ACADEMIC REGULATIONS – R20

COURSE STRUCTURE

AND

DETAILED SYLLABI

B. Tech Regular Four Year Degree Course

(For the Batches Admitted From 2020-2021)

&

B. Tech (Lateral Entry Scheme)

(For the Batches Admitted From 2021-2022)

ELECTRICAL AND ELECTRONICS ENGINEERING

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

(Affiliated to JNTUA, Anantapuramu, Approved by AICTE, New Delhi)

R.V.S. Nagar, CHITTOOR – 517 127, A.P

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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.

DEPARTMENT VISION:

- To be recognized as a center of excellence to produce competent and ethical Electrical Engineers capable of finding solutions to problems related to society, environment and industry using innovative technologies.

DEPARTMENT MISION:

- **M1:** To establish suitable forums and state-of-the art resources to enhance the faculty members creative and innovative endeavours in teaching and research in Electrical Engineering and allied fields
- **M2:** To deliver knowledge among students through contemporary curriculum and modern pedagogical methods in the areas of electrical engineering and interdisciplinary areas
- **M3:** To enable students, develop skills in solving complex engineering problems of current times and also provide a framework for promoting collaborative and multidisciplinary activities
- **M4:** To nurture the personality traits among the students in different dimensions emphasis the ethical values and to address needs of the nation.

PROGRAM EDUCATIONAL OBJECTIVES:

PEO 1: Excel in professional career and/or higher education by acquiring knowledge in Mathematics and Basic Electrical Sciences, Power Systems, Power Electronics and Electrical Drives.

PEO 2: Identify the problems in society and design Electrical systems appropriate to its solutions through starting companies, producing economically feasible and socially acceptable.

PEO 3. Exhibit professionalism, ethical attitude, communication skills, team work in their profession and adapt to current trends in technology by engaging in continuous professional development.

PROGRAM SPECIFIC OUTCOMES:

PSO1: Identify, formulate and investigate various problems of electrical and electronic circuits, power electronics and power systems by applying the fundamental knowledge of mathematics, science and engineering.

PSO2: Design, develop and implement multidisciplinary projects in the field of electrical power and energy using state-of-the-art technologies and modern software tools.

PSO3: Design and develop sustainable models in the fields of Generation, Transmission, Distribution, Control systems and Renewable Energy Systems

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)
R.V.S NAGAR, CHITTOOR, (AP)

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

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.

ACADEMIC REGULATIONS-R20

COURSE STRUCTURE AND DETAILED SYLLABI

B. TECH REGULAR (FULL-TIME) FOUR YEAR DEGREE PROGRAMME

(*FOR THE BATCHES ADMITTED FROM THE ACADEMIC YEAR 2020-21*)

BACHELOR OF TECHNOLOGY

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 by AICTE, New Delhi

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(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" in these 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.

$$SGPA = \Sigma (C_i \times G_i) / \Sigma C_i$$

where, C_i is the number of credits of the ith subject and G_i 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.	

Induction Program: 3 weeks
(Common for All Branches of Engineering)

Semester-0 **Regulations: R20**

S.No	Category	Course code	Course title	Hours per week			Credits
				L	T	P	
1	MC		Physical Activities -- Sports, Yoga and Meditation, Plantation	0	0	6	0
2	MC		Career Counseling	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**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Course Structure & Scheme of Examination

I B.Tech I Semester-EEE **Regulations: R20**

S.No	Category	Course Code	Course Title	Hours per week			Credits	Scheme of Examination Max. Marks		
				L	T	P		CIA	SEE	Total
1	BS	20AHS02	Differential Equations and Multivariable calculus	3	1	0	3	40	60	100
2	BS	20AHS04	Engineering Physics	3	0	0	3	40	60	100
3	ES	20ACS01	C Programming and Data Structures	3	1	0	3	40	60	100
4	ES	20AME01	Computer Aided Engineering Drawing	1	0	4	3	40	60	100
5	ES	20ACE03	Basics of Civil and Mechanical Engineering	3	0	0	3	40	60	100
6	BS	20AHS07	Engineering Physics Lab	0	0	3	1.5	40	60	100
7	ES	20ACS03	C Programming and Data Structures 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	-	100	00	100
TOTAL				**15**	**2**	**13**	**19.5**	**420**	**480**	**900**

I B.Tech II Semester

S.No	Category	Course code	Course title	Hours per week			Credits	Scheme of Examination Max. Marks		
				L	T	P		CIA	SEE	Total
1	HS	20AHS01	Communicative English	3	0	0	3	40	60	100
2	BS	20AHS03	Engineering Chemistry	3	0	0	3	40	60	100
3	BS	20AHS08	Algebra and Transformation Techniques	3	1	0	3	40	60	100
4	ES	20AEE04	Electrical Circuits	3	1	0	3	40	60	100
5	ES	20ACS04	Problem Solving and Programming using Python	3	1	0	3	40	60	100
6	HS	20AHS05	Communicative English 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	BS	20AHS06	Engineering Chemistry Lab	0	0	3	1.5	40	60	100
9	MC	20AMB01	Design Thinking	2	0	0	-	100	00	100
10	20ANSS1/20ANCC1		NSS/NCC	0	0	2	-	-	-	-
TOTAL				**17**	**3**	**11**	**19.5**	**420**	**480**	**900**

