	3	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO4	-	-	-	-	-	-	-	-	3	-	3	-	-	-	-
CO5	-	-	-	-	-	-	-	-	3	-	2	-	-	-	-
Average	-	-	-	-	-	-	-	-	3	-	2.8	-	-	-	-
Level of Correlation	-	-	-	-	-	-	-	-	3	-	3	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

	L	T	P	C
III B. Tech II Semester (EEE)	**3**	**0**	**0**	**3**

IV B. Tech I Semester (Common to CE, ME, ECE, CSE, IT, CSE (AI&ML), CSE (DS), CAI, CSC & CSO)

20AMB06 LAW FOR ENGINEERS

Course Outcomes:

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

1. Explain the essential principles of the law relevant to engineering practice
2. Apply the relevant provisions of contract law
3. Use effective contract laws for decision making and problem-solving techniques in different scenarios
4. Recognize and explore key legal requirements for engineering including health & safety, privacy, and professional indemnity.
5. Discuss about the industrial dispute settlement mechanism

UNIT- I: THE NATURE AND SOURCES OF LAW: Definition and nature of law, definition law and morality, classification of law, Overview of Business laws in India – Sources of business law.

UNIT- II: LAW OF CONTRACT: Contract- Essential features of a valid contract – Performance of a contract – Breach of contract and its remedies.

UNIT- III: SPECIAL CONTRACTS: Quasi Contracts – Contingent Contracts – Indemnity and Guarantee – Contract of Agency – Bailment and Pledge.

UNIT- IV: LAW OF TORT: Definition of Tort, Fundamental Purpose Development of Law of Torts-Specific Torts, Negligence, Nervous Shock, Nuisance, Trespass, Defamation False Imprisonment and Malicious Prosecution Purpose.

UNIT- V INDUSTRIAL DISPUTE & SETTLEMENT MECHANISM: Employee Grievances -Collective Bargaining- Industrial Disputes and Resolution Mechanism; **Overview on IPR.**

Text Books:

1. Kapoor, N. D. (1983). Elements of mercantile law: including company law and industrial law. Sultan Chand & Sons.
2. Kunwar Arora, Vibha Arora. (2017). Law for Engineers. Central Law Publications.

Reference Books:

1. Gulshan, S. S. (2009). Business law. Excel Books.
2. Mulheron, R. (2020). Principles of Tort Law. Cambridge University Press.

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	3	-	-	-	-	-	-	-	-	-
CO2	-	-	-	3	-	3	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	3	-	-	-	-	3	-	-	-	-
CO4	-	-	-	-	-	3	-	-	-	-	3	-	-	-	-
CO5	-	-	-	-	-	3	-	-	-	-	2	-	-	-	-
Average	3	-	-	3	-	3	-	-	-	-	2.6	-	-	-	-
Level of Correlation	3	-	-	3	-	3	-	-	-	-	3	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

L	T	P	C
3	0	0	3

IV B. Tech I Semester
(Common to CE, ME, EEE, ECE, CSE, IT, CSE (AI&ML), CSE (DS),CAI, CSC & CSO)

20AMB07 ENTREPRENEURSHIP ESSENTIALS

COURSE OUTCOMES

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

1. Explain the Fundamentals and specifics of Entrepreneurship.
2. Apply theoretical concepts in developing an idea and startup a new technology-based company.
3. Prepare marketing and financial plans that are viable in nature.
4 Apply marketing research methods and tools to forecast and to analyze the trend.
5. Develop innovative business solutions with a holistic perspective from concept to reality.

UNIT-I: BASIC ENTREPRENEURSHIP: Entrepreneurial traits, true motivation & leadership, understanding of Entrepreneurial process, understanding of personal aspirations, Entrepreneurial personality development, Entrepreneurial communication, Entrepreneurship in Indian Scenario, Future prospects in India and emerging economies.

UNIT-II: MARKETING AND MARKET RESEARCH: Market dynamics, Market segmentations and creation of derivatives, Marketing Research methodologies, trend, assessment, analysis and forecasting, structural aspects of market. Identification of overall market, addressable market and serviceable market for product and services.

UNIT-III: ENGINEERING DESIGN PROCESS: Introduction to Engineering Design Process; Design Approaches - Forward and Reverse Engineering; Reverse Engineering Process – Definition and goal of Reverse engineering (RE); Theory of inventive problem solving (TRIZ): Fundamentals, methods and techniques, inventive design strategies and Simulation in Engineering Design - Computer Aided Engineering and Simulation; Engineering Manufacturing and Materials; Sustainability and Design: Recyclability; Reliability and Lean Design Engineering; Interface with Industrial design; Economic considerations in design; Eco Design and Green Engineering Product Development

UNIT – IV: FINANCIAL AND LEGAL ASPECTS OF BUSINESS: Process for effective financial planning, types of budgets preparation, overview of specific ratios to measure financial performance, liquidity, asset management, profitability, leverage and comparative analysis, business laws enshrined in the Indian constitution, the policies of the state, Income tax structure, the labor laws.

UNIT –V: MANAGEMENT OF GROWTH VENTURE: Importance of Innovation as a differentiator in growth venture, Underlying opportunities, Strategic management for Launching process of growth ventures, understanding organizational & institutional aspects of growth ventures, Exit strategies of Growth ventures, Future prospects of venture financing of growth venture firms.

TEXT BOOKS:

1. Allen, K. R. (2018). Launching New Ventures: An Entrepreneurial Approach. United States: Cengage Learning.
2. Khanka, S. S. (2006). Entrepreneurial Development. India: S. Chand Limited.
3. Nelson, A. J., Byers, T. H., Dorf, R. C. (2018). Technology Ventures: From Idea to Enterprise. United Kingdom: McGraw-Hill Education.

REFERENCES:

1. Harrington, H. J. (2018). Creativity, Innovation, and Entrepreneurship: The Only Way to Renew Your Organization. United States: Taylor & Francis.
2. Smith, A., Pigneur, Y., Papadakos, T., Osterwalder, A., Bernarda, G. (2015). Value Proposition Design: How to Create Products and Services Customers Want. Germany: Wiley.
3. Allen, K. R. (2010). Entrepreneurship for Scientists and Engineers. United Kingdom: Pearson Prentice Hall.

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO3	-	1	1	-	-	-	-	-	-	-	3	-	-	-	-
CO4	-	1	1	-	-	-	-	-	-	-	3	-	-	-	-
CO5	-	1	1	-	-	-	-	-	-	-	3	-	-	-	-
Average	-	1	1	-	-	-	-	-	-	-	3	-	-	-	-
Level of Correlation	-	1	1	-	-	-	-	-	-	-	3	-	-	-	-

3-High Mapping　　2- Medium Mapping　　1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

	L	T	P	C
III B. Tech II Semester (EEE)	**3**	**0**	**0**	**3**

IV B. Tech I Semester (Common to CE, ME, ECE, CSE, IT, CSE (AI&ML), CSE (DS), CAI, CSC & CSO)

20AMB08 ESSENTIALS OF MANAGEMENT SCIENCE

COURSE OUTCOMES:

After completion of the course student will be able to

1. Apply various areas of functional management for the prospects of business organization.
2. Apply management principles for decision making.
3. Apply various functions of Hr manager.
4. Use tools and techniques to become an effective manager.
5. Apply production tools and techniques in every area of business

UNIT-I INTRODUCTION TO MANAGEMENT: Nature, importance and Functions of Management, Approaches to Management - Taylor's Scientific Management - Henry Fayol's Principles of Management, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Leadership Styles .

UNIT-II INTRODUCTION TO ORANISATION: Types of Mechanistic and organic structures. Delegation, Decentralization - Formal and Informal Organization

UNIT III OPERATIONS MANAGEMENT: Principles and Types of Plant Layout - Methods of production (Job, batch and Mass Production), Work Study - Basic procedure involved in Method Study and Work Measurement

UNIT IV MATERIALS MANAGEMENT: Objectives, Need for Inventory control, EOQ, ABC Analysis, Purchase Procedure, Stores Management and Stores Records, Marketing: Functions of Marketing, Marketing Mix, Product Life Cycle and Channels of Distribution.

UNIT V HUMAN RESOURCES MANAGEMENT (HRM): Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Wage and Salary Administration, Job Evaluation and Merit Rating, Performance Appraisal

TEXT BOOKS:

1. Aryasri, Management Science, TMH, 4 th Edition, 2009.

2. Stoner, Freeman, Gilbert, Management, Pearson Education, New Delhi, 6 th Edition, 2004.

3. PannerSelvem, Production and Operations Management, Prentice Hall of India, 3 rd Edition, 2012

REFERENCE BOOKS:

1. Kotler Philip & Keller Kevin Lane, Marketing Management, PHI, 12th Edition, 2005.

2. Koontz &Weihrich, Essentials of Management, TMH, 6 th Edition, 2005.

3. SubbaRao. P, Personnel and Human Resource Management, Himalaya Publishing House, 2000

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	3	-	3	-	-	-	-
CO2	-	-	-	-	-	-	-	-	3	-	3	-	-	-	-
CO3	-	-	-	-	-	-	-	-	3	-	3	-	-	-	-
CO4	-	-	-	-	-	-	-	-	3	-	3	-	-	-	-
CO5	-	-	-	-	-	-	-	-	3	-	3	-	-	-	-
Average	-	-	-	-	-	-	-	-	3	-	3	-	-	-	-
Level of Correlation	-	-	-	-	-	-	-	-	3	-	3	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B. Tech I Semester ECE

Course Code: 20AEC65

EMBEDDED SYSTEM PROGRAMMING

L	T	P	C
1	0	2	2

Course Outcomes:

After successful completion of course the student will be able to

CO1: Define fundamentals of embedded systems and write programs for a specific application.

CO2: Analyze and design the interfacing of different peripherals.

CO3: Explain concepts of Realtime Operating Systems.

CO4: Implement real time applications using embedded system

List of Experiments (Minimum 10 experiments has to be done)

1. Write a program to a) Clear the Register and b) Add 3 to Register Ten Times and place the result into Memory Use the Indirect Instructions to Perform Looping.

2. To transfer the data serially between two microcontroller kit using RS232C.

3. Write an 8051 C program to get a byte of data from P0,if it is less than 100, send it to P1, otherwise send it to P2.

4. Write an 8051 C program to get a byte of data fromP1, wait ½ second and then send it to P2.

5. Write a Program to monitor Door Sensor and when it Open, Sounds the Buzzer by sending a Square Wave of few Hundred Hz Frequency to it. A Door Sensor is connected to RB1 Pin and a Buzzer is connected to RB7.

6. Write a Program to Toggle all the Bits of PORT B parts continuously with a 250ns delay.

7. Write an Interfacing Program to blink LED.

8. Write an Interfacing Program to blink LED in dancing fashion.

9. Write an Interfacing Program to display numerical characters on LCD.

10. Write a program to implement data transmission using serial mode.

11. Write a program to implement data receiving using serial mode.

12. Write a program to use the TIMER 0 as a counter.

13. Mini project

TEXT BOOKS:

1. Frank Vahid, Tony D. Givargis, "Embedded System Design – A Unified Hardware/Software Introduction", John Wiley, 2002.
2. RajKamal, "Introductionto Embedded Systems", TMS, 2002.
3. Muhammed Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay, "The 8051 Microcontroller and Embedded systems using Assembly and C", second Edition, Pearson, 2007.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	2	-
CO2	3	3	-	3	-	-	-	-	-	-	-	-	-	2	-
CO3	3	3	-	3	-	-	-	-	-	-	-	-	-	2	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	-	2	-
Average	3	3	-	3	-	-	-	-	-	-	-	-	-	2	-
Level of Correlation	3	3	-	3	-	-	-	-	-	-	-	-	-	2	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

IV B. Tech I Semester

L	T	P	C
3	0	0	3

(Common to CE, EEE, ME, ECE, CSE, IT, CSE(AI&ML), CAI, CSC, CSO & CSE(DS))

20AMB12 PROFESSIONAL ETHICS

COURSE OUTCOMES:

After completion of this course students will be able to:

1. Identify and analyze an ethical issue in the relevant field.
2. Apply specific ethical theories to current social issues.
3. Identify significant problems in contemporary professional ethics.
4. Explain the ethical roles of engineers in industry and society.
5. Explain moral and ethical obligations toward the environment.

UNIT I INTRODUCTION: Professionalism-models of professionalism-Ethics-Types of ethics and morality-Engineering ethics-Positive and negative faces of ethics-Responsibility for safety-Technology pessimism and perils of technological optimism.

UNIT II ETHICAL CONCEPTS: Human Values – morals-integrity-work ethics-Respect for others-respect for authority-conflicts of interests-moral dilemmas-honesty- courage-cooperation-valuing time-commitment-collegiality-loyalty-self -interest-Professional accountability-royalty-Problem of bribery, extortion and grease payments-problem of nepotism, excessive gifts-confidentiality-uses of ethical theories-Kohlberg's Theory- Gilligan`s Theory-Ethical codes of IEEE and Institution of Engineers.

UNIT III ENGINEERS ROLE IN SAFETY: Safety and risks-risk and costs-risk benefit analysis-Testing methods for safety-The promise of technology-Computer Technology Privacy-Social policy-Engineering standards-the standards care-Social and value dimensions of technology-communicating risk and public policy-occupational crime-professional rights and employee rights-whistle blowing.

UNIT IV ROLES OF ENGINEERS: Engineers as managers, Advisors, Consultants, Experts and witnesses- Engineers role in industry and society- models of professional roles-Theories about right action-paternalism-different business practices-Moral leadership- Cases - Bhopal gas tragedy, Nuclear power plant disasters.

UNIT V ENVIRONMENTAL ETHICS: Global Issues-Multinational corporations-Living in harmony with NATURE-Holistic technology-Eco friendly production system-sustainable technology and development-weapon development-Four orders of living, their interconnectedness-Eco system-Ozone depletion-pollution

TEXT BOOKS:

1. Subramanian R, Professional Ethics,1st Edition, Oxford University Press. 2013.
2. Naagarazan , R.S., A Textbook on Professional Ethics and Human Values,1st edition, New Age International (P) Limited, Publishers New Delhi.,2014
3. R. R. Gaur, R. Sangal and G. P. Bagaria, Human Values and Professional Ethics:,EecelBooks,New Delhi.2010.

REFERENCE BOOKS:

1. Fundamentals of Ethics for scientists and Engineers, Edmond G Seebauer and Robert L. Barry, 1st edition Oxford University Press, 2008.
2. Professional Ethics and Human Values – M.Govindrajan, S.Natarajan and V.S. Senthil Kumar, PHI Learning Pvt. Ltd. Delhi.
3. Professional Ethics and Human Values: Prof. D.R. Kiran, TATA McGraw Hill Education, 2007.
4. Charles D Fleddermann, “Engineering Ethics”, Prentice Hall.
5. Charles E Harris, Micheal J Rabins, “Engineering Ethics, Cengage Learning.

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	2	3	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	2	3	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	2	3	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	2	3	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	2	3	-	-	-	-	-	-	-
Average	-	-	-	-	-	-	2	3	-	-	-	-	-	-	-
Level of Correlation	-	-	-	-	-	-	2	3	-	-	-	-	-	-	-

3-High Mapping 2- Medium Mapping 1-Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B. Tech I Semester ECE

Course Code: 20AEC66

INDUSTRIAL/RESEARCH INTERNSHIP

L	T	P	C
0	0	0	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B. Tech II Semester ECE

Course Code: 20AEC70

PROJECT, PROJECT WORK, SEMINAR AND INTERNSHIP IN INDUSTRY

L	T	P	C
0	0	0	12

HONORS

In

Electronics and Communication Engineering

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

II B.Tech II Semester ECE

20AEC71 PULSE AND DIGITAL CIRUITS

(POOL1)

L	T	P	C
3	1	0	4

Course Outcomes:

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

CO1 Apply the concepts of various linear and nonlinear wave shaping circuits in the design of electronic circuits

CO2 Analyze and design various multivibrator circuits and time basegenerators.

CO3 Understand the operation of various sampling gates and digital logic gates.

UNIT I – WAVESHAPING (12Periods)

High pass, low pass RC circuits- their response for various inputs, s. RC network as Differentiator and Low Integrator, attenuators and its applications as a CRO probe, RL circuit and its response for step input.

Clippers- Types, clipping at two independent levels, Comparators-applications of voltage comparators, Clampers-Types, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage.

UNIT II – MULTIVIBRATORS (12Periods)

Transistor as a switch, Break down voltages, Transistor-Switching Times, Triggering circuits. Analysis and Design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger circuit using BJT.

UNIT III-TIME BASE GENERATORS (12Periods)

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, Transistor Current time base generators.

UNIT IV- SYNCHRONIZATION AND FREQUENCY DIVISION (12Periods)

Pulse Synchronization of relaxation Devices, Frequency division in sweep circuit, Stability of relaxation Devices, A stable relaxation circuits, Monostable relaxation circuits, Synchronization of a sweep circuit with symmetrical signals.

UNIT V - REALIZATION OF LOGIC GATES (10 Periods)

Realization of Logic Gates Using Diodes and Transistors: AND, OR, NOT gates using Diodes and Transistors, RTL, DTL, TTL and CML logic families and their comparisons.

Total Periods: 45

Text Books:

1. J.Millman, H.Taub and Mothiki S. PrakashRao, " Pulse, Digital and Switching Waveforms", TMH 2nd Edition, 2008.
2. David A. Bell, "Solid State Pulse Circuits", PHI, 4th edition, 2002.

Reference Books:

1. Jacob Millman, Christos C. Halkias, "Integrated electronics" TataMcGraw Hill Publication
2. A.Anand Kumar, "Pulse and Digital Circuits", PHI, 2005.
3. Ronald J. Tocci, "Fundamentals of Pulse and Digital Circuits", 3rd edition, 2008
4. Mothiki S. PrakashRao (2006), Pulse and Digital Circuits, Tata McGraw Hill, India

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	-	-	-	-	-	-	-	-	-	2	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	2	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-	2	-	-
Average	3	3	3	-	-	-	-	-	-	-	-	-	2	-	-
Level of correlation	3	3	3	-	-	-	-	-	-	-	-	-	2	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech II Semester ECE

(20AEC72)ELECTRONICS SYSTEM DESIGN

(POOL1)

L	T	P	C
3	1	0	4

Course Outcomes:

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

CO1 Understand the fundamentals of Digital electronics to Analyze MSI, LSI Circuits and Sequential Machines.

CO2 Analyze the multi-input controller design based on timing and frequency.

CO3 Design asynchronous finite state machines and analyze the various hazards for the design of.

UNIT I Review of Digital electronics concept:(12 Periods)

Introduction to Digital, Digital and its Symbology, Digital and the Real World, Digital-to-Analog/Analog-to-Digital Converters, Number Systems, Juxta positional Numbers, Polynomial Notation, Base Conversion Methods, Number Conversion, Complements of Numbers, Codes.

UNIT II MSI and LSI Circuits and Their Applications:(10Periods)

Arithmetic Circuits, Comparators, Multiplexers, Code Converters, XOR And AND-OR INVERTER Gates, Wired Logic, Bus Oriented Structures, Tri-State Bus System, Propagation Delay.

UNIT III Sequential Machines(14Periods)

The Concept Of Memory, The Binary Cell, The Cell And The Bouncing Switch, Set / Reset, D, Clocked T, Clocked JK Flip Flop, Design Of Clock F/F, Conversion, Clocking Aspects, Clock Skew, State Diagram Synchronous Analysis Process, Design Steps For Traditional Synchronous Sequential Circuits, State Reduction, Design Steps For Next State Decoders, Design Of Out Put Decoders, Counters.

UNIT IV Multi Input System Controller Design(14Periods)

System Controllers, Design Phases And System Documentation, Defining The System, Timing And Frequency Considerations, Functional, Position And Detailed Flow Diagram Development, MDS Diagram, Generation, Synchronizing Two System And Choosing Controller, Architecture, State Assignment, Next State Decoders And Its Maps, Output Decoders, Clock And Power Supply Requirements, MSI Decoders, Multiplexers In System Controllers, Indirect Addressed Multiplexers Configurations.

UNIT V Asynchronous Finite State Machines(10Periods)

Scope, Asynchronous Analysis, Design Of Asynchronous Machines, Cycle And Races, Plotting And Reading The Excitation Map, Hazards, Essential Hazards Map Entered Variable, MEV Approaches To Asynchronous Design, Hazards In Circuit Developed By MEV Method.

Total Periods: 60

Text Books:

1. Fletcher,"An Engineering Approach To Digital Design" PHI Publication, 1990.
2. Lienig, Jens, Bruemmer, Hans, "Fundamentals of Electronic Systems Design" Springer, First Edition 2017

Reference Books:

1. Luca Sterpone , "Electronics System Design Techniques for Safety Critical Applications"Springer, First Edition, 2009.
2. J B Gosling, "Simulation in the design of digital electronic systems",Cambridge University Press,1993.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	1	-	-	-	-	-	-	-	-	2	-	-
CO2	3	1	-	1	-	-	-	-	-	-	-	-	2	-	-
CO3	2	3	-	1	-	-	-	-	-	-	-	-	2	-	-
Average	2.66	2.33	-	1	-	-	-	-	-	-	-	-	2	-	-
Level of Correlation	3	2	-	1	-	-	-	-	-	-	-	-	2	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech II Semester ECE

Course Code: 20AEC73 COMMUNICATION ENGINEERING

L	T	P	C
3	1	0	4

Course Outcomes:

CO1 Analyze and understand various analog, pulse and digital modulation techniques

CO2 Analysis of Source and Error control coding

CO3 Analyze Spread Spectrum and Multiple Access Techniques

UNIT I

ANALOG MODULATION (9 Periods)

Amplitude Modulation – AM, DSBSC, SSBSC, VSB – PSD, modulators and demodulators – Angle modulation – PM and FM – PSD, modulators and demodulators – Superheterodyne receivers

UNIT II

PULSE MODULATION (9 Periods)

Low pass sampling theorem – Quantization – PAM – Line coding – PCM, DPCM, DM, and ADPCM And ADM, Channel Vocoder - Time Division Multiplexing, Frequency Division Multiplexing

UNIT III

DIGITAL MODULATION (9 Periods)

Phase shift keying – BPSK, DPSK, QPSK – Principles of M-arysignaling M-ary PSK & QAM – Comparison, ISI – Pulse shaping – Duo binary encoding – Cosine filters – Eye pattern, equalizers

UNIT IV

INFORMATION THEORY AND CODING (9 Periods)

Measure of information – Entropy – Source coding theorem – Shannon–Fano coding, Huffman Coding, LZ Coding – Channel capacity – Shannon-Hartley law – Shannon's limit – Error control codes – Cyclic codes, Syndrome calculation – Convolution Coding, Sequential and Viterbi decoding

UNIT V

SPREAD SPECTRUM AND MULTIPLE ACCESS (9 Periods)

PN sequences – properties – m-sequence – DSSS – Processing gain, Jamming – FHSS – Synchronisation and tracking – Multiple Access – FDMA, TDMA, CDMA,

Total Periods: 45

Text Books:

1. H Taub, D L Schilling, G Saha, "Principles of Communication Systems" 3rd edition, TMH 2007
2. S. Haykin "Digital Communications" John Wiley 2005

Reference Books:

1. B.P.Lathi, "Modern Digital and Analog Communication Systems", 3rd edition, Oxford University Press, 2007
2. H P Hsu, Schaum Outline Series – "Analog and Digital Communications" TMH 2006
3. B.Sklar, Digital Communications Fundamentals and Applications" 2/e Pearson Education 2007.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	2	-	-	-	-	-	-	-	-	-	-	2
CO2	3	3	-	3	-	-	-	-	-	-	-	-	-	-	2
CO3	3	3	-	3	-	-	-	-	-	-	-	-	-	-	2
Average	3	3	-	2.66	-	-	-	-	-	-	-	-	-	-	2
Level of Correlation	3	3	-	3	-	-	-	-	-	-	-	-	-	-	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech II Semester ECE

(20AEC74)LINEAR SYSTEM THEORY

(POOL1)

L	T	P	C
3	1	0	4

Course Outcomes:

After completion of the course students will be able to

CO1 Analyze Linear and Non-Linear Dynamical Systems

CO2 Apply the Lyapunov Stability Theory to analyze Dynamical Systems

CO3 Analyze the Controllability and Observability of the system

UNIT I Fundamentals of linear algebra:(10Periods)

Vector spaces, Linear Operators, Eigen values and Eigenvectors, Diagonal Forms and Jordan Forms, Special Linear Operators: Symmetric and Normal/Orthogonal Operators

UNIT II Linear and Non-Linear Dynamical Systems :(15Periods)

General Dynamical Models, Examples of linear and non-linear models, Linear and non-linear phenomena, Solution of Systems of linear differential Equations, Laplace transform and the concept of transfer function, Duality

UNIT III Stability Concepts:(15Periods)

Stability of Equilibrium Points and Linearization, Lyapunov Stability: General Concepts, Lyapunov Stability for Linear Systems, Lyapunov Stability for Non-linear Systems and Linearization, Exponential Stability and Region of Attraction, Converse Lyapunov Functions and Non- Autonomous Systems

UNIT IV Controllability:(10Periods)

Random variables - Probability function – moments – moment generating functions and their properties – Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and Normal distributions – Function of a Random Variable.

UNIT V Observability :(10Periods)

General Conditions, Observability Canonical Forms ,Time Invariant Systems, Controllability Canonical Forms.

Total Periods: 60

Text Books:

1. Szidarovszky and Bahill, Linear Systems Theory, Second Edition (Systems Engineering) Hardcover – November 25, 1997
2. Joao P. Hespanha, ”Linear Systems Theory”, Princeton University Press, First Edition, ISBN-10: 0-691-14021-9

Reference Books:

1. Hans Blomberg and Raimo Ylinen, “Algebraic Theory for Multivariable Linear Systems” , Academic Press, 1983
2. Peter Butkovič , “Max-linear systems”, Theory and algorithms, Springer-Verlag London,2010

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	2	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	2	-	-
Average	3	3	-	-	-	-	-	-	-	-	-	-	2	-	-
Level of Correlation	3	3	-	-	-	-	-	-	-	-	-	-	2	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING ANDTECHNOLOGY (AUTONOMOUS)

III B.Tech I Semester ECE

Course Code: 20AEC75

MICROELECTRONIC DEVICES TECHNOLOGY AND CIRCUITS (HONOR)

L	T	P	C
3	1	0	4

Course Outcomes:

After successful completion of course the student will be able to

CO1: Demonstrate the behavior of charge carriers and transport in semiconductor devices.

CO2: Use PN junctions in semiconductor devices under various conditions

CO3: Apply BJT and MOSFET transistor characteristics

CO4: Analyze and Design the various transistor circuits.

UNIT-I: CHARGE CARRIERS AND TRANSPORT

Electrons and holes in semi-conductors; generation and recombination; intrinsic conductivity. Doping; detailed balance and mass action; extrinsic carrier concentration; p-type and n-type semiconductors. Excess carriers; recombination; low level injection and minority carrier life time. Drift; mobility and conductivity; photo conductivity. Diffusion; the Einstein relation, quasi-neutrality, and dielectric relaxation; role of minority carriers.

UNIT-II P-NJUNCTIONS:

Space charge in in homogeneously doped semiconductor. Poisson -Boltzmann equation; Debye length. Depletion approximation. Boundary conditions at edge of space charge layer. Diode i-v characteristics. Depletion and diffusion capacitances. Incremental equivalent circuit. Light emitting diodes. Optical injection ofcarriers; photodiodes; solar cells.

UNIT- III BIPOLAR TRANSISTORS:

Derivation of large signal forward active region model; base width modulation. Hybrid-incremental model including Early effect and capacitive elements; intrinsic high frequency limitations of BJTs.

UNIT-IV MOS FIELDEFFECTTRANSISTORS:

MOS capacitor: accumulation, depletion, inversion, strong inversion with depletion approximation, factors that control threshold voltage. MOS transistors: gradual channel approximation; i-v characteristics in strong in version; channel length modulation; velocity saturation. Incremental model including Early effect, back gate effect, and capacitive elements; intrinsic high frequency limitations of MOSFETs. Sub-threshold physics; drain current, comparison to BJT.

UNIT-V: TRANSISTOR CIRCUITS:

Digital building-block circuits; MOS and bipolar inverter technologies; CMOS; memory cells. Switching transients and gate delays. Various single stage MOSFET and BJT amplifier configurations; resistor and current source biasing. Current source design. Resistive, current source, and active loads. Multistage amplifiers; differential pairs; direct-coupled stages- Frequency response; Miller effect; methods of open circuit and short circuit time constants. Sub threshold amplifier design and applications.

TEXT BOOKS:

1. Millman's Electronic Devices and Circuits, 4th Edition, Jacob Millman, Christos C. Halki as and Satya bratha Jit, McGraw Hill Education, 2016.
2. Electronic Devices and Circuits, 4th Edition, S Salivahanan and N Suresh Kumar, McGraw Hill Education, 2017.

REFERENCE BOOKS:

1. Electronic Devices and Circuits, 6th edition, T.F. Bogart Jr., J.S. Beasley and G. Rico, Pearson Education, 2008.
2. Electronic Devices and Circuits, 5th edition, David A. Bell, Oxford University Press, 2008.
3. Electronic Devices and Circuits, 10th Edition,R.L. Boylestad and Louis Nashelsky, Pearson Prentice Hall, 2009.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	-	-	-	-	-	-	-	-	2	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	-	2	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	-	2	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	-	2	-	-
Average	3	3	2.5	2.5	-	-	-	-	-	-	-	-	2	-	-
Level of Correlation	3	3	3	3	-	-	-	-	-	-	-	-	2	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech I Semester ECE
Course Code: 20AEC76

DIGITAL IC DESIGN
(HONOR)

L	T	P	C
3	1	0	4

Course Outcomes:

After successful completion of course the student will be able to

CO1: Apply the IC design rules to construct CMOS Integrated Circuits

CO2: Analyze the CMOS fundamentals using the design of CMOS inverter

CO3: Analyze and design CMOS-based combinational, sequential and memory circuits.

UNIT -I THE MANUFACTURING PROCESS:

Manufacturing CMOS Integrated Circuits: The Silicon Wafer, Photolithography, Some Recurring Process Steps, Simplified CMOS Process Flow, Design Rules, Packaging Integrated Circuits: Package Materials, Interconnect Levels, Interconnect Parameters — Capacitance, Resistance, and Inductance, Thermal Considerations in Packaging, Trends in Process Technology.

UNIT -II THE CMOS INVERTER:

The Static CMOS Inverter — An Intuitive Perspective; Evaluating the Robustness of the CMOS Inverter: The Static Behavior: Switching Threshold, Noise Margins, Performance of CMOS Inverter: The Dynamic Behavior: Computing the Capacitances, Propagation Delay: First-Order Analysis, Propagation Delay from a Design Perspective, Power, Energy, and Energy-Delay: Dynamic Power Consumption, Static Consumption.

UNIT- III DESIGNING COMBINATIONAL LOGIC CIRCUITS:

Static CMOS Design: Complementary CMOS, Ratioed Logic, Pass-Transistor Logic, Dynamic CMOS Design: Dynamic Logic: Basic Principles, Speed and Power Dissipation of Dynamic Logic, Issues in Dynamic Design, Cascading Dynamic Gates.

UNIT- IV DESIGNING SEQUENTIAL LOGIC CIRCUITS:

Timing Metrics for Sequential Circuits, Classification of Memory Elements, Static Latches and

Registers, Dynamic Latches and Registers, Alternative Register Styles, Pipelining: An approach to optimize sequential circuits, Non-Bistable Sequential Circuits, Timing Issues: Timing classification of digital systems, Clock distribution.

UNIT- V DESIGNING MEMORY AND TESTOF MANUFACTURED CIRCUITS:

Memory Classification, Memory Architectures and Building Blocks, The Memory Core, Memory Peripheral Circuitry, Memory Reliability and Yield, Power Dissipation in Memories, Case Studies in Memory Design. Design for Testability: Test-Pattern Generation, Fault Models, Automatic Test-Pattern Generation (ATPG).

TEXT BOOKS:

1. Jan M Rabaey, “Digital Integrated Circuits - A Design Perspective”, Prentice Hall, Second Edition, 2016.
2. Sung-Mo Kang, YusufLeblebici, “CMOS DigitalIntegrated Circuits - Analysis and Design”, McGraw-Hill, FourthEdition, 2014.
3. Eugene D Fabricus, “Introductionto VLSI Design,” McGraw Hill InternationalEdition.1990

REFERENCE BOOKS:

1. Ken Martin, “DigitalIntegrated Circuit Design”, Oxford UniversityPress, 2000
2. JohnP. Uyemura, “Introductionto VLSI Circuits”, WileyIndia Pvt. Ltd., 2012.
3. Neil.H, E.Weste, David Harris, Ayan Banerjee, CMOS VLSI Design: A Circuit and Systems Perspective, PearsonEducation, FourthEdition, 2011.

	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	-	-	-	-	-	-	-	-	-	2	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	2	-	-
CO3	3	3	3	2	-	-	-	-	-	-	-	-	2	-	-
Average	3	3	3	2	-	-	-	-	-	-	-	-	2	-	-
Level of Correlation	3	3	3	2	-	-	-	-	-	-	-	-	2	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech I Semester ECE
Course Code: 20AEC77

MODERN ANALOG COMMUNICATION SYSTEMS (HONOR)

L	T	P	C
3	1	0	4

Course Outcomes:

After successful completion of course the student will be able to

CO1: Demonstrate the concept of Analog and Digital communication

CO2: Analyze the effect of noises present in the different modulation techniques.

CO3: Apply coding techniques for analog information

CO4: Apply concept of software defined radios for the sensor networks

UNIT -1 INTRODUCTION:

Communication System, Analog and Digital messages, Channel Bandwidth, SNR, Randomness, Redundancy, Convolutional codes, error detecting and correcting codes, comparison of coded and uncoded system.

UNIT -2 NOISES IN THE COMMUNICATION SYSTEM:

Introduction, Noise in amplitude modulation, frequency modulation, pulse code, delta modulation, MPSK, MQAM and MFSK, CPFSK, OQPSK, CPM, performance of spread spectrum system

UNIT -3 INFORMATION THEORY AND CODING:

Optimum reception of digital signals, Performance analysis of digital communication systems; Multi carrier communications, multi-channel communications and Multi-user communications

UNIT -4 INTRODUCTION TO SOFTWARE DEFINED RADIOS:

Spectrum sensing, Dynamic spectrum access and management, Distributed learning; Introduction to sensor networks, Deployment and configuration, Protocols routing and application

UNIT -5 EMERGING DIGITAL COMMUNICATION TECHNOLOGIES:

Digital Services, Broadband digital communications, Digital switching Technologies, Broadband services for entertainment and home office applications, video compression, Spread spectrum systems

TEXT BOOKS:

1.B. P. Lathi and Zhi Ding, “Modern Digital and Analog Communication Systems,” Oxford UniversityPress, 4th Ed., 2009.

2. Simon Haykin, “Communication Systems,” John Wiley & Sons, 5th Ed., 2009.

REFERENCE BOOKS:

1.J. G. Proakis and Masoud Salehi, “Fundamentals of Communication Systems,” 1st Edition, Prearson Education, 2006.

2. U. Madhow, “Fundamentals of Digital Communication,” Cambridge Univ. Press, 2008.

	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-	2
CO2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	2
CO3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	2
CO4	3	3	-	3	-	-	-	-	-	-	-	-	-	-	-
Average	3	3	-	3	-	-	-	-	-	-	-	-	-	-	2
Level of Correlation	3	3	-	3	-	-	-	-	-	-	-	-	-	-	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. Tech I Semester ECE

Course Code: 20AEC78

SIGNAL COMPRESSION THEORY AND METHODS (HONOR)

L	T	P	C
3	1	0	4

Course Outcomes:

After successful completion of course the student will be able to

CO1: Understand the concepts of compression and coding techniques.

CO2: Apply the rate distortion Properties, theorem and quantization to calculate rate distortion for different sources.

CO3: Analyze the compression standards of data, audio, image and video.

UNIT- I REVIEW OF INFORMATION THEORY

The discrete memory less information source - Kraft inequality; optimal codes Source coding theorem. Compression Techniques - Lossless and Lossy Compression - Mathematical Preliminaries for Lossless Compression.

UNIT –II CODING

Huffman Coding - Optimality of Huffman codes - Extended Huffman Coding – Adaptive Huffman Coding - Arithmetic Coding - Adaptive Arithmetic coding, Run Length Coding, Dictionary Techniques - Lempel-Ziv coding, Applications - Predictive Coding - Prediction with Partial Match- Burrows Wheeler Transform, Dynamic Markov Compression

UNIT- III RATE DISTORTION THEORY

Rate distortion function R(D),Properties of R(D); Calculation of R(D) for the binary source and the Gaussian source, Rate distortion theorem, Converse ofthe Rate distortion theorem

UNIT- IV QUANTIZATION

Quantization - Uniform & Non-uniform - optimal and adaptive quantization, vector quantization and structures for VQ, Optimality conditions for VQ, Predictive Coding - Differential Encoding Schemes

UNIT- V COMPRESSION STANDARDS

Data Compression standards: Zip and Gzip, Speech Compression Standards: PCM, ADPCM, SBC, CELP, MPC-MLQ, MELP, LPC. Audio Compression standards: MPEG.

Image Compression standards: JBIG, GIF, JPEG & JFIF, SPIHT, EZW, JPEG 2000. Video Compression Standards: MPEG, H.261, H.263 & H264.

TEXT BOOKS:

1. Khalid Sayood, "Introduction to Data Compression", Morgan Kaufmann Publishers., Third Edn. 2006.
2. David Salomon, "Data Compression: The Complete Reference", Springer Publications, 4th Edn.2006.

	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	-	3	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	3	-	-	-	-	-	-	-	-	-	-	2
CO3	3	3	-	3	-	-	-	-	-	-	-	-	-	-	2
Average	3	3	-	3	-	-	-	-	-	-	-	-	-	-	2
Level of Correlation	3	3	-	3	-	-	-	-	-	-	-	-	-	-	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. Tech II Semester ECE

Course Code: 20AEC79

NANO ELECRONICS (HONOR)

L	T	P	C
3	1	0	4

Course Outcomes:

After successful completion of course the student will be able to

CO1: Understand the Nano electronics concepts through ballistic transport and quantum confinement effect.

CO2: Explain about concepts of Nano structures and Single electron devices.

CO3: Analyze the device characteristics of carbon nano tubes-based FET device

CO4: Design various Nano electronic devices.

UNIT- I INTRODUCTION TO NANOELECTRONICS

Limitations of the conventional MOSFETs at Nanoscales, MOSFET Scaling & implications, Introductory concepts of Ballistic transport and Quantum confinement, Differences in few electron devices (as analog version) and single electron devices (as digital version) of Nano electronic devices.

UNIT- II NANOSTRUCTURES AND QUANTUM ELECTRONIC DEVICES

1D,2D & 3D Nanostructures, Quantum wells, Quantum wires and Quantum dots, Density of states in low dimensional structures, Quantum Interference Devices, Split-Gate Transistor, Electron-Wave Transistor, Resonant tunnelling phenomena and its applications in diodes and transistors.

UNIT- III SINGLE ELECTRON DEVICES

Principle of operation, Single electron effect, Coulomb blockade phenomenon, Theoretical quantum dot transistor, Energy of quantum dot system, Single electron quantum dot transistor, Single transistors, Conductance oscillation and potential fluctuation, Transport under finite temperature and finite bias, Coulomb blockade devices.

UNIT- IV CARBON NANO ELECTRONICS

Carbon nanotubes: Single Walled Carbon Nano Tubes (SWCNTs) and Multi Walled Carbon Nano Tubes (MWCNTs), Fabrication of CNTs, CNT-FETs, Device characteristics, CNT-TUBFET, CNT-SET, and Nano wire FETs, Electronic structure of graphene, Graphene FETs-GNRFETs.

UNIT- V NANO ELECTRONIC DEVICES

Quantum Effects in MOSFETs, Strained silicon, Fully depleted SOI-MOSFET, Double-gate MOSFET, Multi-gate MOSFETs, FIN-FET, HEMT

TEXT BOOKS:

1. ShunriOda, David k.Ferry, Nanoscale Silicon Devices, CRC Press, Taylor &Francis Group, 2015.

2. K. Goser, P. Glosekotter, Nanoelectronics and Nanosystems, Springer, 2005.

REFERENCE BOOKS:

1. SuprioDatta, Lessons fromnano electronics, World Scientific publisher, 2015.

2. C.N.R. Rao and A. Govindaraj, Nano tubes and Nano wires, RSC Publishing, 2005.

	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CO 2	2	-	2	-	1	-	-	-	-	-	-	-	2	-	-
CO 3	3	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CO 4	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-
Average	2.66	2	2	-	1	-	-	-	-	-	-	-	2	-	-
Level of Correlation	3	2	2	-	1	-	-	-	-	-	-	-	2	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. Tech II Semester ECE

Course Code: 20AEC80

FPGA ARCHITECTURE & APPLICATIONS
(HONOR)

L	T	P	C
3	1	0	4

Course Outcomes:

After successful completion of the course students will be able to

CO1. Analyze various architectures and device technologies of PLD's

CO2. Develop FPGA-based devices using FSM concept.

CO3. Apply FSM Architectures to various applications.

CO4. Analyze System level Design and their application

UNIT- I PROGRAMMABLE LOGIC DEVICES:

ROM, PLA, PAL, PLD, PGA – Features, programming and applications using complex programmable logic devices Altera series – Max 5000/7000 series and Altera FLEX logic – 10000 series CPLD, AMD's – CPLD (Mach 1 to 5); Cyprus FLASH 370 Device Technology, Lattice LSI's Architectures – 3000 Series – Speed Performance and in system programmability.

Field Programmable Gate Arrays (FPGA): Field Programmable Gate Arrays – Logic blocks, routing architecture, Design flow, Technology Mapping for FPGAs.

UNIT- II FPGA/CPLD ARCHITECTURES:

Xilinx XC4000 & ALTERA's FLEX 8000/10000 FPGAs: AT & T – ORCA's (Optimized Reconfigurable Cell Array): ACTEL's – ACT-1, 2, 3 and their speed performance.

UNIT -III FINITE STATE MACHINES (FSM):

Top-Down Design – State Transition Table, state assignments for FPGAs. Problem of initial state assignment for one hot encoding. Derivations of state machine charges. Realization of state machine charts with a PAL. Alternative realization for state machine chart using microprogramming. Linked state machines. One – Hot state machine, Petrinets for state machines – basic concepts, properties, extended petrinets for parallel controllers. Finite State Machine – Case Study, Meta Stability, Synchronization.

UNIT -IV FSM ARCHITECTURES:

Architectures centred around non-registered PLDs. State machine designs centred around shift registers. One – Hot design method. Use of ASMs in One – Hot design. Application of One – Hot method.

UNIT- V SYSTEM LEVEL DESIGN:

Controller, data path and functional partitions, Parallel adder cell, parallel adder sequential circuits, counters, multiplexers, parallel controllers.

TEXT BOOKS:

1. P.K.Chan& S. Mourad, “Digital Design Using Field Programmable Gate Array”, prentice Hall(Pte), 1994.
2. S.Brown, R.Francis, J.Rose, Z.Vransic, “Field Programmable Gate Array”, Kluwer Publications, 1992.

REFERENCE BOOKS:

3. . Old Field, R.Dorf, “Field Programmable Gate Arrays”, John Wiley & Sons, New York, 1995.
4. S.Trimberger, Edr. “Field Programmable Gate Array Technology”, Kluwer Academic Publications, 1994.
5. Bob Zeidman, “Designing with FPGAs & CPLDs”, CMP Books, 2002.

	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	2	-
CO2	3	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	1	3	-	-	-	-	-	-	-	-	-	-	2	-
CO4	3	1	1	-	-	-	-	-	-	-	-	-	-	2	-
Average	3	1	2.33	-	-	-	-	-	-	-	-	-	-	2	-
Level of Correlation	3	1	2	-	-	-	-	-	-	-	-	-	-	2	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. Tech II Semester ECE

Course Code: 20AEC81

MODERN DIGITAL COMMUNICATION SYSTEMS (HONOR)

L	T	P	C
3	1	0	4

Course Outcomes:

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

CO1: Develop the ability to understand the concepts of signal space analysis Coherent and non-coherent receivers.

CO2: Analyze the generation and the processing of f OFDM signals

CO3: Describe different block codes and convolutional codes

UNIT-I COHERENT AND NON-COHERENT COMMUNICATION:

Coherent receivers – Optimum receivers in WGN – IQ modulation & demodulation – Noncoherent receivers in random phase channels; MFSK receivers – Rayleigh and Rician channels – Partially coherent receivers – DPSK; M-PSK; M-DPSK--BER Performance Analysis, Carrier Synchronization - Bit synchronization.

UNIT-II EQUALIZATION TECHNIQUES:

Band Limited Channels- ISI – Nyquist Criterion- Controlled ISI-Partial Response signals- Equalization algorithms – Viterbi Algorithm – Linear equalizer – Decision feedback equalization – Adaptive Equalization algorithms.

UNIT-III BLOCK CODED DIGITAL COMMUNICATION:

Architecture and performance – Binary block codes; Orthogonal; Biorthogonal; Trans orthogonal – Shannon's channel coding theorem; Channel capacity; Matched filter; Concepts of Spread spectrum communication – Coded BPSK and DPSK demodulators– Linear block codes; Hammning; Golay; Cyclic; BCH ; Reed – Solomon codes.

UNIT- IV CONVOLUTIONAL CODED DIGITAL COMMUNICATION:

Representation of codes using Tree diagram, and Trellis diagram – Decoding techniques using Maximum likelihood, Viterbi algorithm, Sequential and Threshold methods – Error probability performance for BPSKand Viterbi algorithm, Turbo Coding.

UNIT- V ORTHOGONAL FREQUENCY DIVISION MULTIPLEXING:

Digital multi-carrier modulation, Generation of sub-carriers using the IFFT; Guard Time and Cyclic Extension; Windowing; OFDM signal processing; Peak Power Problem: PAP reduction schemes- Clipping, Filtering, Coding and Scrambling.

TEXT BOOKS:

1. John G. Proakis., ‘Digital Communication’, 4 th edition, Mc Graw Hill Publication, 2001

2.Stephen G. Wilson., ‘Digital Modulation and Coding’, First Indian Reprint, Pearson Education, 2003

REFERENCES:

1. M.K.Simon, S.M.Hinedi and W.C.Lindsey, Digital communication techniques; Signalling and detection, Prentice Hall India, New Delhi. 1995.

2. Bernard Sklar., ‘Digital Communications’, second edition, Pearson Education, 2001.

3. Richard Van Nee & Ramjee Prasad., ‘OFDM for Multimedia Communications’ Artech House Publication, 2001.

	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	-	3	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	3	-	-	-	-	-	-	-	-	2	-	-
CO3	3	3	-	3	-	-	-	-	-	-	-	-	2	-	-
Average	3	3	-	3	-	-	-	-	-	-	-	-	2	-	-
Level of Correlation	3	3	-	3	-	-	-	-	-	-	-	-	2	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. Tech II Semester ECE

Course Code: 20AEC82

BIOMEDICAL SIGNAL PROCESSING (HONOR)

L	T	P	C
3	1	0	4

Course Outcomes:

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

CO:1 Understanding the algorithms used for signal processing

CO:2 Possess the basic mathematical, scientific and computational skills necessary to analyze ECG and EEG signals.

CO:3 Apply classical and modern filtering and compression techniques

CO:4 Develop a thorough understanding on basics of ECG and EEG feature extraction.

UNIT- 1 FUNDAMENTALS OF SIGNAL PROCESSING:

Sampling and aliasing, Signal reconstruction, Signal conversion systems, Circular convolution Correlation- Autocorrelation – Cross correlation, FFT-decimation in time algorithm, Decimation in Frequency algorithm

UNIT -II DIGITAL FILTER DESIGN:

Basics of filter, Design of IR filter-impulse invariant method – Bilinear Transformation Method Warping and pre-warping effect, Frequency transformation, Characteristics of FIR filter, FIR filter design using windowing techniques- Rectangular window – Hamming window – Hanning window

UNIT -III WAVELET AND SPEECH PROCESSING:

Introduction to wavelets, Time frequency representation, Discrete wavelet transform, pyramid algorithm, Comparison of Fourier transform and wavelet transform, Speech analysis – Cepstrum – Homomorphic filtering of speech signals, ECG signal characteristics – EEG analysis.

UNIT-IV ANALYSIS OF BIO-SIGNALS:

Automatic analysis and classification of ECG, P-wave detection, QRS complex detection, Correlation analysis of ECG signals, Signal averaged ECG, Analysis of Heart Rate variability, Synchronized averaging of PCG envelopes, Analysis of PCG signal, Analysis of EMG signal

UNIT-V APPLICATION OF BSP:

Neurological signal processing: The brain and its potentials, The electrophysiological origin of brain waves, The EEG signal and its characteristics (EEG rhythms, waves, and transients), Correlation. Analysis of EEG channels: Detection of EEG rhythms, Template matching for EEG, spike and wave detection

TEXT BOOKS:

1. Digital Signal Processing, Principles Algorithms and Applications, Third edition; John G, Proakis and Dimitris G Manolakis (Prentice Hall)
2. Biomedical signal analysis-A Case-Study Approach, Rangaraj M Rangayan (WileyInterscience, John Wiley & Sons, Inc) 3. Biomedical DigitalSignalProcessing ,Willis J. Tompkins (Prentice Hall)

REFERENCES

1. Introduction to Wavelets and Wavelet Transforms- A Primer, C. Sidney Burrus, Ramesh A. Gopinath and Haitao Guo (Prentice Hall)
2. Digital Image Processing, Second edition Rafael C. Gonzalez, Richard E. Woods, (Prentice Hall) 4. Hüseyin Arslan, “Cognitive Radio, Software Defined Radio and Adaptive Wireless Systems”, Springer, 2007.

	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	-	3	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	-	3	-	-	-	-	-	-	-	-	3	-	-
CO4	3	3	-	--	-	3	-	-	-	-	-	-	-	-	-
Average	3	3	-	3	-	3	-	-	-	-	-	-	3	-	-
Level of Correlation	3	3	-	3	-	3	-	-	-	-	-	-	3	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. Tech II Semester ECE

Course Code: 20AEC83

SEMICONDUCTOR MEMORY DESIGN AND TESTING (HONOR)

L	T	P	C
3	1	0	4

Course Outcomes:

After successful completion of course the student will be able to

CO1: Understand Volatile & Non-volatile memories, their architectures and characterization technique.

CO2: Analyze different memory testing and radiation effects.

CO3: Explain recent developments in semiconductor memory design and packaging

UNIT- I RANDOM ACCESS MEMORY TECHNOLOGIES

MOS RAM technologies, SRAMs architecture, SRAM cell and peripheral, Circuit operation, SRAM technologies, SOI technology, Advanced SRAM architectures and technologies, DRAM technology development, CMOS SRAMs cell, Theory and advanced cell structures.

UNIT- II NON-VOLATILE MEMORIES

Masked Read-Only Memories (ROMs), High density ROMs, Programmable Read-Only Memories (PROMs), Bipolar PROMs, CMOS PROMs, Erasable Programmable Read-Only Memories (EPROMs), One-Time Programmable (OTP) EPROMS, Electrically Erasable PROMs (EEPROMs) technology and architecture, Non-volatile SRAM, Flash memories, Advanced flash memory architecture.

UNIT- III MEMORY FAULT MODELING, TESTING, AND FAULT TOLERANCE

RAM fault modelling, Electrical testing, Pseudo random testing, DRAM testing, non-volatile memory modelling and testing, IDDQ fault modelling and testing, Application specific memory testing.

UNIT- IV SEMICONDUCTOR MEMORY RELIABILITY AND RADIATION EFFECTS

General reliability issues, RAM failure modes and mechanism, Reliability modelling and failure rate prediction, Reliability test structures, Reliability screening and qualification. Radiation effects, Radiation hardening techniques, Process and design issues, Radiation hardened memory characteristics, Soft errors.

UNIT V ADVANCED MEMORY TECHNOLOGIES AND PACKAGING: (9 PERIODS)

Ferro electric Random-Access Memories (FRAMs), Gallium Arsenide (GaAs) FRAMs, Analog memories, Magneto resistive RAM (MRAMs), Memory Multi Chip Module (MCM) testing and reliability issues, Memory cards, high density memory packaging future directions.

TEXT BOOKS:

1. Ashok K. Sharma, “Advanced semiconductor memories: Architectures, Designs, and Applications”, 2nd Edition, John Wiley, 2009.
2. A.K Sharma, “Semiconductor memories technology, Testing and Reliability”, 1st Edition IEEE Press, 2003.
3. Santosh K. Kurinec and Krzysztol Iniewski, “Nano scale semiconductor memories”, CRC Press, 2017.

REFERENCE BOOKS:

1. Luecke Mire Care, “Semiconductor memory design and application”, 1st Edition, Mc-Graw Hill, 1999.
2. Belty Prince, “Semiconductor memory design hand book”, 1st Edition, IEEE Computer Society, 2001.
3. William D. Brown, and Joe E. Brewer, “Non-volatile semiconductor memory technology”, IEEE Press, 2018.

	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CO 2	2	-	2	-	1	-	-	-	-	-	-	-	-	-	-
CO 3	3	2	-	-	-	-	-	-	-	-	-	-	2	-	-
Average	2.66	2	2	-	1	-	-	-	-	-	-	-	2	-	-
Level of Correlation	3	2	2	-	1	-	-	-	-	-	-	-	2	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. Tech II Semester ECE

Course Code: 20AEC84

HARDWARE SOFTWARE CO-DESIGN (HONOR)

L	T	P	C
3	1	0	4

Course Outcomes:

After successful completion of course the student will be able to

CO1: Apply various co-design approaches

CO2: Describe hardware/software mapping and its trade-offs

CO3: Design and synthesis of techniques used for co-design and related problems

CO4: Estimate hardware and software

UNIT -I SPECIFICATION OF EMBEDDED SYSTEMS:

Introduction to Co-design - Comparison of Co-design approaches–MoCs: State oriented, Activity oriented, Structure oriented, Data oriented and Heterogeneous –Software CFSMs–Processor Characterization

UNIT -II HW/SW PARTITIONING CONSTRAINTS & TRADEOFFS:

Cost modelling, Principle of hardware/software mapping-Real-time scheduling-design specification &constraints on Embedded systems-Trade-offs

UNIT- III HW/SW PARTITIONING METHODOLOGIES:

Partitioning granularity-Kernigan-Lin Algorithm-Extended Partitioning – Binary Partitioning: GCLP Algorithm

UNIT- IV CO-VERIFICATION:

Co-synthesis: Software synthesis–Hardware Synthesis- Interface Synthesis–Co-synthesis Approaches: Vulcan, Cosyma, Cosmos, Polis and COOL. Co-simulation and verification: Principles of Co-simulation–Abstract Level; Detailed Level –Co-simulation as Partitioning support– Co- simulation using Ptolemy approach, Virtual Prototyping.

UNIT -V HW/SW ESTIMATION:

Hardware area, execution timing and power. Software memory and execution timing, Worst Case Execution Time.

TEXT BOOKS:

1. Felice Balarin, Massimiliano Chiodo, Paolo Giusto, Harry Hsieh, Attila Jurecska, Luciano Lavagno, Claudio Passerone, Alberto Sangiovanni - Vincentelli, Ellen Sentovich, Kei Suzuki, Bassam Tabbara, “Hardware-Software Co-Design of Embedded Systems”: The POLIS Approach, 2012., reprint, Springer, India
2. Schaumont, Patrick, A Practical Introduction to Hardware/Software Co design, 2013, reprint, Springer, India.
3. Patrick Schaumont “A Practical Introduction to Hardware/Software Co-design”, Patrick Schaumont, Springer, 2012.

REFERENCEBOOKS:

1. Ralf Niemann, “Hardware/Software Co-Design for Data Flow Dominated Embedded Systems”, Kluwer, 1998.
2. Alxel Jantsch, “Modeling Embedded Systems and SOC’s. Concurrency and Time in Models of Computation”, MK, 2004.

	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	3	-	-	-	-	-	-	-	-	-	2	2	-
CO3	3	2	2	1	-	-	-	-	-	-	-	-	2	2	-
CO4	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-
Average	3	2.5	2.66	1	-	-	-	-	-	-	-	-	2	2	-
Level of Correlation	3	3	3	1	-	-	-	-	-	-	-	-	2	2	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. Tech II Semester ECE

Course Code: 20AEC85

MICROWAVE INTEGRATED CIRCUIT DESIGN (HONOR)

L	T	P	C
3	1	0	4

Course Outcomes:

After successful completion of course the student will be able to

CO1: Analyze of microwave integrated circuits and planar transmission line.

CO2: Use lumped elements for MIC, Microwave semiconductor Devices

CO3: Design and implement integrated Circuits operating at microwave frequencies.

UNIT- I MONOLITHIC MICROWAVE INTEGRATED CIRCUITS:

Introduction to Monolithic Microwave Integrated Circuits (MMICs), their advantages over discrete circuits, materials, Hybrid MICs, MMIC fabrication techniques, MOSFET fabrication. Thick film and Thin film technology.

UNIT- II MICRO STRIP LINES:

Analysis of strip line and microstrip line, Method of conformal transformation for microstrip analysis, Characteristic parameters of strip, Microstrip lines, Microstrip Circuit Design, Impedance transformers, Filters, losses in microstrip

UNIT-III SLOT LINES AND COPLANAR WAVEGUIDE:

Slot Lines, Analysis of Slot Lines, Design consideration, transitions and applications. Coplanar Waveguide: Analysis, Design considerations and coplanar line circuits.

UNIT IV LUMPED ELEMENTS:

Lumped Elements for MICs, Use of lumped elements, Design and fabrication of lumped elements, circuits using lumped elements

UNIT-V

TEXT BOOKS:

1. Gupta KC and Amarjit Singh, "Microwave Integrated circuits", WileyEastern, 1974.
2. Leo Young, "Advances in Microwaves", Academic Press.

REFERENCE BOOKS:

1. Thomas H. Lee "Planar Microwave Engineering" , Cambridge Universitypress, 2004.

2. Matthew M. Radmanesh,", "Radio Frequency and Microwave Electronics", pearson education.

	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
Average	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
Level of Correlation	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. Tech II Semester ECE

Course Code: 20AEC86

WAVELETS: THEORY AND CONSTRUCTION (HONOR)

L	T	P	C
3	1	0	4

Course Outcomes:

After successful completion of course the student will be able to

CO1: Describe the terminology used in the wavelet's literature.

CO2: Describe the concepts, theory of algorithms behind wavelets for harmonic analysis, filter banks & multiresolution analysis

CO3: Apply modern signal processing tools using signal spaces, bases, operators & series expansions.

CO4: Apply wavelets, filter banks and multiresolution techniques to a problem at hand

UNIT- I INTRODUCTION:

Stationary and non-stationary signals, Signal representation using basis and frames, Fourier transform and Short time Fourier transform, Time frequency analysis, Bases of time frequency: orthogonal, Filter banks, Multi resolution formulation: Wavelets from filters, Classes of wavelets: Haar, Daubechies, bi-orthogonal.

UNIT- II CONTINUOUS WAVELET TRANSFORM

Continuous wavelet transform (CWT), Time and frequency resolution of the continuous wavelet transform, Construction of continuous wavelets: Spline, orthonormal, bi-orthonormal, Inverse continuous wavelet transform, Redundancy of CWT, Zoom property of the continuous wavelet transform, Filtering in continuous wavelet transform domain.

UNIT-III DISCRETE WAVELET TRANSFORM AND FILTER BANKS:

Orthogonal and biorthogonal two-channel filter banks, Design of two-channel filter banks, Tree-structured filter banks, Discrete wavelet transform, Non-linear approximation in the Wavelet domain, multi resolution analysis, Construction and Computation of the discrete wavelet transform, the redundant discrete wavelet transform.

UNIT-IV MULTIRATE DISCRETE TIME SYSTEMS:

Multi Resolution Analysis Multirate discrete time systems, Parameterization of discrete wavelets, Bi-orthogonal wavelet bases, Two dimensional, wavelet transforms and Extensions to higher dimensions, wave packets

UNIT -V APPLICATIONS:

Signal and Image compression, Detection of signal changes, analysis and classification of audio signals using CWT, Wavelet based signal de-noising and energy compaction, Wavelets in adaptive filtering, Adaptive wavelet techniques in signal acquisition, coding and lossy transmission, Digital Communication and Multicarrier Modulation, Trans multiplexers, Image fusion, Edge Detection and object isolation.

TEXT BOOKS:

1. Wavelets and their Applications, Michel Misiti, Yves Misiti, Georges Oppenheim, Jean-Michel Poggi, John Wiley & Sons, 2010 .
2. Wavelet transforms: Introduction, Theory and applications, Raghuveer rao and Ajit S.Bopardikar, Pearson Education Asia, 2000.

REFERENCE

1. Fundamentals of Wavelets: Theory, Algorithms, and Applications, J.C. Goswami and A.K. Chan, 2nd ed., Wiley, 2011.
2. Multirate Systems and Filter Banks, P. P. Vaidyanathan, PearsonEducation, 2004
3. A Wavelet Tour ofSignalProcessing, 2nd edition, S. Mallat, Academic Press, 1999.

	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	2
CO3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	2
CO4	3	3	-	-	-	-	-	-	-	-	-	-	-	-	2
Average	3	3	-	-	-	-	-	-	-	-	-	-	-	-	2
Level of Correlation	3	3	-	-	-	-	-	-	-	-	-	-	-	-	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B. Tech I Semester ECE

Course Code: 20AEC87

LITHOGRAPHIC TECHNIQUES FOR DEVICE FABRICATION (HONOR)

L	T	P	C
3	1	0	4

Course Outcomes:

After successful completion of course the student will be able to

CO1: Apply optical and electron beam lithography techniques.

CO2: Explain conventional aspects of lithography, techniques related and their resolutionaspects ofX- ray, Ion, SPM based and soft lithography.

CO3: Define the importance of plasmonics in lithography.

UNIT-IOPTICAL LITHOGRAPHY:

Process steps involved in the optical lithography; Types - Contact, proximity printing and Projection Printing; Resolution Enhancement techniques for projection systems; Deep Ultraviolet lithography; Extreme Ultraviolet lithography; Scanning Near Field Optical Lithography.

UNIT-II ELECTRON BEAM LITHOGRAPHY:

Interaction of the electrons with the substrate; Electron Lithography System components; Raster scans and Vector scans; Electron resists and processing technique; Application of Electron Beam Lithography.

UNIT-III X-RAY LITHOGRAPHY AND ION LITHOGRAPHY:

X- ray lithography system components, Resolution enhancement, X-ray mask construction, X-ray sources, x-ray resists.

Ion lithography system components; Focused Ion Beam Lithography; Masked Ion Beam Lithography; Ion Projection Lithography.

UNIT-IV SCANNING PROBE LITHOGRAPHY AND SOFT LITHOGRAPHY:

Scratching Lithography; Anodic Oxidation- Mechanism of Nano-oxidation; Dip-Pen Nanolithography - Mechanism, DPN Types: Parallel DPN, Polymer DPN, Application of DPN; Nano-shaving.

Micro-contact printing, Solvent-Assisted Micro moulding, Micro moulding in capillaries, Patterning SAMs.

UNIT-V PLASMONIC NANOLITHOGRAPHY:

Principle of Plasmonic Lithography, Plasmonic Mask, Near-field Plasmonic Lithography, Plasmonic Contact Lithography, Plasmonic direct write lithography.

TEXT BOOKS:

1. M Feldman, Nanolithography: The Art of Fabricating Nano electronic and Nanophotonic Devices and Systems, Woodhead Publishing, 2014..
2. Stefano Cabrini, Satoshi Kawata, Nanofabrication Handbook, CRC Press, 2012.

REFERENCE BOOKS:

1. Bruce W. Smith, Kazuaki Suzuki, Microlithography: Science and Technology, Second Edition, CRC Press, 2007.
2. D Bucknall, Nanolithography and Patterning Techniques in Microelectronics, Elsevier, 2005.
3. Marc J. Madou, Manufacturing Techniques for Microfabrication and Nanotechnology, 3rd Edition, VolII, CRC Press, 2011.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-		-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	3	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	-	3	-	-	-	-	-	-	-	-	1	-	-
Average	3	3	-	3	-	-	-	-	-	-	-	-	1	-	-
Level of Correlation	3	3	-	3	-	-	-	-	-	-	-	-	1	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B. Tech I Semester ECE

Course Code: 20AEC88

SOC DESIGN
(HONOR)

L	T	P	C
3	1	0	4

Course Outcomes:

After successful completion of course the student will be able to

CO1: Explain fundamentals of System Architecture.

CO2: Describe different Processors for SOC.

CO3: Design Memories for SOC

CO4: Perform Customization and Configuration of SOC

CO5: Analyze different SOC Designs

UNIT-1 INTRODUCTION TO THE SYSTEM APPROACH:

System Architecture, Components of the system, Hardware & Software, Processor Architectures, Memory and Addressing. System level interconnection, an approach for SOC Design complexity.

UNIT - II PROCESSORS:

Introduction, Processor Selection for SOC, Basic concepts in Processor Architecture, Basic concepts in Processor Micro Architecture, Basic elements in Instruction handling. Buffers: minimizing Pipeline Delays, Branches, More Robust Processors, Vector Processors and Vector Instructions extensions, VLIW Processors, Superscalar Processors.

UNIT - III MEMORY DESIGN FOR SOC:

Overview of SOC external memory, Internal Memory, Size, Scratchpads and Cache memory, Cache Organization, Cache data, Write Policies, Strategies for line replacement at miss time, Types of Cache, Split – I, and D – Caches, Multilevel Caches, Virtual to real translation, SOC Memory System, Models of Simple Processor – memory interaction.

UNIT - IV: INTERCONNECT CUSTOMIZATION AND CONFIGURATION:

Inter Connect Architectures, Bus: Basic Architectures, SOC Standard Buses, Analytic Bus Models, Using the Bus model, Effects ofBus transactions and contention time.

SOC Customization: An overview, Customizing Instruction Processor, Reconfiguration Technologies, Mapping design onto Reconfigurable devices, Instance Specific design, Customizable Soft Processor, Reconfiguration – overhead analysis and trade-off analysis on reconfigurable Parallelism.

UNIT - V: APPLICATION STUDIES / CASE STUDIES:

SOC Design approach, AES algorithms, Design and evaluation, Image compression – JPEG compression.

TEXT BOOKS:

1. Michael J. Flynn and Wayne Luk, "Computer System Design System-on-Chip", Wiley India Pvt. Ltd.
2. Steve Furber, "ARM System on Chip Architecture ", 2nd Edition, 2000, Addison Wesley Professional.

REFERENCE BOOKS:

1. Ricardo Reis, "Design of System on a Chip: Devices and Components", 1st Edition, 2004, Springer
2. Jason Andrews, "Co-Verification of Hardware and Software for ARM System on Chip Design (Embedded Technology)", Newnes, BK and CDROM.
3. Prakash Rashinkar, Peter Paterson and Leena Singh L, "System on Chip Verification – Methodologies and Techniques", 2001, Kluwer Academic Publishers.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	2	-	-	-	-	-	-	-	-	2	-	-
CO2	3	3	-	3	-	-	-	-	-	-	-	-	2	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO4	2	2	-	1	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	-	2	-	-	-	-	-	-	-	-	-	-	-
Average	2.75	2.5	-	2	-	-	-	-	-	-	-	-	2	-	-
Level of Correlation	3	3	-	2	-	-	-	-	-	-	-	-	2	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B. Tech I Semester ECE

Course Code: 20AEC89

OPTICAL NETWORKS
(HONOR)

L	T	P	C
3	1	0	4

Course Outcomes:

Aftersuccessful completion of course the student will be able to

CO1: Explain physical properties of optical networks and protocols

CO2: Apply concepts of physical layer design of optical networks and architectures

CO3: Apply optical switching methods & networking techniques and their limitations

CO4: Describe the benefits of optical layer survivability and the main issues in managing and controlling optical networks.

UNIT-I INTRODUCTION TO OPTICAL NETWORKS AND OPTICAL COMPONENTS:

Couplers, Isolators & Circulators, Multiplexers & Filters (Grating, Fiber Bragg Grating, Fabry-Perot Filters, Dielectric filters, Acousto-optic filter, etc.), Some Optical Amplifiers (Erbium-Doped Fiber Amplifiers, Raman Amplifiers, Semiconductor Optical Amplifiers), Switches (Large Optical Switches, Optical Switch Technologies, Large Electronic Switches), and Wavelength Converters (Optoelectronic Approach, Optical Gating, Interferometric Techniques, Wave-Mixing).

UNIT-II TRANSMISSION SYSTEM (DESIGN OF PHYSICAL LAYER OF OPTICAL NETWORK):

System Model, Power Penalty (Transmitter & Receiver), Optical Amplifiers (Gain saturation and equalization in EDFAs, Amplifier cascading, Amplifier spacing penalty, Power Transients &Automatic Gain Control, Lasing Loops), Crosstalk (Intra-channel and Inter-channel Crosstalk,

Crosstalk in Networks, Crosstalk Reduction, Cascaded Filters), Dispersion (Chromatic Dispersion Limits: NRZ & RZ Modulation, Dispersion Compensation, Polarization-Mode Dispersion (PMD)), Fiber Nonlinearities, Wavelength Stabilization.

UNIT-III OPTICAL NETWORK ARCHITECTURES:

SONET / SDH (Multiplexing, VCAT & LCAS, Layers and Frame structures, SONET/SDH Physical Layer, Infrastructure elements), Optical Transport Network, Generic Framing Procedure, Ethernet (Frame structure, Switches, Physical layer, Carrier transport), Internet Protocol, Multi-Protocol Label Switching, Resilient Packet Ring.

UNIT-IV WAVELENGTH ROUTING NETWORKS, PHOTONIC PACKET SWITCHING AND ACCESS NETWORK:

WDM Network Elements (Optical-Line Terminals & Amplifiers, Optical Add/Drop Multiplexers, Optical Cross-connects), WDM Network Design (Cost Trade-Offs, Wavelength-Routing Network Design & Problems, Statistical Dimensioning Models). Optical Time Division Multiplexing (Bit & Packet Interleaving, Optical AND Gates), Synchronization, Header Processing, Buffering, Burst Switching, Testbeds and Access Networks.

UNIT-V NETWORK MANAGEMENT AND SURVIVABILITY:

Control and Management (Network Management Functions, Configuration management, Performance & Fault management, Optical safety), Network Survivability (Protection in SONET / SDH and IP Networks, Optical layer Protection, Interworking between layers)

TEXT BOOKS:

1. Rajiv Ramaswami, Kumar N. Sivarajan, and Galen H. Sasaki, "Optical Networks: A Practical Perspective", Third Edition, Morgan Kaufmann Publishers Inc., 2010.
2. U. Black, “OpticalNetworks: Third Generation Transport Systems”/ Pearson Educations

REFERENCE BOOKS:

1. Biswanath Mukherjee “Optical WDM Networks” Springer Pub 2006.
2. Siva Ram Moorthy and Mohan Gurusamy, “WDM Optical Networks: Concept, Design and Algorithms”, Prentice HallofIndia, 2002.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	3	3	-	3	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	-	3	-	-	-	-	-	-	-	-	-	-	1
CO4	3	3	-	3	-	-	-	-	-	-	-	-	-	-	-
Average	3	3	-	3	-	-	-	-	-	-	-	-	1	-	1
Level of Correlation	3	3	-	3	-	-	-	-	-	-	-	-	1	-	1

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B. Tech I Semester ECE

Course Code: 20AEC90

DIGITAL SIGNAL PROCESSOR SYSTEM DESIGN (HONOR)

L	T	P	C
3	1	0	4

Course Outcomes:

After successful completion of course the student will be able to

CO1: Explain fundamentals of DSP processor architecture

CO2: Analyze Pipelining issues and numeric representations

CO3: Analysis of Dynamic Hardware Prediction and TMS320C6X Processors

UNIT- I PROGRAMMABLE DSP:

Introduction to Programmable DSP - Block Diagram. MAC (Multiply and Accumulate), Numeric Representations and Arithmetic: Classification of number system, Conventional fixed-point number system, Carry free adders, Multiplier Adder Graph, Floating point number format, Unconventional fixed-point number system: Signed digit numbers, LNS and RNS.

UNIT- II PIPELINING:

Basic Pipelining and Simple RISC Processors: RISC Architecture, instructions and its format, Implementation of RISC instruction set, Pipelining, Pipeline Registers, Basic performance issue in pipelining, Pipeline Hazards (based on MIPS), Reducing Pipeline Branch Penalties, Performance ofpipeline with stalls.

UNIT - III MIPS:

Simple implementation of MIPS, Basic pipeline for MIPS, Instruction Level Parallelism: Concepts, Dependences, RAW, WAW, and WAR hazards, Dynamic Scheduling - Reducing data hazards, Tomasulo's Algorithm.

UNIT- IV HARDWARE PREDICTION:

Dynamic Hardware Prediction - Reducing branch hazards. 1-bit, 2-bit, correlating branch and tournament predictor, Limitations of ILP, Branch Target Buffer, Return address predictor, Memory hierarchy – Cache design, Cache performance review, Memory mapping techniques. Block identification and replacement.

UNIT- V TMS320C6X PROCESSORS:

Introduction to TMS320C6X Processors: C6713 – Architecture -Functional Units- Pipelining, Peripherals, Linear and Circular addressing modes. Types of Instructions-Programming Examples, Typical DSP development system, support tools and files, compiler, assembler, Code composer studio.

TEXT BOOKS:

1. Digital Signal Processing with Field Programmable Gate Arrays, 3rd edition, Uwe Meyer-Baese, Springer;,2007
2. Computer Architecture: A Quantitative Approach: 3rd edition J L Hennessy, D A Patterson Elsevier India, 2002

REFERENCE BOOKS:

1. DSP Processor and Fundamentals: Architecture and Features. Phil Lapsley, JBier, Amit Sohan, Edward A Lee; Wiley IEEE Press,1997
2. Digital Signal Processors, Sen M Kuo, Woon- Seng S Gan,. Pearson,2005.
3. DigitalSignalProcessing and Application with C6713 and C6416 DSK, Rulph Chassaing , Wiley, 2005

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	2	-	-	-	-	-	-	-	-	2	-	-
CO2	3	3		3	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3		3	-	-	-	-	-	-	-	-	2	-	-
Average	3	3		2.66	-	-	-	-	-	-	-	-	2	-	-
Level of Correlation	3	3		3		-	-	-	-	-	-	-	2	-	-

MINOR (General)

for

Students opting from other disciplines of Engineering

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

II B.Tech II Semester ECE

(20AEC91) ANALOG ELECTRONICS

L	T	P	C
3	0	2	4

Course Outcomes:

After completion of the course students will be able to

CO1 Understand working principle and analyze the characteristics of Diode, BJT and special electronic Devices.

CO2 Analyze various types of oscillator functionality and its applications

UNIT-I SEMICONDUCTORS AND DIODES (12Periods)

Conductors, Insulators, and Semiconductors- definition & energy band diagrams. Properties of semiconductors. Meaning of Hole current, electron-hole pairs, recombination, doping, acceptor and donor impurities Diode-formation, depletion region, VI Characteristics, Diode types, ratings and applications Zener diode- reverse bias characteristics Regulation.

UNIT-II SWITCHING CHARACTERISTICS OF DEVICES (10Periods)

Diode as a switch, piecewise linear diode characteristics, Transistor as a switch, Break down voltage consideration of transistor, saturation parameters of Transistor and their variation with temperature, Design of Transistor Switch, Transistor-Switching times.

UNIT-III TRANSISTORS (10Periods)

Transistors- definition, terminals, types, symbols Formation of NPN and PNP, Transistor biasing- definition, importance, list types Stabilisation, thermal runaway, heat sink, and voltage divider bias method. List configurations and applications. Alpha and Beta definitions, CE input and output characteristics- cut off, saturation, and active regions Transistor as a switch in CE mode. List applications

UNIT- IV OPTOELECTRONIC DEVICES(8Periods)

Electron emission– types, applications. Symbols, working and applicationsof– photo diode, photo voltaic cell, LED, LDR, LCD, SCR

UNIT V OSCILLATORS (10Periods)

Oscillators- definition, barkhausen criterion, classification, LC tank circuit, criteria. RC phase shift and crystal oscillator- working, applications, Colpitts Oscillator, Hartley Oscillator

	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	3	-	-	-	-	-	-	1	1	2	-	-
CO2	3	2	1	2	-	1	-	-	-	-	1	1	2	-	-
Average	2	2.5	1.5	2.5	-	1	-	-	-	-	1	1	2	-	-
Level of Correlation	2	3	2	3	-	1	-	-	-	-	1	1	2	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B. Tech I Semester ECE

Course Code: 20AEC92

ANALOG IC APPLICATIONS
(MINOR)

L	T	P	C
3	0	2	4

Course Outcomes
After successful completion of course the student will be able to

CO1: Illustrate the operational amplifiers with linear integrated circuits and, Compute DC and AC parameters for Differential Amplifier configurations

CO2: explain the negative feedback circuits of op-amp and applications.

CO3: Demonstrate Knowledge of IC 555 and its applications.

CO4.: Demonstrate Knowledge of IC 555 and its applications. Design various types of DACs, ADCs using operational amplifier.

UNITI: INTEGRATED CIRCUITS AND OPERATIONAL AMPLIFIER:

Introduction, Classification of IC‘s, IC chip size and circuit complexity, basic information of Op-Amp IC741 Op-Amp and its features, the ideal Operational amplifier, Op-Amp internal circuit, Op-Amp characteristics - DC and AC.

UNIT II OP-AMP WITH NEGATIVE FEEDBACK AND APPLICATIONS

Introduction, feedback configurations, voltage series feedback, voltage shunt feedback and differential amplifiers, features of Practical op-amp. Peaking amplifier, summing, scaling and averaging amplifiers, Instrumentation amplifier, voltage to current converter, current to voltage converter, integrator, differentiator.

UNIT III Active Filters & Oscillators:

Introduction, 1st order LPF, HPF filters, Band pass, Band reject and all pass filters. Oscillators, Phase shift and wein bridge oscillators, Comparators, and its types, Square, triangular and saw toothwave generators.

UNIT IV TIMERS & PHASE LOCKED LOOPS:

Introduction to 555 timer, functional diagram, monostable and astable operations and applications, Schmitt Trigger. PLL - introduction, block schematic, principles and description of individual blocks of 565.

UNIT V ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS

Analog and Digital Data Conversions, D/A converter – specifications – weighted resistor type, R-2R Ladder type ,Inverted R-2R Ladder type DAC, A/D Converters –specifications – Flash type –Successive Approximation register type – Single Slope type – Dual Slope type and Counter types.

TEXT BOOKS:

1. D. RoyChowdhury, "Linear Integrated Circuits", New Age International(p) Ltd, 2 nd Edition, 2013.

2. Ramakanth A. Gayakwad, "Op-Amps & Linear ICs", PHI, 4th edition, 2010.

REFERENCE BOOKS:

1. R.F.Coughlin& Fredrick Driscoll, "Operational Amplifiers & Linear Integrated Circuits", 6 th Edition, PHI.

2. David A. Bell, "Operational Amplifiers & Linear ICs", Oxford University Press, 2nd edition, 2010.

	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	2	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	2	2	-	-	-	-	-	-	-	-	3	-	-
CO4	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
Average	3	3	2.5	2	-	-	-	-	-	-	-	-	3	-	-
Level of Correlation	3	3	3	2	-	-	-	-	-	-	-	-	3	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. Tech II Semester ECE

Course Code: 20AEC93

DIGITAL IC DESIGN USING VHDL

(MINOR)

L	T	P	C
3	0	2	4

Course Outcomes

After successful completion of course the student will be able to

CO1: List different types of digital logic families

CO2: Demonstrate VHDL elements

CO3: Analyze the design of Combinational and Sequential Logic design using VHDL

CO4: Infer memories with data sheets

UNIT–I CMOS LOGICANDBIPOLARLOGICANDINTERFACING:

Introduction to logic families, CMOS logic, CMOS steady state electrical behavior, CMOS dynamic electrical behavior, CMOS logic families; Bipolar logic, transistor logic, TTL families, CMOS/TTL interfacing, low voltage CMOS logic and interfacing, emitter coupled logic, comparison of logic families, familiarity with standard 74XX and CMOS 40XX series- ICs – specifications

UNIT–II THEVHDLHDLAND ITSELEMENTS:

Design flow, program structure, types and constants, functions and procedures, libraries and packages; The VHDL design elements: Structural design elements, data flow design elements, behavioral design elements, time dimension and simulation synthesis.

UNIT–III COMBINATIONALLOGICDESIGNUSINGVHDL:

Decoders, encoders, three state devices, multiplexers and demultiplexers, Code Converters, EX-OR gates and parity circuits, comparators, adders and subtractors, ALUs, combinational multipliers. VHDL modes for the above ICs. Design examples (using VHDL) - Barrel shifter, comparators, floating-point encoder, dual parity encoder.

UNIT–IV SEQUENTIALLOGICDESIGN:

Latches and flip-flops, PLDs, counters, shift register, and their VHDL models, synchronous design methodology, impediments to synchronous design.

UNIT–V MEMORIES:

ROMs: Internal structure, 2D-decoding commercial types, timing and applications; Static RAM: Internal structure, SRAM timing, standard SRAMS, synchronous SRAMS; Dynamic RAM: Internal structure, timing, synchronous DRAMs; Familiarity with component data sheets: Cypress CY6116, CY7C1006, specifications.

TEXT BOOKS:

1. John F.Wakerly, ―Digital Design Principles & Practices‖, PHI/ Pearson Education Asia, 3rd Edition, 2005.
2. J. Bhasker, ―VHDL Primer‖, Pearson Education / PHI, 3 rd Edition. Pearson Higher Education.

REFERENCE BOOKS:

1. Charles H. Roth Jr., ―Digital System Design Using VHDL‖, PWS Publications, 1998.
2. Alan B. Marcovitz, ―Introductionto Logic Design‖, TMH, 2 nd Edition, 2005.
3. Stephen Brown, Zvonko Vransesic, ―Fundamentals ofDigital Logic with Verilog Design‖, TMH, 2003.

	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	1	-	-	-	-	-	-	-	-	3	-	-
CO2	3	2	2	2	-	-	-	-	-	-	-	-	-	3	-
CO3	3	3	1	2	-	-	-	-	-	-	-	-	-	3	-
CO4	3	1	3	-	-	-	-	-	-	-	-	-	-	-	-
Average	3	2.25	2	1.25	-	-	-	-	-	-	-	-	3	3	-
Level of Correlation	3	2	2	1	-	-	-	-	-	-	-	-	3	3	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. Tech II Semester ECE

Course Code: 20AEC94

PRINCIPLES OF COMMUNICATIONS (MINOR)

L	T	P	C
3	0	2	4

Course Outcomes:

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

CO1	Apply the concept of Signal, modulation and multiplexing techniques to analyze communication system.
CO2	Analyze AM, FM, PM mathematically and their generation and detection.
CO3	Apply the concept of noises, SNR to analyze the effect of noise on various analogcommunication systems.
CO4	Analyze the pulse modulation techniques, and different transmitter & radio receivers used in communication systems.

UNIT- I INTRODUCTION TO COMMUNICATION SYSTEM:

Overview of signal and system:

Definition and classification of signals and systems, Elementary signals such as impulse, step, ramp, sinusoidal and exponential signals, Operations on signals. Basic System Properties (Continuous-Time and Discrete-Time).

Communication system:

Block schematic of communication system, communication channels, classification of electronic communication systems: unidirectional/ bidirectional communication, nature of information signal, techniques of transmission Modes of communication: Broadcast and point to point communication, Fundamental Limitations of communication Systems, concept of modulation, necessity of modulation, classification of modulation, multiplexing, FDM, TDM, Applications of communication.

UNIT -II AMPLITUDE MODULATION & DEMODULATION:

Amplitude modulation (time and frequency domain), modulation index of AM, transmission efficiency, single tone AM, relationship between transmitted power and carrier power, generation of AM signal using Switching modulator, demodulation of AM signal using Envelope detector, types of AM, DSB-SC signal using switching modulator and ring modulator, Coherent detection for DSB-SC wave, Time domain and frequency representation of SSB signals, Generation of SSB signals using Selective- Filtering method and Phase shift method, demodulation of SSB signal using coherent detector, Vestigial sideband (VSB) modulator and demodulator, Applications of AM.

UNIT- III ANGLE MODULATION:

Introduction, mathematical analysis of FM and PM, modulation index for FM and PM, frequency spectrum and bandwidth of FM, narrow band and wide band FM, Carson's rule, direct and indirect methods of FM generation, demodulation of FM: frequency discriminator, balance frequency detector, phase discriminator, pre emphasis and de-emphasis, PLL-FM demodulator, comparison of AM, FM and PM.

UNIT= IV NOISE IN COMMUNICATION SYSTEMS:

Introduction, Thermal noise, Time domain representation of narrowband noise, filtered white noise, Envelope of narrowband noise plus sine wave, Signal to noise ratio & probability of error, Noise equivalent bandwidth, Effective noise temperature, and Noise figure, Baseband systems with channel noise, Performance analysis (i.e. finding SNR expression) of AM, DSB-SC, SSB-SC, FM, PM in the presence of noise.

UNIT -V ANALOG PULSE MODULATION SCHEMES AND RADIO RECEIVERS:

Analog Pulse Modulation Schemes:

Sampling of low pass signals, types of sampling, Pulse Amplitude Modulation (PAM) generation and detection. Pulse time modulation schemes: PWM and PPM generation and detection.

Transmitter/ Receiver: Transmitters: AM Transmitter- Low level& High level Modulation, FM Transmitter, Receiver: Working principle of Super heterodyne AM and FM Receivers along with suitable block diagrams, Sensitivity, Selectivity and fidelity.

TEXT BOOKS:

1. Simon Hakin, "Communication Systems," Wiley India Edition, 4th Edition, 2011.
2. George Kennedyand Bernard Davis, "Electronics & Communication System" TMH, 2004. (edition)
3. B.P. Lathi, & Zhi Ding, "Modern Digital & Analog Communication Systems", Oxford University Press, International 4th edition, 2010.

Reference Books:

1. Sam Shanmugam, “Digital and Analog Communication Systems”, John Wiley, 2005.
2. Herbert Taub & Donald L Schilling, “Principles of Communication Systems”, Tata McGraw- Hill, 3rd Edition, 2009
3. J. G. Proakis, M Salehi, Gerhard Bauch, “Modern Communication Systems Using MATLAB,” CENGAGE, 3rd Edition, 2013

	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	2	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	--	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-	2	-	-
Average	3	2.75	-	-	-	-	-	-	-	-	-	-	2	-	-
Level of Correlation	3	3	-	-	-	-	-	-	-	-	-	-	2	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B. Tech I Semester ECE
Course Code: 20AEC95

ADVANCED COMMUNICATIONS (MINOR)

L	T	P	C
3	0	2	4

Course Outcomes:

After successful completion of course the student will be able to

CO1: Define principles of digital communication systems.

CO2: Adopt various approaches for digital modulation.

CO3: Determine the digital transmission through the AWGN channels

CO4: Apply concepts of information theory& coding

CO5: Apply the digital modulation techniques to various advanced applications

UNIT-I INTRODUCTION TO DIGITAL COMMUNICATIONS:

Introduction to Digital Communications; Block Diagram of Digital Communication System; Information Theoretic Approach to Digital Communications; Digital Communication Blocks Realized as Software-Defined Radio. (4L).

UNIT II: DIGITAL CARRIER MODULATION:

Introduction to Carrier Modulation, ASK, BPSK, QPSK, BFSK, M-ary PSK, M-ary FSK, Modulations, QAM, MSK and GMSK Modulation, Differential Encoding and Decoding.

UNIT III: DIGITAL TRANSMISSION THROUGH AWGN CHANNEL:

Geometric representation of signal waveforms, Two-dimensional signal waveforms, Optimum receiver for digitally modulated signals in additive white Gaussian noise, Probability of error for signal detection in additive white Gaussian noise – PAM, MPSK, MFSK, MQAM, etc.

UNIT IV: DIGITAL TRANSMISSION THROUGH BAND LIMITED AWGN CHANNELS:

Digital transmission through band limited channels, Power spectrum of digitally modulated signals, Signal design for band limited channels – for zero ISI (Nyquist criterion) and with controlled ISI.

CONCEPTS OF INFORMATION THEORY AND CODING: Information, Mutual Information, Measure of Information, Entropy, Information Rate, Shannon's Theorem, Channel Capacity, Capacity of Gaussian Channel, Bandwidth-SNR Trade-off; Coding for Discrete Sources- Need for coding source letters, Introduction to source and channel coding techniques; Error Control coding.

UNIT V: APPLICATIONS OF DIGITAL COMMUNICATIONS:

Spread spectrum systems, Code division multiple access – Principle of operation, Forward and reverse channels, Processing gain, Advantage and disadvantage of CDMA, Concept of near-far problem and power control, Multicarrier modulation scheme – MC-CDMA, OFDM.

TEXT BOOKS:

1. J. G. Prokias and M. Salehi, "Communication Systems Engineering", 2nd Edition, Pearson,2015.
2. S. Haykin, "Digital Communication", 5th ed., John Wiley & Sons, Inc. .
3. B. P. Lathi and Z. Ding, "Modern Digital and Analog Communication Systems", 4th Ed.,xford University Press, 2009.

REFERENCE BOOKS:

1. H. Taub, D. L. Schilling, and G. Saha, "Principles of communication systems", 4th Edition,McGraw-Hill Education (India) Pvt. Ltd., 2014.
2. B. Skalar, "Digital Communications: Fundamentals & Applications", 2nd Ed., Pearson Education India, 2009.
3. R. E. Ziemer, and W. H. Tranter, "Principles of Communications: Systems, Modulation, and Noise", Wiley, 7th Ed., 2015.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO4	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
Average	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
Level of Correlation	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-

MINOR (Specialization)

Industrial Relevant Track

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
II B.Tech II Semester ECE
(MINOR SPECIALIZED TRACK-1)
(20AEC96) BASICS OF VLSI

L	T	P	C
3	1	0	4

Course Outcomes:

After completion of the course, students will be able to

CO1: Understand the various IC fabrication technology involved in VLSI chip Processing
CO2: Analyze electrical characteristics and performance estimation of MOS and CMOS circuits to identify the design issues of VLSI systems
CO3: Design digital circuits by applying appropriate MOS and CMOS technologies.
CO4: Apply engineering fundamentals and technology to develop an Ultra-fast VLSI circuits

UNIT – I : VLSI PROCESS TEHNOLOGY(14Periods)

Introduction to VLSI, Evaluation of VLSI, Need for VLSI, VLSI Design flow, Design methodology, levels of design, fabrication technology- Crystal growth. Wafer preparation. Vapour phase and molecular beam epitaxy. Oxidation techniques, lithography and its methods. ,etc mechanism, etch techniques. Deposition process and methods. Diffusion mechanisms. Ion implantation and metallization.

UNIT – II : MOS TRANSISTOR THEORY(14Periods)

MOS Transistor, switches, Ideal I-V characteristics, C-V characteristics, non-ideal I-V effects, small signal AC characteristics, CMOS Logic, CMOS inverter DC transfer characteristics. MOS models, Switching characteristics.

UNIT-III: CMOS TECHNOLOGY (12 Periods)

NMOS, PMOS, CMOS technologies, Latch up, Layout design rules, CMOS process enhancement, Technology related CAD issues, manufacturing issues.

UNIT–IV:CIRCUIT CHARACTERISATION AND PERFORMANCEESTIMATION(10Periods)

Delay estimation, Logical effort and transistor sizing, Power dissipation, Interconnect design margin, Reliability, Scaling.

UNIT- V: ULTRA FAST VLSI CIRCUIT AND S Y S T E M S (10Periods)

Ultra fast systems, GaAs crystal structure, Technology development, Device modelling and performance estimation, MESFET based design, FINFET, GAA.

Total Periods: 60

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Text Books:

1. N.H.E.Weste&D. Harris, “CMOS VLSI Design: A Circuits and Systems Perspective”, 4th Edition, Pearson, 2011.
2. 1. Pucknell&Eshraghian, “Basic VLSI Design”, 3rd Edition,, PHI, 1996

Reference Books:

1. J.Rabey& B. Nikolic, “Digital Integrated circuits”, 2ndEdition,Pearson, 2003.
2. S.M. Sze , “VLSI Technology”, 2ndEdition,McGraw-Hill, 1983

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	-	-	-	-	-	-	-	-	-	2	-	-
CO2	2	3	2	-	-	-	-	-	-	-	-	-	2	-	-
CO3	2	1	1	-	3	-	-	-	-	-	-	-	-	3	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-	-	3	-
Average	2.5	2	1.5	-	3	-	-	-	-	-	-	-	-	-	-
Level of Correlation	3	2	2	-	3	-	-	-	-	-	-	-	-	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. Tech I Semester ECE

Course Code: 20AEC97

DESIGN OF ASIC (MINOR)

L	T	P	C
3	1	0	4

Course Outcomes:

After successful completion of course the student will be able to

CO1: Describe the basics of industrial standard ASIC and FPGA designs.

CO2: Demonstrate Design flow and methodologies.

CO3: Explain various design aspects and tools , logic synthesis, simulation and testing.

CO4: Apply XILINX, ALTERA tools.

CO5: Define basics of System on Chip and Platform based design

UNIT -I INTRODUCTION TO ASICS:
Full custom, Semi- custom and Programmable ASICs, ASIC Design flow, ASIC cell libraries, Gate Arrays, Standard Cells, Cell Based ASICs, Mixed Mode and Analogue ASICs. ASICs PROGRAMMABLE LOGIC DEVICES: Overview, PAL based PLDS Structures, PAL Characteristics, FPGAS: Introduction, Selected Families, Design Outline.

UNIT-II ASICs–DESIGNISSUES:
Design Methodologies and Design Tools, Design for Testability, Economies. ASICs-CHARACTERISTICS AND PERFORMANCE: Design Styles, Gate Arrays,

UNIT=III ASICs-DESIGNT ECHNIQUES:
Overview-Design Flow and Methodology, Hardware Description Languages, Simulation and Checking, Commercial Design Tools, FPGA Design Tools: XILINX, ALTERA

UNIT=IV LOGIC SYNTHESIS, SIMULATION AND TESTING:
Verilog and Logic Synthesis -VHDL and Logic Synthesis, Types of Simulation, Boundary Scan Test, Fault Simulation, Automatic Test Pattern Generation.

UNIT- V ASIC CONSTRUCTION:
Floor Planning: Goals and objectives, Measurement of delay in Floor planning, Floor planning tools, Channel definition, I/O and Power planning and Clock planning. Placement: Goals and Objectives, Min-cut

Placement algorithm, Iterative Placement Improvement, Time driven placement methods, Physical Design Flow. Routing: Global Routing: Goals and objectives, Global Routing Methods, Global routing between blocks, Back-annotation. Detailed Routing: Goals and objectives, Measurement of Channel Density, Left-Edge Algorithm, Area-Routing Algorithms, Multilevel routing, Timing –Driven detailed routing, Final routing steps, Special Routing, Circuit extraction and DRC, System Partition.

TEXTBOOKS:

1. L.J.Herbst, *"Integrated CircuitEngineering"*,OXFORDSCIENCEPublications,1996.
2. K.Eshraghianet.al, *"EssentialsofVLSICircuitsandSystems"*,PHIofIndiaLtd.,2005
3. WayneWolf, *"ModernVLSIDesign"*,PearsonEducation,FifthIndianReprint,3rdEdition,2005.

REFERENCES:

1. M.J.S.Smith, *"Application- Specific Integrated Circuits"*, Addison-Wesley LongmanInc1997.
2. DouglasAPucknell,Weste,K.Eshraghian, *"BasicVLSIDesign"*, PHI,3rdEdition.
3. Fabricius, *"IntroductiontoVLSIDesign"*,MGHInternationalEdition,1990.

	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	3	3	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	2	-	-	-	-	-	-	-	-	-	-	-
CO3	3	1	3	3	-	-	-	-	-	-	-	-	-	3	-
CO4	3	3	3	-	-	-	-	-	-	-	-	-	-	3	-
CO5	3	3	3	-	-	-	-	-	-	-	-	-	2	-	-
Average	3	2.4	3	2.66	-	-	-	-	-	-	-	-	2	3	-
Level of Correlation	3	2	3	3	-	-	-	-	-	-	-	-	2	3	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B.Tech II Semester ECE
Course Code:20AEC98

LOW POWER VLSI DESIGN (MINOR)

L	T	P	C
3	1	0	4

Course Outcomes:

After successful completion of course the student will be able to

CO1 Understand various sources of power dissipation

CO2 Analyze various scaling techniques

CO3 Understand the operation of Low-Voltage Low-Power Adders

CO4 Demonstrate Low- Voltage Low-Power Multipliers & Memories

UNIT-I SOURCES OF POWER DISSIPATION

Need for Low Power Circuit Design, Short-Circuit Power Dissipation, Sources of Power Dissipation–Switching Power Dissipation, Short Circuit Power Dissipation, Dynamic Power for a Complex Gate, Reduced Voltage Swing, Switching Activity, Leakage Power Dissipation, Glitching Power Dissipation, Short Channel Effects–Drain induced Barrier Lowering and Punch Through, Surface Scattering, Velocity Saturation, Impact Ionization, Hot Electron Effect.

UNIT- II SUPPLY VOLTAGE SCALING FOR LOW POWER

Device Feature Size Scaling, Constant-Field Scaling, Constant-Voltage Scaling, Architectural-Level Approaches: Parallelism for Low Power, Pipelining for Low Power, Combining Parallelism with Pipelining, Voltage Scaling Using High-Level Transformations: M u l t i level Voltage Scaling Challenges in MVS Voltage Scaling Interfaces, VTCMOS Circuits, MTCMOS Circuits, Static Timing Analysis, Dynamic Voltage and Frequency Scaling

UNIT- III LOW-VOLTAGE LOW-POWER ADDERS

Introduction, Standard Adder Cells, CMOS Adders Architectures–Ripple Carry Adders, Carry Look-ahead Adders, Carry Select Adders, Carry Save Adders, Low-Voltage Low-Power Design Techniques –Trends of Technology and Power Supply Voltage, Low-Voltage Low-Power Logic Styles.

UNIT- IV LOW-VOLTAGELOW-POWER MULTIPLIERS

Introduction, Overview of Multiplication, Types of Multiplier Architectures, Braun Multiplier, Baugh-Wooley Multiplier, Booth Multiplier, and Introduction to Wallace Tree Multiplier.

UNIT- V LOW-VOLTAGE LOW-POWER MEMORIES

Basics of ROM, Low-Power ROM Technology, Future Trend and Development of ROMs, Basics of SRAM, Memory Cell, Pre-charge and Equalization Circuit, Low-Power SRAM Technologies, Basics ofDRAM, Self-Refresh Circuit, Future Trend and Development ofDRAM.

TEXT BOOKS:

1. Sung- MoKang, Yusuf Leblebici, “CMOS Digital Integrated Circuits–Analysis and Design”, TMH,2011.
2. Kiat-Seng Yeo, Kaushik Roy,“Low-Voltage, Low Power VLSI Sub systems”, TMH Professional Engineering.2005.

REFERENCE BOOKS:

1. Kaushik Roy, Sharat C.Prasad, “Low Power CMOS VLSI Circuit Design”, John Wiley&Sons, 2000.
2. GaryK.Yeap, “Practical Low Power Digital VLSI Design”, Kluwer Academic Press,2002.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	-	2	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	-	2	-	-
CO4	3	3	3	-	-	-	-	-	-	-	-	-	2	-	-
Average	3	3	3	3	-	-	-	-	-	-	-	-	2	-	-
Level of Correlation	3	3	3	3	-	-	-	-	-	-	-	-	2	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B.Tech II Semester – ECE

Course Code:20AEC99

VLSI DESIGN VERIFICATION & TESTING

L	T	P	C
3	1	0	4

Course Outcomes:

After successful completion of course the student will be able to

CO1	Demonstrate advanced knowledge in the basic faults that occur in digital systems, testing of stuck at faults for digital circuits, Design for testability.
CO2	Analyze testing issues in the field of digital system design critically
CO3	Solve engineering problems by modeling different faults for fault free simulation in digital circuits.
CO4	Apply appropriate research methodologies and techniques to develop new testing strategies for digital and mixed signal circuits and systems.

UNIT I INTRODUCTION TO TEST AND DESIGN FOR TESTABILITY (DFT) FUNDAMENTALS:

Testing Philosophy, Role of Testing, Digital and Analog VLSI Testing, VLSI Technology Trends affecting Testing, Types of Testing, Fault Modeling: Defects, Errors and Faults, Functional Versus Structural Testing, Levels of Fault Models, Single Stuck-at Fault.

UNIT-II FAULT MODELING:

Logic Fault Models, Fault Detection and Redundancy, Fault Equivalence and Fault Location, Single Stuck and Multiple Stuck – Fault Models, Fault Simulation Applications, General Techniques for Combinational Circuits.

TESTING FOR SINGLE STUCK FAULTS (SSF): Automated Test Pattern Generation (ATPG/ATG) For SSF sin Combinational and Sequential Circuits, Functional Testing With Specific Fault Models

UNIT-III DESIGNFORTESTABILITY:

Testability Trade-Offs, Techniques, Scan Architectures and Testing– Controllability and Absorbability, Generic Boundary Scan, Full Integrated Scan, Storage Cells for Scan Design, Board Level and System Level DFT Approaches, Boundary Scans Standards, Compression Techniques–Different Techniques, Syndrome Test and Signature Analysis.

UNIT-IV BUILT-INSELF-TEST(BIST):

BIST Concepts and Test Pattern Generation, Response Compaction, Built-In Logic Block Observers, Test-Per-Clock, Test Per Scan, Specific BIST Architectures–CSBL, BEST, RTS, LOCST, STUMPS, CBIST, CEBS, RTD, SST, CATS, CSTP, BILBO, Brief Idea some Advanced BIST Concepts and Designfor Self-Test at Board Level.

MEMORYBIST(MBIST): Memory Test Architectures and Techniques–Introduction to Memory Test, Types of Memories and Integration, Embedded Memory Testing Model, Memory Test Requirements for MBIST.

BRIEF IDEAS ON EMBEDDED CORE TESTING: Introduction to Automatic in Circuit Testing (ICT), JTAG Testing Features.

UNIT- V System Configuration with Boundary Scan:

TAP Controller and Port, Boundary Scan Test Instructions, Pin Constraints of the Standard, Boundary Scan Description Language: BDSL Description Components, Pin Descriptions.

TEXT BOOKS:

1. Miron Abramovici, Melvin A. Breur, ArthurD . Friedman, "Digital Systems Testing and Testable Design",JaicoPublishingHouse,2001.

2. Alfred Crouch,"DesignforTestforDigitalICs&EmbeddedCoreSystems",PrenticeHall.

REFERENCES:

1. Robert J. Feugate,Jr.,StevenM.Mentyn,"IntroductiontoVLSITesting",PrenticeHall,EnglehoodCliffs, 1998.
2. M.L.Bushnell,V.D.Agrawal,"EssentialsofElectronicTestingforDigital,MemoryandMixedSignal VLSICircuits",KluwerAcademicPulishers.

3. P.K.Lala, “Digital Circuits Testing and Testability”, Academic Press.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO1 2	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	-	2	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	-	-	2	-
CO3	3	3	3	3	-	-	-	-	-	-	-	-	-	2	-
CO4	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-
Average	3	3	3	3	-	-	-	-	-	-	-	-	2	2	-
Level of Correlation	3	3	3	3	-	-	-	-	-	-	-	-	2	2	-

3-High Mapping **2-Medium Mapping** **1-Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B. Tech I Semester ECE
Course Code: 20AECA0

ELECTRONIC DESIGN AUTOMATION TOOLS (MINOR)

L	T	P	C
3	1	0	4

Course Outcomes:

After successful completion of course the student will be able to

CO1: Define fundamentals of OS Commands

CO2: Analyze Logic Synthesis using Verilog

CO3: Apply AC, DC, simulation Transient Techniques

CO4: Explain functional Modeling, Testing, Debugging of a system

UNIT - I

An Overview of OS Commands - System Settings and Configuration, Introduction to Unix Commands, Writing Shell Scripts, VLSI Design Automation Tools, An Overview of the features of Practical CAD Tools. Modelsim, Leonardo Spectrum, ISE 8.1i, Quartus II, VLSI Backend Tools.

UNIT - II

Synthesis using HDLs-Logic Synthesis using Verilog and VHDL, Memory and FSM Synthesis, Performance Driven Synthesis.

UNIT - III

Simulation, Types of Simulation, Static Timing Analysis, Formal Verification, Switch Level and Transistor Level Simulation.

UNIT - IV

Circuit Simulation using Spice - Circuit Description. AC, DC and Transient Analysis, Advanced Spice Commands and Analysis, Models for Diodes, Transistors and Opamp, Digital Building Blocks, A/D, D/A and Sample and Hold Circuits, Design and Analysis of Mixed Signal Circuits. Mixed Signal Circuit Modeling and Analysis using VHDL–AMS.

UNIT - V

System Design Using System C- System C Models of Computation, Classical Hardware Modeling in System C. Functional Modeling, Parametrized Modules and Channels, Test Benches, Tracing and Debugging.

TEXT BOOKS:

1. M.J.S.Smith, "Application Specific Integrated Circuits",Pearson, 2002
2. M.H.Rashid, "Spice for Circuits and Electronics using Pspice", (2/e), PHI.

REFERENCE BOOKS:

1. T. Grdtker et al, "System Design with System-C", Kluwer, 2004.
2. P.J. Ashenden et al, "The System Designer's Guide to VHDL-AMS", Elsevier, 2005

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	--	2	--	--	--	--	--	--	--	-	-	-	-
CO2	3	3	-	3	-	-	-	-	-	-	-	-	-	2	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	-	2	-
CO4	3	-	-	-	-	-	-	-	-	-	-	-	-	2	-
Average	3	3	-	2.5	-	-	-	-	-	-	-	-	-	2	-
Level of Correlation	3	3	-	3	-	-	-	-	-	-	-	-	-	2	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech II Semester ECE

(MINOR SPECIALIZED TRACK-2)

(20AECA1) C PROGRAMMING FOR EMBEDDED SYSTEMS

L	T	P	C
3	1	0	4

Course Outcomes:

After completion of the course, students will be able to

CO1 Understand the embedded systems architecture, and design process,

CO2 Understand the basic concepts of C programming for Embedded Systems to solve different problems.

CO3 Analyze various optimization and testing techniques for implementing applications using Embedded C programming.

UNIT I INTRODUCTION (12 Periods)

Benefits of C in Embedded Systems, Problem Specification: Product Requirements, Hardware Engineering, Software Planning, Testing Regime, Microcontrollers In-depth: The Central Processing Unit (CPU), Memory Addressing and Types, Timers, Interrupt Circuitry, I/O Ports, Serial Peripheral Buses, Development Tools for a Microcontroller.

UNIT II DESIGN PROCESS AND C FOR EMBEDDED SYSTEMS (12 Periods)

Design Process: Product Functionality, Hardware Design, Software Design, Resource Management, Testing Choices C for Embedded Systems: In-line Assembly Language, Device Knowledge, Mechanical Knowledge, Libraries, First Look at an Embedded C Program.

UNIT III DATA TYPES AND VARIABLES (12 Periods)

Identifier Declaration, Function Data Types, The Character Data Type, Integer Data Types, Bit Data Types, Real Numbers, Complex Data Types, typedef, Data Type Modifiers, Storage Class Modifiers.

UNIT IV C STATEMENTS, STRUCTURES, OPERATIONS AND LIBRARIES (10Periods)

Combining Statements in a Block, Functions, Control Structures, Decision Structures, Looping Structures, Operators and Expressions, Libraries: Creating Libraries, Writing the Library, Libraries and Linking.

UNIT V OPTIMIZING AND TESTING EMBEDDED C PROGRAMS (14Periods)

Optimization, Hand Optimization, Debugging Embedded C, Mixed C and Assembly, Exercising Hardware, Debugging by Inspection, Dummy Loads, Working with Emulators and Simulators, The Packaging of Embedded Software.

Sample Project: Hardware Exercise Programs, Talking to Ports, A/D Converter Theory.

Total Periods: 60

Text Books:

1. Kirk Zurell, "C Programming for Embedded Systems", R&D Books, CMP Media, Inc.
2. Behrouz A Forouzan, Richard F Gilberg " C Programming and Data Structures, Indian Edition, 2010

Reference Books:

1. Embedded C Michael J. Pont, 2nd Ed., Pearson Education,2008.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	2	-
CO2	3	3	-	-	2	-	-	-	-	-	-	-	-	2	-
CO3	3	3	-	-	2	-	-	-	-	-	-	-	-	2	-
Average	3	3	-	-	2	-	-	-	-	-	-	-	-	2	-
Level of Correlation	3	3	-	-	2	-	-	-	-	-	-	-	-	2	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B.Tech I Semester – ECE
Course Code: 20AECA2

EMBEDDED SYSTEM DESIGN

L	T	P	C
3	1	0	4

Course Outcomes:

After completion of the course students will be able to

CO1: Apply functionalities of processor internal blocks with their requirement.

CO2: Apply Bus standards on interface overheads without sacrificing processor performance

CO3: Use Embedded consumer product design based on phases of product development.

UNIT- I INTRODUCTION TO EMBEDDED SYSTEMS:

Introduction to Embedded Systems –built in features for embedded Target Architecture – selection of Embedded processor – DMA- memory devices – Memory management methods-memory mapping, cache replacement policies- Timer and Counting devices, Watchdog Timer, Real Time Clock.

UNIT- II EMBEDDED NETWORKING BY PROCESSORS:

Embedded Networking: Introduction, I/O Device Ports & Buses- multiple interrupts and interrupt service mechanism – Serial Bus communication protocols -RS232 standard–RS485–USB–Inter Integrated Circuits (I2C)- CAN Bus –Wireless protocol based on Wifi , Bluetooth, Zigbee.

UNIT- III RTOS BASED EMBEDDED SYSTEM DESIGN:

Introduction to basic concepts of RTOS- Need, Task, process & threads, interrupt routines in RTOS, Multiprocessing and Multitasking, Preemptive and non-preemptive scheduling, Task communication- context switching, interrupt latency and deadline shared memory, message passing-, Interprocess Communication – synchronization between processes-semaphores, Mailbox, pipes, priority inversion, priority inheritance.

UNIT- IV MODELLING WITH HARDWARE/SOFTWARE DESIGN APPROACHES:

Modelling embedded systems- embedded software development approach --Overview of UML modeling with UML, UML Diagrams-- Hardware/Software Partitioning , Co-Design Approaches for System Specification and modeling- CoSynthesis- features comparing Single-processor Architectures & Multi-Processor Architectures--design approach on parallelism in uniprocessors & Multiprocessors.

UNIT -V EMBEDDED SYSTEM APPLICATION DEVELOPMENT:

Objective, Need, different Phases & Modelling of the EDLC. choice of Target Architectures for Embedded Application Development-for Control Dominated-Data Dominated Systems-Case studies on Digital Camera, Adaptive Cruise control in a Car.

TEXT BOOKS:

1. Rajkamal, 'Embedded system-Architecture, Programming, Design', TMH,2011.
2. Peckol, "Embedded system Design",JohnWiley&Sons,2010
3. Lyla B Das," Embedded Systems-An Integrated Approach",Pearson2013

REFERENCE BOOKS:

1. Elicia White,"Making Embedded Systems",O'Reilly Series,SPD,2011
2. Bruce Powel Douglass,"Real-Time UML Workshop for Embedded Systems, Elsevier,2011
3. Advanced Computer architecture , By Rajiv Chopra, S Chand , 2010
4. Jorgen Staunstrup, Wayne Wolf , Hardware / Software Co- Design Principles and Practice, Springer, 2009.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	3	-	-	-	-	-	-	-	-	-	-
CO2	2	-	2	-	2	-	-	-	-	-	-	-	2	-	-
CO3	3	2	-	-	3	-	-	-	-	-	-	-	2	-	-
Average	2.66	2	2	-	2.66	-	-	-	-	-	-	-	2	-	-
Level of Correlation	3	2	2	-	3	-	-	-	-	-	-	-	2	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B.Tech II Semester – ECE

Course Code:20AECA3

EMBEDDED NETWORKING

	L	T	P	C
	3	1	0	4

Course Outcomes:

After completion of the course students will be able to

CO1: Define wired and wireless network protocols

CO2: Define Ethernet purpose in embedded systems

CO3: Design the incorporate networks in embedded systems

UNIT -I COMMUNICATION PROTOCOLS:

Serial/Parallel Communication – Serial communication protocols -RS232 standard – RS485 – Synchronous Serial Protocols -Serial Peripheral Interface (SPI) – Inter Integrated Circuits (I2C) – PC Parallel port programming - ISA/PCI Bus protocols – Firewire.

UNIT- II USB AND CAN BUS:

USB bus – Introduction – Speed Identification on the bus – USB States – USB bus communication: Packets –Data flow types –Enumeration –Descriptors –PIC Microcontroller USB Interface – CAN Bus – Introduction - Frames –Bit stuffing –Types of errors –Nominal Bit Timing – PIC microcontroller CAN Interface –A simple application with CAN.

UNIT - III ETHERNET BASICS:

Elements of a network – Inside Ethernet – Building a Network: Hardware options – Cables, Connections and network speed – Design choices: Selecting components –Ethernet Controllers – Using the internet in local and internet communications – Inside the Internet protocol.

UNIT - IV EMBEDDED ETHERNET:

Exchanging messages using UDP and TCP – Serving web pages with Dynamic Data – Serving web pages that respond to user Input – Email for Embedded Systems – Using FTP – Keeping Devices and Network secure.

UNIT- V WIRELESS EMBEDDED NETWORKING:

Wireless sensor networks – Introduction – Applications – Network Topology – Localization –Time Synchronization - Energy efficient MAC protocols –SMAC – Energy efficient and robust routing –Data Centric routing.

TEXT BOOKS:

1. Frank Vahid, Tony Givargis, “Embedded Systems Design: A Unified Hardware/Software Introduction” - John & Wiley Publications, 2002
2. Jan Axelson, “Parallel Port Complete: Programming, interfacing and using the PCs parallel printer port” - Penram Publications, 1996.
3. Dogan Ibrahim, “Advanced PIC microcontroller projects in C: from USB to RTOS with the PIC18F series” - Elsevier 2008.

REFERENCE BOOKS:

1. Jan Axelson, “Embedded Ethernet and Internet Complete”, Penram publications, 2003.
2. Bhaskar Krishnamachari, Networking, Wireless Sensors - Cambridge press 2005.
3. Olaf Pfeiffer, Andrew Ayre and Christian Keydel, “Embedded Networking with CAN and CAN open”, Second edition published by Copperhill Media Corporation, 2003.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	2	-	2	-	1	-	-	-	-	-	-	-	2	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	2.66	2	2	-	1	-	-	-	-	-	-	-	2	-	-
Level of Correlation	3	2	2	-	2	-	-	-	-	-	-	-	2	-	-

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B.Tech II Semester – ECE
Course Code:20AECA4

EMBEDDED REAL TIME OPERATING SYSTEMS

L	T	P	C
3	1	0	4

Course Outcomes:

After completion of the course students will be able to

CO1: Describe the architecture and programming of ARM processor.

CO2: Outline the concepts of embedded systems

CO3: Differentiate between the general-purpose operating system and the real time operating system

UNIT I INTRODUCTION TO EMBEDDED COMPUTING AND ARM PROCESSORS:

Complex systems and microprocessors– Embedded system design process –Design example: Model train controller- Instruction sets preliminaries – ARM Processor – CPU: programming input and output-supervisor mode, exceptions and traps – Co-processors- Memory system mechanisms – CPU performance- CPU power consumption.

UNIT- II EMBEDDED COMPUTING PLATFORM DESIGN:

The CPU Bus-Memory devices and systems–Designing with computing platforms – consumer electronics architecture – platform-level performance analysis – Components for embedded programs-Models of programs- Assembly, linking and loading – compilation techniques- Program level performance analysis.

UNIT- III PROCESSES AND OPERATING SYSTEMS:

Introduction – Multiple tasks and multiple processes – Multirate systems- Preemptive real-time operating systems- Priority based scheduling- Interprocess communication mechanisms – Evaluating operating system performance- power optimization strategies for processes – Example Real time operating systems.

UNIT -V SYSTEM DESIGN TECHNIQUES AND NETWORKS:

Design methodologies- Design flows – Requirement Analysis – Specifications-System analysis and architecture design – Quality Assurance techniques- Distributed embedded systems – MPSoCs and shared memory multiprocessors.

UNIT V CASE STUDY:

Data compressor – Alarm Clock – Audio player – Software modem-Digital still camera – Telephone answering machine-Engine control unit – Video accelerator.

TEXT BOOKS:

1. Marilyn Wolf, “Computers as Components – Principles of Embedded Computing System Design”, Third Edition “Morgan Kaufmann Publisher (An imprint from Elsevier), 2012.

REFERENCE BOOKS:

1. Jonathan W.Valvano, “Embedded Microcomputer Systems Real Time Interfacing”, Third Edition Cengage Learning, 2012.
2. David. E. Simon, “An Embedded Software Primer”, 1st Edition, Fifth Impression,

   Addison-Wesley Professional, 2007.
3. K.V.K.K.Prasad, “Embedded Real-Time Systems: Concepts, Design & Programming”, Dream Tech Press, 2005.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO2	2	-	2	-	1	-	-	-	-	-	-	-	3	-	-
CO3	3	2	-	-		-	-	-	-	-	-	-	3	-	-
Average	2.66	2	2	-	1	-	-	-	-	-	-	-	3	-	-
Level of Correlation	3	2	2	-	1	-	-	-	-	-	-	-	3	-	-

3- High mapping **2-Medium Mapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B. Tech I Semester ECE
Course Code: 20AECA5

FPGA BASED EMBEDDED SYSTEM DESIGN (MINOR)

L	T	P	C
3	1	0	4

Course Outcomes:
After successful completion of course the student will be able to

CO1: Define basic concepts of Verilog with different modules

CO2: Demonstrate FPGA architectures

CO3: Analyze FPGA Implementation using VHDL and Verilog.

CO4: Design microprocessors using FPGA

UNIT-I INTRODUCTION TO VERILOG:

Basic concepts- Lexical conventions, data types, system tasks and compiler directives. Modules and ports. Gate level modeling- gate types, various types of gate delay specifications. Data flow modeling- assignments, delays, expressions, operators, Behavioral modeling- structured procedures, procedural assignments, timing controls, conditional statements, loops, sequential and parallel blocks, generate blocks. Tasks and functions

UNIT-II FPGA ARCHITECTURE AND TECHNOLOGY:

Historical background, channel type FPGA Xilinx 3000 and Actel ACT2 family, structured programmable array logic, programming FPGAs, benchmarking of FPGAs. Recent developments- new architectures such as Altera FLEX, Pilkington (Motorola/ Toshiba), Xilinix XC4000, field programmable interconnect.

UNIT-III VHDL SYNTHESIS FOR FPGA IMPLEMENTATION:

Mapping of statements to gate assignment statements, logical, arithmetic and relational operators, vectors and slices, IF, Process, Case, Loop, Null, Wait statements. Modeling of flip-flops and latches. Modeling of FSM for synthesis. Some examples of synthesizable constructs.

UNIT-IV VERILOG SYNTHESIS FOR FPGA IMPLEMENTATION:

Verilog constructs and operators, interpretation of Verilog constructs, synthesis design flow- RTL to gates, translation, un- optimized intermediate representations, logic optimization, technology mapping and optimization, technology library, design constraints, optimized gate level description

UNIT-V MICROPROCESSOR DESIGN:

History of Microprocessors, Instruction Set Design, Addressing Modes Data Flow: Zero-, One-, Two- or Three-Address Design Register File and Memory Architecture, Operation Support, FPGA Microprocessor Cores, Hardcore Microprocessors Softcore Microprocessors, Case Studies, Nios-Processor Design.

TEXT BOOKS:

1. S. Palnitkar, Verilog HDL : A Guide to Digital Design and Synthesis, PH/Pearson.
2. K. Coffman, Real World FPGA Design with Verilog, PH

REFERENCES BOOKS:

1. P.J. Ashenden, The Designer's Guide to VHDL, Second Edition, Morgan Kaufmann.
2. C. H. Roth, Digital System Design with VHDL, PWS/Brook scole.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	-	-	-	-	-	-	-	-	-	-	-	3	-
CO2	1	1	-	-	-	-	-	-	-	-	-	-	-	3	-
CO3	2	2	-	-	-	-	-	-	-	-	-	-	-	3	-
CO4	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	1.5	1.75	-	-	-	-	-	-	-	-	-	-	-	3	-
Level of Correlation	2	2	-	-	-	-	-	-	-	-	-	-	-	3	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

II B.Tech II Semester ECE

Code: 20AECA6 Introduction to wireless and mobile communication Systems

(Minor (Specialization – Industry Relevant Track))

L	T	P	C
4	0	0	4

Course Outcomes:

After completion of the course the student will be able to

CO1	Understand the cellular mobile system, cell coverage and frequency reuse concept for improving system coverage.
CO2	Analyze the mobile antennas system for interference reduction, process of fading mechanism, and diversity techniques.
CO3	Apply the wireless system standard applications for the global system for mobile communications, code division multiple access and time division multiple access technologies.
CO4	Analyze the advanced intelligent network for wireless communications and future public land mobile telecommunications.

UNIT I CELLULAR MOBILE RADIO SYSTEMS (10)

Introduction to cellular mobile System, performance criteria, uniqueness of mobile radio environment, operation of cellular systems, hexagonal shaped cells, analog and digital Cellular systems, General description of the problem, concept of frequency channels, Frequency reuse, Co-channel Interference Reduction Factor, desired C/I from a normal case in a omni directional Antenna system, Cell splitting, consideration of the components of Cellular system.

UNIT II INTERFERENCE AND CELL COVERAGE FOR SIGNAL AND TRAFFIC (09)

Introduction to Co-Channel Interference, real time Co-Channel interference, Co-Channel measurement, design of Antenna system, Antenna parameters and their effects, diversity techniques-space diversity, polarization diversity, frequency diversity, time diversity, non-co channel interference-different types, 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 antenna height gain, formof point to point model. Small-scale fading and multipath: Small scale multipath propagation, types of small - Scale fading; Fading effects due to multipath time delay spread, flat fading, frequency selective fading.

UNIT III CELL SITE AND MOBILE ANTENNAS (10)

Sum and difference patterns and their synthesis, omni directional antennas, directional antennas for interference reduction, space diversity antennas, umbrella pattern antennas, minimum separation of cell site antennas, high gain antennas, Numbering and grouping, setup access and paging channels channel assignments to cell sites and mobile units, channel sharing and borrowing, sectorization, overlaid cells, non-fixed channel assignment.

Handoff, dropped calls and cell splitting, types of handoff, handoff invitation, delaying handoff, forced handoff, mobile assigned handoff. Intersystem handoff, cell splitting, micro cells, vehicle locating methods, dropped call rates and their evaluation, channel planning for wireless systems, Indoor propagation models-partition losses (Same Floor), partition losses between floors, log- distance path loss model.

UNIT IV WIRELESS SYSTEMS AND STANDARDS (08)

Second generation and Third generation Wireless Networks and Standards, WLL, Bluetooth, GSM, IS95, DECT, GSM architecture, GSM channels, multiplex access scheme, TDMA, CDM.

UNIT V INTELLIGENT NETWORK FOR WIRELESS COMMUNICATIONS (08)

Intelligent cell concept, advanced intelligent network, SS7 network and ISDN for AIN, AIN for mobile communication, Common channel signaling, asynchronous transfer mode technology, future public land mobile telecommunication system, wireless information superhighway, Gateway, TCP/IP Model and the OSI Network Model.

Total Periods: 45

Text Books:

1. Theodore.S.Rapport, “Wireless Communications”, Pearson Education, 2nd Edition, 2010.
2. Upen Dalal,“Wireless Communication”, Oxford University Press, 2010.
3. Kaveh Pahlvan, Prashant Krishnamurthy,“Principle of wireless networks”, A United Approach”, Pearson Education, 2004.
4. Andrea Goldsmith,“Wireless Communications”, Cambridge University Press, 2005.

Reference Books:

1. Theodore.S.Rapport, “Wireless Communications", Pearson Education, 3rd Edition 2003.
2. Lee, “Wireless and Mobile Communications”, McGraw Hill, 3rd Edition, 2006.
3. Jon W. Mark and Weihua Zhqung, “Wireless Communication and Networking”, PHI, 1st Edition, 2005.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	-	-	-	-	-	-	-	-	-	-	-	3
CO2	3	3	3	-	-	-	-	-	-	-	-	-	-	-	3
CO3	3	3	3	-	-	-	-	-	-	-	-	-	-	-	3
CO4	3	3	3	-	-	-	-	-	-	-	-	-	-	-	3
Average	3	3	3	-	-	-	-	-	-	-	-	-	-	-	3
Level of Correlation	3	3	3	-	-	-	-	-	-	-	-	-	-	-	3

3-Highmapping **2-MediumMapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech I Semester ECE

Course Code:20AECA7

RADIO RECEIVERS AND CODING TECHNIQUES

(Minor (Specialization – Industry Relevant Track))

L	T	P	C
3	1	0	4

Course Outcomes:

After completion of the course students will be able to

CO1	Analyze the working of Communication receiver, AM receiver, FM receiver of an analog communication system
CO2	Analyze the coding techniques with the mutual information and capacity of channel.
CO3	Analyze linear block codes, cyclic codes and convolution codes with error detection and correction.

UNIT -I RECEIVERS:

Basic concept of analog modulations, Comparison among AM, FM and PM, AM Transmitter- Low level & High-level Modulation, FM Transmitter. Introduction to radio receiver, Receiver Types: Tuned Radio-Frequency (TRF) Receiver, Super heterodyne Receiver. Introduction, RF Section and Characteristics, Reasons for use and functions of RF amplifier, Sensitivity. Selectivity, Image frequency and its rejection, Adjacent channel selectivity (Double spotting), Frequency Changing and Tracking, Conversion trans conductance, separately excited mixer, Self-excited mixer: Separately excited FET mixer, Self-excited bipolar transistor mixer. Super heterodyne receiver, Intermediate Frequencies and IF Amplifiers, and Automatic Gain Control (AGC): Operation of diode detector, Practical diode detector, Principles of simple automatic gain control, Simple AGC in bipolar transistor receivers, Distortion in diode detectors.

UNIT- II SINGLE- AND INDEPENDENT-SIDEBAND RECEIVERS:

Introduction, Receiver Types: Pilot-carrier receiver, Suppressed-carrier receiver.

COMMUNICATIONS RECEIVERS: Extensions of the Superheterodyne Principle: Input stages, Fine tuning, Double conversion, Delayed AGC, Variable sensitivity and selectivity, · Blocking Tuning calibration, Beat-frequency oscillator, Noise limiter, Squelch (muting), Automatic frequency control, Metering, FM and SSB reception, Diversity reception Frequency synthesizers, Direct synthesizers, Direct synthesizer block diagram, Indirect synthesizers, Basic block diagram of indirect synthesizer. Microprocessor control, Functional diagram of communications receiver microprocessor control

UNIT- III FM RECEIVERS:

FM receiver block diagram, Comparison with AM receivers, components used in FM receiver: RF amplifiers, Oscillators and mixers, Intermediate frequency and IF amplifiers, Amplitude Limiting: Operation of the amplitude limiter, Performance of the amplitude limiter, Further limiting, Basic FM Demodulators, Slope detection Balanced slope detector, Phase discriminator, Radio Detector: operation, FM Demodulator Comparison, Stereo FM Multiplex Reception: Stereo FM multiplex demodulation with optional SCA output.

UNIT- IV SOURCE ENCODING & DECODING:

Information, Entropy and it‘s Properties, Information Rate, Joint & Conditional Entropy, Mutual Information and its properties, Binary Symmetry Cannel – Binary Erassure Channel, Shannon Hartly theorem, Coding efficiency, Shannon Fano coding and Huffman coding.

UNIT- V CHANNEL ENCODING AND DECODING:

Automatic Repeat Request, Forward error control, Linear block codes, Error detection & correction capabilities of linear block codes, Binary Cyclic Codes and its error detection & Correction capabilities, Convolutional codes : Time domain & Frequency domain Approach, code tree, State diagram, Trellis Diagram, Decoding of Convolutional Code using Viterbi Algorithm.

TEXT BOOKS:

1. George Kennedy and Bernard Davis, “Electronics & Communication System”, TMH,2004.(edition)

2. B.P. Lathi, & Zhi Ding, “Modern Digital & Analog Communication Systems”, Oxford University Press, International 4th edition, 2010.

Reference Books:

1. Sam Shanmugam, “Digital and Analog Communication Systems”, John Wiley, 2005.

2. Herbert Taub & Donald L Schilling, “Principles of Communication Systems”, TataMcGraw- Hill, 3rd Edition, 2009

3. J. G. Proakis, M Salehi, Gerhard Bauch, “Modern Communication Systems Using MATLAB,” CENGAGE, 3rd Edition, 2013

	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-	3
CO2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	3
CO3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	3
Average	3	3	-	-	-	-	-	-	-	-	-	-	-	-	3
Level of Correlation	3	3	-	-	-	-	-	-	-	-	-	-	-	-	3

3-Highmapping **2-MediumMapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B.Tech II Semester ECE

Course Code:20AECA8

WIRELESS SENSOR NETWORKS

(Minor (Specialization – Industry Relevant Track))

L	T	P	C
3	1	0	4

Course Outcomes:

After completion of the course the student will be able to

CO1	Define concept of the components of Wireless Sensor Networks to analyze the architectures, features, and performance for wireless sensor network systems.
CO2	Use infrastructure establishment and Sensor Network Platforms and Tools for wireless sensor network.
CO3	APPLY communication protocols and routing protocols adopted in wireless sensor networks for energy efficiency

UNIT -I INTRODUCTION TO WIRELESS NETWORKING :

Introduction, Difference between wireless and fixed telephone networks, Development of wireless networks, Traffic routing in wireless networks.

Wireless sensor Network: introduction Constraints and Challenges, Opportunities and Challenges in

Wireless, Sensor Networks, Advantages of Sensor Networks (Energy Advantage and Detection Advantage), Sensor Network Applications, Smart Transportation, Collaborative Processing, Key Definitions

UNIT- II SENSOR NETWORK ARCHITECTURE AND APPLICATIONS:

Introduction, Functional Architecture for Sensor Networks, Sample Implementation Architectures, Classification of WSNs, Characteristics, Technical Challenges, and Design Directions, Technical Approaches, Coverage in Wireless Sensor Networks, Location in Wireless Sensor Networks, Data Gathering and Processing

UNIT -III INFRASTRUCTURE ESTABLISHMENT:

Topology Control, Clustering, Time Synchronization, Localization and Localization Services

UNIT- IV SENSOR NETWORK PLATFORMS AND TOOLS:

Individual Components of SN Nodes, Sensor Network Node, WSNs as Embedded Systems, Sensor Node Hardware, Sensor Network Programming Challenges, Node-Level Software Platforms, Node-Level Simulators, Programming beyond Individual Nodes: State-Centric Programming.

UNIT -V TAXONOMY OF ROUTING TECHNIQUES

Routing Protocols, Future Directions, Applications/Application Layer Protocols, Localization Protocols, Time Synchronization Protocols, Transport Layer Protocols, Network Layer Protocols, Data Link Layer Protocols.

TEXT BOOKS:

1. Feng Zhao, Leonidas Guibas, "Wireless Sensor Networks: An Information Processing Approach, Morgan Kaufmann, 2004.
2. Bhaskar Krishnamachari, "Networking Wireless Sensors", Cambridge University Press
3. Mohammad Ilyas, Imad Mahgoub, Hand book of Sensor Networks, CRC Press, 2005.

REFERENCE BOOKS:

1. Wireless Communications, Principles, Practice – Theodore S.Rappaport, PHI, 2nd Ed., 2002.
2. C.S Raghavendra, Krishna M, Sivalingam, TaiebZnati, "Wireless Sensor Networks, Springer.
3. Kazem Sohraby, Daniel Minoli, TaiebZnati, Wireless Sensor Networks: Technology, Protocols, and Applications, Wiley Inter Science.

CO-PO Mapping:

	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	2	-	-	-	-	-	-	-	-	-	2
CO3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	3	3	-	-	2	-	-	-	-	-	-	-	-	-	2
Level of Correlation	3	3	-	-	2	-	-	-	-	-	-	-	-	-	2

3-Highmapping **2-MediumMapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech II Semester ECE

Course Code:20AECA9

OPTICAL WIRELESS COMMUNICATION

(Minor (Specialization – Industry Relevant Track))

L	T	P	C
3	1	0	4

Course Outcomes:

After completion of the course the student will be able to

CO1 Use the concept of optical wireless communication to analyze modeling of channel for indoor and outdoor OWC

CO2 apply free space optical communication and Laser satellite communication

CO3 Analyze the advanced modulation and demodulation techniques favorable for optical wireless communication and their performance in presence of noise.

CO4 explain working and principle of Visible Light, Infrared Communications and utilization of OWC in sensor networks.

UNIT- I WIRELESS OPTICAL COMMUNICATION:

Introduction to wireless optical communication (WOC), Need of Optical Wireless Communication (OWC)-block diagram, Application -Optical sources-optical detectors-Optical Detection Statistics, wireless optical channels: atmospheric channel, underwater optical channel, atmospheric losses, weather condition influence, atmospheric turbulence effects i.e. scintillation, beam spreading, etc. wireless optical communication application areas, WOC challenges

UNIT- II CHANNEL MODELING

Linear time invariant model, channel transfer function, models of turbulence induced fading such as log -normal turbulence model, exponential, K distribution, gamma-gamma distribution, indoor optical wireless communication channel: LOS propagation model, Non-LOS propagation model, spherical model.

UNIT- III FREE SPACE OPTICAL COMMUNICATIONS

Introduction-operating principles-characteristics-Qos and availability--FSO OFDM communication-FSO underwater- Free space optical networks-laser satellite communication. effect of turbulence and weather conditions i.e. drizzle, haze fog on error performance

UNIT- IV MODULATION TECHNIQUES

analogue intensity modulation, digital baseband modulation techniques: baseband modulations, on–off keying, error performance on Gaussian channels, power efficiency, BW efficiency, bit versus symbol error rates, different modulation schemes such as M-PPM, DPPM, DAPPM schemes, subcarrier modulation, optical polarization shift keying: binary PolSK, bit error rate analysis.

UNIT-V VISIBLE LIGHT COMMUNICATIONS- VLC PRINCIPLE AND INFRARED OPTICAL WIRELESS COMMUNICATIONS:

VLC system model- system implementation-VLC applications Infrared optical wireless communications - Optical wireless in sensor networks- FSO Sensor networks.

TEXT BOOKS:

1. Z.Ghassemlooy, W.Popoola, S.Rajbhandari, Optical Wireless Communications, CRC Press,2013.
2. Gerd Keiser, Optical Fiber Communication, 4th Edition, Tata McGraw-Hill Ltd., 2008 (Indian Edition).
3. Heinz, Phd. Willebrand, "Free Space Optics," Sams, 1st Ed., 2001.
4. Stamatioas V. Kartalopouls "Free space optical Networks for Ultra Broadband services" JohnWiley& Sons, 2011.

Reference Books:

1. Morris Katzman, "Laser Satellite Communication," Prentice Hall Inc., New York, 1991.2.

2. Roberto Ramirez-Iniguez, SeviaM.Idrus, Ziran sun "Optical wireless communications: IR for wireless connectivity" CRC Press, Taylor and Francis Group, 2007

CO-PO Mapping:

	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-	
CO2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	3
CO3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	3
CO4	3	3	-	-	-	-	-	-	-	-	-	-	-	-	3
Average	3	3	-	-	-	-	-	-	-	-	-	-	-	-	3
Level of Correlation	3	3	-	-	-	-	-	-	-	-	-	-	-	-	3

3-Highmapping **2-MediumMapping** **1- Low Mapping**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B. Tech I Semester ECE

Course Code: 20AECB0

5G Mobile Networks

(MINOR)

L	T	P	C
3	1	0	4

Course Outcomes:

After successful completion of course the student will be able to

CO1: Explain the concepts of 5G Technology.

CO2: Analyze the channels modeling, Propagation and modeling of mm Wave MIMO Systems.

CO3: Apply different modulation and multiple access techniques in 5G.

CO4: Apply Device to device and millimeter wave communication concepts in 5G.

UNIT-I OVERVIEW OF 5G BROADBAND WIRELESS COMMUNICATIONS:

Evaluation of mobile technologies 1G to 4G (LTE, LTEA, LTEA Pro), An Overview of 5G requirements, Regulations for 5G, Spectrum Analysis and Sharing for 5G.

UNIT-II 5G WIRELESS PROPAGATION CHANNELS:

Channel modeling requirements, propagation scenarios and challenges in the 5G modeling, Channel Models for mm Wave MIMO Systems

UNIT- III TRANSMISSION AND DESIGN TECHNIQUES FOR 5G:

Basic requirements of transmission over 5G, Modulation Techniques – Orthogonal frequency division multiplexing (OFDM), generalized frequency division multiplexing (GFDM), filter bank multi-carriers (FBMC) and universal filtered multi-carrier (UFMC), Multiple Accesses Techniques – orthogonal frequency division multiple accesses (OFDMA), generalized frequency division multiple accesses (GFDMA), nonorthogonal multiple accesses (NOMA).

UNIT-IV DEVICE-TO-DEVICE (D2D) AND MACHINE-TO-MACHINE (M2M) TYPE COMMUNICATIONS:

Extension of 4G D2D standardization to 5G, radio resource management for mobile broadband D2D, multi hop and multi-operator D2D communications.

UNIT- V MILLIMETER-WAVE COMMUNICATIONS:

spectrum regulations, deployment scenarios, beamforming, physical layer techniques, interference and mobility management, Massive MIMO propagation channel models, Channel Estimation in Massive MIMO, Massive MIMO with Imperfect CSI, Multi-Cell Massive MIMO, Pilot Contamination, Spatial Modulation (SM)

TEXT BOOKS:

1. Martin Sauter "From GSM From GSM to LTE–Advanced Pro and 5G: An Introduction to Mobile Networks and Mobile Broadband", 3rd edition, Wiley-Blackwell, 2017.
2. Afif Osseiran, Jose.F.Monserrat, Patrick Marsch, "5G Mobile and Wireless Communications Technology" , Cambridge University Press, 2016

REFERENCE BOOKS:

1. Jonathan Rodriguez, "Fundamentals of 5G Mobile Networks", John Wiley & Sons, 2015
2. Athanasios G.Kanatos, Konstantina S.Nikita, Panagiotis Mathiopoulos, "New Directions in Wireless Communication Systems from Mobile to 5G", CRC Press,2018

	Program Outcomes												Program Specific Outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	2
CO3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	2
CO4	3	3	-	-	-	-	-	-	-	-	-	-	-	-	2
Average	3	3	-	-	-	-	-	-	-	-	-	-	-	-	2
Level of Correlation	3	3	-	-	-	-	-	-	-	-	-	-	-	-	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech II Semester ECE

(MINOR SPECIALIZED TRACK-4)

(20AECB1)Nanotechnology

L	T	P	C
3	1	0	4

Course Outcomes:

On successful completion of the course the student will be able to

CO1 Understand various Top-Down and Bottom-Up approaches for nanomaterial synthesis.

CO2 Apply various physicochemical synthesis methods to Synthesize nanomaterials and analyse nanomaterial characteristics.

CO3 Apply their knowledge to design various nanodevices for environmental and biological applications.

UNIT-INANOTECHNOLOGY:(12 Periods)

Introduction to nanotechnology, types of nanotechnology and nano-machines, top down and bottom-up techniques, atomic manipulation-nanodots, semi-conductor quantum dots, self-assembly monolayers, Simple details of characterization tools- SEM, TEM, STM, AFM.

UNIT- IINANOMATERIALS:(12 Periods)

Nanomaterials, Preparation of nanomaterials- solid state reaction method, Chemical Vapor Deposition, Sol-gels techniques, Electrodeposition, Ball Milling, Introduction to lithography, pulse laser deposition (PLD),

Applications of nanomaterials

UNIT- IIICARBON TUBES:(12 Periods)

New forms of carbon, Carbon tubes-types of nanotubes, formation of nanotubes, Assemblies, purification of Carbon nanotubes, Properties of nanotubes, applications of nanotubes.

UNIT- IV OPTICS, PHOTONICS AND SOLAR ENERGY:(12 Periods)

Light and nanotechnology, Interaction of light and nanotechnology, Nanoholes and photons, Solar cells, optically useful nanostructured polymers, Photonic Crystals.

UNIT-VFUTURE APPLICATIONS:(12 Periods)

MEMs, Nanomachines, Nanodevices, quantum computers, Opto-electronic devices, quantum electronic devices, Environmental and Biological applications.

Total Periods: 60

Text Books:

1. Nanotechnology Rebecca L Johnson, Lerner Publications.
2. Introduction to Nanotechnogy Charles P. Poole Jr., Chapman and Hall/CRS

Reference Books:

1. Nanotechnology-Basic Science and Emerging Technologies Mick Wilson, Kamali Kannangra Geoff Smith, Michelle Simons and BurkhardRaguse, Overseas Press.

3. Nanotechnology-A Gentle Introduction to the Next Big Idea MarkRatner and Daniel Ratner, Prentice Hall

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	2	-	2	-	-	-	-	-	-	-	-	-	-
CO2	2	-	3	-	2	-	-	-	-	-	-	-	-	-	-
CO3	3	-	2	-	1	-	-	-	-	-	-	-	3	-	-
Average	2.66	-	2.33	-	1.66	-	-	-	-	-	-	-	3	-	-
Level of Correlation	3	-	2	-	2	-	-	-	-	-	-	-	3	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B. Tech I Semester ECE

Course Code:20AECB2

NANO TECHNOLOGY IN FLEXIBLE ELECTRONICS APPLICATIONS

(Minor Track)

L	T	P	C
3	1	0	4

Course Outcomes:

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

CO1: Define trends and technologies of flexible electronics

CO2: Identify materials and understand the various thin film deposition methods for flexible electronics application.

CO3: Demonstrate TFT device structures, characteristics and applications

UNIT-I INTRODUCTION TO FLEXIBLE ELECTRONICS:

Background and history, trends, emerging technologies, general applications, areas of research.

UNIT-II MATERIALS FOR FLEXIBLE ELECTRONICS:

Nanowire and nanoparticle synthesis, transition metal oxides, amorphous thin films, polymeric semiconductors, structure and property relationships, paper-based electronics, textile substrates, barrier materials.

UNIT-III FABRICATION METHODS AND PATTERNING PROCESSES FOR FLEXIBLE DEVICES:

CVD, PECVD, PVD, etching, photolithography, low-temperature process integration, Ink-jet printing, gravure, imprint lithography, spray pyrolysis, surface energy effects, multilayer patterning, design rule considerations.

UNIT-IV THIN FILM TRANSISTORS: DEVICE STRUCTURE AND PERFORMANCE: Fundamental issues for low-temperature processing, Low-temperature thin-film transistor Devices, Device structures and materials processing, Low-temperature a-Si:Hand a-IGZO thin-film transistor device performance, I-V characteristics, device stability

UNIT-V FLEXIBLE ELECTRONICS APPLICATIONS: Displays, sensor arrays, memory devices, MEMS, lab-on-a-chip, and flexible solar panels.

TEXT BOOKS:

1. William S. Wong, Alberto Salleo, Flexible Electronics: Materials and Applications, 2011, 1 st Edition, Springer, New York.
2. Guozhen Shen, Zhiyong Fan, “Flexible Electronics: From Materials to Devices”, 2015, 1st Edition, World Scientific Publishing Co, Singapore

REFERENCES BOOKS:

1. Edward Sazonov, Michael R. Newman, “Wearable Sensors: Fundamentals, Implementation and Applications”, 2014, 1st Edition, Academic Press, Cambridge.
2. Kate Hartman, “Make: Wearable Electronics: Design, prototype, and wear your own interactive garments”, 2014, 1st Edition, Marker Media, Netherlands.
3. Yugang Sun, John A. Rogers, “Semiconductor Nanomaterials for Flexible Technologies: From Photovoltaics and Electronics to Sensors and Energy Storage (Micro and Nano Technologies)”, 2011, 1st Edition, William Andrew, New York.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	3	2	-	-	2	-	-	-	-	-	-	-	2	-	-
CO3	2	-	2	-	-	-	-	-	-	-	-	-	2	-	-
Average	2.33	2.5	2	-	2	-	-	-	-	-	-	-	2	-	-
Level of Correlation	2	3	2	-	2	-	-	-	-	-	-	-	2	-	-

3-Highmapping 2-MediumMapping 1- Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech II Semester ECE

Course Code: 20AECB3

NANOMATERIALS FOR SOLAR ENERGY AND PHOTO VOLTAICS

(Minor Track)

L	T	P	C
3	1	0	4

Course Outcomes:

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

CO1: Define various properties of nanomaterials and nanostructures.

CO2: Explain role of Nanomaterials in solar energy conversion devices and system**s**

CO3: Use nanostructures and nanomaterials towards solar energy storage, fuel cell and hydrogen technology

UNIT-I PROPERTIES OF NANOMATERIALS:

Introduction to nanomaterial, nano dimensional materials, classification of nanomaterials, bulk materials and nanomaterials – changes in bulk and nanomaterials of silicon, silver, gold. General methods of preparation of nanomaterials, thermal and thermo-electric properties of nano structures - modeling and metrology. Nanowires, nanostructures, nanocomposites.

UNIT-II NANOMATERIALS FOR SOLAR THERMAL CONVERSION:

Conversion of thermal energy - Nanostructures and nanomaterials, materials selection criteria, particle-scale effect. Phase compositions on nanoscale microstructures. Nanoparticles for conduction heat transfer, coatings on fins.

UNIT-III NANO APPLICATIONS IN THERMAL ENERGY STORAGE:

Basics of thermal energy storage systems. Application of nanomaterials in solar thermal energy production and storage systems - Sensible, latent heat and chemical energy storages. Nano encapsulated phase change materials in cooling applications. Nanotechnology for electrochemical energy storage.

UNIT-IV NANOMATERIALS FOR PHOTOVOLTAICS:

Photochemical solar cells, PV panels with nanostructures. Phase compositions on nanoscale microstructures – role of nanostructures and materials – nanomaterials in solar photovoltaic technology-band gap engineering and optical engineering - tandem structures - quantum well and quantum dot solar cells - photo-thermal cells – organic solar cells. Performance and reliability of nanomaterials based solar cells.

UNIT-V NANOMATERIALS IN FUEL CELL APPLICATIONS:

Use of nanostructures and nanomaterials in fuel cell technology - high and low temperature fuel cells, cathode and anode reactions, fuel cell catalysts, electrolytes, ceramic catalysts. Use of nano technology in hydrogen production and storage.

TEXT BOOKS:

1. Leite .E.R., “Nano Structured Materials for Electrochemical Energy Production and Storage”, Springer, 2009.
2. Garcia-Martinez .J, “Nano Technology for Energy Challenge”, Wiley- H Weinheim, 2010.
3. Tsakalakos .L, “Nanotechnology for Photovoltaic”s, CRC, 2010

REFERENCES BOOKS:

1. KarkareI .K , “Nanotechnology- Fundamentals and Applications”, IK Intern.Publ.,2008.
2. Allhoff .F, “What is Nanotechnology”, Wiley, 2010
3. Maheshwar Sharon, Madhuri Sharon, Carbon “Nano forms and Applications”, McGraw-Hill, 2010.
4. Eftekhari .A, “Nano Structured Materials in Electrochemistry”, Wiley-VCH, 2008. \

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	2	-	2	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	2	-	-	-	-	-	-	-	2	-	-
CO3	3	-	3	-	2	-	-	-	-	-	-	-	2	-	-
Average	3	2	2.5	-	2	-	-	-	-	-	-	-	2	-	-
Level of Correlation	3	2	3	-	2	-	-	-	-	-	-	-	2	-	-

3-Highmapping 2-MediumMapping 1- Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IIIB. Tech II Semester ECE

Course Code: 20AECB4

NANO ELECTRONICS AND NANO PHOTONICS

(Minor Track)

L	T	P	C
3	1	0	4

Course Outcomes:

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

CO1: Explain concepts of nanoelectronics such as ballistic transport and quantum confinement.

CO2: Use nanostructures and its applications towards Single Electron Devices, Molecular Electronics and Spintronics.

CO3: Apply nano photonics in various applications.

UNIT-I INTRODUCTION TO NANOELECTRONICS:

Limitations of the conventional MOSFETs at Nanoscales, MOSFET Scaling & implications, Introductory concepts of Ballistic transport and Quantum confinement, Differences in Few Electron Devices (as analog version) and Single Electron Devices (as digital version) of Nano electronic devices

UNIT-II SINGLE ELECTRON DEVICES:

Principle of operation- Single-Electron Effect, Coulomb Blockade Phenomenon; Theoretical Quantum Dot Transistor - Energy of Quantum Dot system, Single-Electron Quantum-Dot Transistor, Single transistors; Conductance Oscillation and Potential Fluctuation; Transport under Finite temperature and Finite Bias; Coulomb Blockade Devices.

UNIT-III FOUNDATIONS OF PHOTONICS:

Photons and Electrons - Similarities and differences, Light Interaction with Matter, Complex refractive index and dielectric constant, Dispersion in Materials.

UNIT-IV CONFINEMENT AND PROPAGATION: Confinement of Photons and Electrons, Co-operative effects for Photons and Electrons, Propagation through Classically Forbidden Zone- Tunneling, Concept of Near-Field phenomena in Photonic Crystals and Evanescent wave.

UNIT-V APPLICATIONS OF PHOTONICS:

TE/TM Mode, Optical fiber, filters, switching devices, Kerr effect devices; Super Lenses – Micro and Nano Lenses, Prisms and Meta-materials, Graphene photonics.

TEXT BOOKS:

1. K. Goser, P. Glosekotter, Nanoelectronics and Nanosystems, Springer, 2005.
2. Shunri Oda, David Ferry, Nanaoscale Silicon Devices, CRC Press, Taylor & Francis Group, 2015.
3. Paras Prasad, Nanophotonics, Wiley-Interscience, 2004.

REFERENCES BOOKS:

1. Konstantin K. Likharev, Single Electron Devices and their Applications, IEEE proceedings, vol. 87, no. 4, April 1999.p 606- 632.
2. Suprio Datta, Lessons from nanoelectronics, World Scientific publisher, 2015.
3. MotoichiOhtsu, Kiyoshi Kobayashi, Tadashi Kawazoe, Takashi Yatsui, Makoto Naruse, Principles ofNanophotonics, CRC Press, Taylor & Francis Group, 2008.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	2	-	2	-	1	-	-	-	-	-	-	-	2	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	2.66	2	2	-	1	-	-	-	-	-	-	-	2	-	-
Level of Correlation	3	2	2	-	1	-	-	-	-	-	-	-	2	-	-

3-Highmapping 2-MediumMapping 1- Low Mapping

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B. Tech I Semester ECE
Course Code: 20AECB5

NANO MATERIALS SYNTHESIS AND CHARACTERIZATION TECHNIQUES (MINOR)

L	T	P	C
3	1	0	4

Course Outcomes:

After successful completion of course the student will be able to

CO1: Identify various process techniques to synthesis nanostructured materials

CO2: Explain factors controlling growth of the nanomaterials

CO3: Analyze structural, morphological and optical properties of nano structured materials

UNIT-I INTRODUCTION TO NANOMATERIALS AND PROPERTIES:

One dimensional, Two dimensional and Three-dimensional nanostructured materials, Quantum Dots shell structures, metal oxides, semiconductors, composites, mechanical-physical-chemical properties, Opportunity at the nano scale - Length and time scale in structures -energy landscapes-Inter dynamic aspects of inter molecular forces -Evolution of band structure and Fermi surface.

UNIT-II NANOMATERIAL SYNTHESIS METHODS:

Introduction to Nano scale materials - Synthesis and processing, method of nano structured material preparation – mechanical grinding, wet chemical synthesis – sol-gel processing, gas phase synthesis, gas condensation processing, chemical vapor condensation – nano composite synthesis – processing.

UNIT-III DIFFRACTION ANALYSES:

X- ray diffraction, powder diffraction, lattice parameters, structure analyses, strain analyses, phase identification, particle size analyses using - Scherer`s formula - X-ray photoelectron spectroscopy (XPS)-Auger electron spectroscopy (AES).

UNIT-IV SURFACE IMAGING:

Scanning Electron Microscope (SEM) – Field Emission Scanning Electron Microscope (FESEM)-Atomic Force Microscopy (AFM), Scanning Tunneling Microscopy (STM)– Transmission Electron Microscopy (TEM).

UNIT-V SPECTROSCOPIC TECHNIQUES:

Infrared spectroscopy (IR) – Rotational & Vibrational - UV-visible - Raman Spectroscopy- Photoluminescence (PL)– Cathodoluminescence (CL).

TEXT BOOKS:

1. Mick Wilson, Kamali Kannargare., Geoff Smith, ―Nano technology: Basic Science and Emerging technologies‖, Overseas Press, 2005
2. Encyclopedia of nanoscience and nanotechnology, Edited by H.S. Nalwa, American Scientific Publishers, 2007
3. Nanostructures and Nanomaterials: synthesis, properties and applications, G. Cao and Y. Wang, World Scientific, 2nd edition, 2011

REFERENCES BOOKS:

1. Ghuzang G. Cao, Nanostructures and Nanomaterials: Synthesis, properties and applications, Imperical College Press, 2004
2. Nanoelectronics and nano systems: from transistors to molecular and quantum devices, K. Goser, P. Glosekotter and J. Dienstuhl, Springer 2005

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	2	-	2	-	-	-	-	-	-	-	-	-	-
CO2	-	-	3	-	2	-	-	-	-	-	-	-	-	-	-
CO3	3	-	2	-	2	-	-	-	-	-	-	-	1	-	-
Average	3	-	2.33	-	2	-	-	-	-	-	-	-	1	-	-
Level of Correlation	3	-	2	-	2	-	-	-	-	-	-	-	1	-	-