II B.Tech I Semester

S.NO	Category	Course code	Course Title	Hours per week			Credits	Scheme of Examination Max. Marks		
				L	T	P		CIA	SEE	Total
1	BS	20AHS10	Numerical Methods	3	0	0	3	40	60	100
2	ES	20AEC01	Electronic Devices and Circuits	3	0	0	3	40	60	100
3	PC	20AEE06	Network Analysis and Synthesis	3	0	0	3	40	60	100
4	PC	20AEE07	Electro Magnetic Fields	3	0	0	3	40	60	100
5	PC	20AEE08	DC Machines and Transformers	3	0	0	3	40	60	100
6	ES/PC LAB	20AEC05	Electronic Device Circuits Lab	0	0	3	1.5	40	60	100
7	PC LAB	20AEE09	Electrical Circuits and Simulation Lab	0	0	3	1.5	40	60	100
8	PC LAB	20AEE10	DC Machines and Transformers Lab	0	0	3	1.5	40	60	100
9	SC	20AEE11	Electrical CAD	1	0	2	2	40	60	100
10	MC	20AMB02	Universal Human Values-I	2	0	0	-	100	00	100
11	AC	20AHS11	Quantitative Aptitude and Reasoning-I	2	0	0	-	-	-	-
12	20ANSS1/20ANCC1		NSS/NCC	0	0	2	-	-	-	-
TOTAL				**20**	**00**	**13**	**21.5**	**460**	**540**	**1000**

II B.Tech, II Semester

S.NO	Category	Course code	Course Title	Hours per week			Credits	Scheme of Examination Max. Marks		
				L	T	P		CIA	SEE	Total
1	BS	20AHS12	Complex Analysis and probability distributions	3	0	0	3	40	60	100
2	PC	20AEE15	Generation, Transmission and Distribution of Electric Power	3	0	0	3	40	60	100
3	PC	20AEE16	Control Systems	3	0	0	3	40	60	100
4	PC	20AEE17	Induction and Synchronous Machines	3	0	0	3	40	60	100
5	PC	20AEC15	Analog and Digital logic Circuits	3	0	0	3	40	60	100
6	PC LAB	20AEE18	Control Systems and Simulation Lab	0	0	3	1.5	40	60	100
7	PC LAB	20AEE19	Induction and Synchronous Machines Lab	0	0	3	1.5	40	60	100
8	PC LAB	20AEC16	Analog and Digital logic Circuits Lab	0	0	3	1.5	40	60	100
9	SC	20AEE20	PLC and SCADA	1	0	2	2	40	60	100
10	AC	20AHS15	Quantitative Aptitude and Reasoning -II	2	0	0	-	-	-	-
TOTAL				**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

S.No	Category	Course code	Course Title	Hours per week			Credits	Scheme of Examination Max. Marks		
				L	T	P		CIA	SEE	Total
1	HSS	20AMB03	Managerial Economics and Financial Analysis	3	0	0	3	40	60	100
2	PC	20AEE21	Electrical and Electronics Measurements	3	0	0	3	40	60	100
3	PC	20AEE22	Power Electronics and Drives	3	0	0	3	40	60	100
4	PE	**Professional Elective Courses-I**		3	0	0	3	40	60	100
		20AEE23	Real Time Embedded Systems Concepts and Practice							
		20AEE24	Power System Components							
		20AEE25	Distribution System Automation							
		20AEE26	Advanced Power System Protection							
		20AEE27	Reliability Engineering Application to Power Systems							
5	OE/JOE	**Open Elective/ Job Oriented Elective –I**		3	0	0	3	40	60	100
		20ACS07	Object Oriented Programming through JAVA							
		20ACS17	Computer Networks							
		20AME18	Robotics and Artificial Intelligence							
		20AEE28	Technical Transformer Design							
		20AEE29	Electrical Load Estimation and Design							
6	PC LAB	20AEE30	Transmission and Distribution Lab	0	0	3	1.5	40	60	100
7	PC LAB	20AEE31	Electrical and Electronics Measurements Lab	0	0	3	1.5	40	60	100
8	SC	20AHS16	Advanced English Communication Skill	1	0	2	2	40	60	100
9	MC	20AHS21	Indian Constitution	2	0	0	-	100	00	100
10	AC	20AHS17	Quantitative Aptitude and Reasoning -III	2	0	0	-	-	-	-
11	AC	20AHS18	French Language	2	0	0	-	-	-	-
		20AHS19	German Language							
		20AHS20	Japanese Language							
12	20AEE32/ 20AEEB7		Summer Internship/Community Service project	0	0	0	1.5	40	60	100
Total				**22**	**00**	**8**	**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

S.NO	Category	Course code	Course Title	Hours per week			Credits	Scheme of Examination Max. Marks		
				L	T	P		CIA	SEE	Total
1	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							
2	PC	20AEE34	Power System Analysis	3	0	0	3	40	60	100
3	PC	20AEC19	Microprocessor and Microcontrollers	3	0	0	3	40	60	100
4	PE	**Professional Elective Courses-II**		3	0	0	3	40	60	100
		20AEE35	Soft Computing Techniques							
		20AEE36	Direct Energy Conversion Systems							
		20AEE37	Instrumentation							
		20AEE38	Electrical Machine Design							
		20AEE39	Modeling of Power System Components							
5	OE/JOE	**Open Elective/ Job Oriented Elective -II**		3	0	0	3	40	60	100
		20ACS08	Relational Database Management Systems							
		20AEC24	Nano Technology and Applications							
		20AEC25	MEMS and NEMS							
		20AEE40	Solar Power Plant Design							
		20AEE41	Electrical Substations and Switch Yards							
6	PCLAB	20AEE42	Power Electronics and Simulation Lab	0	0	3	1.5	40	60	100
7	PC LAB	20AEC27	Microprocessor and Micro Controllers Lab	0	0	3	1.5	40	60	100
8	PC LAB	20AEE43	Electrical Power Systems and Simulation Lab	0	0	3	1.5	40	60	100
9	SC	20AEE44	Switch Gear and Protection	1	0	2	2	40	60	100
10	MC	20AHS23	Essence of Indian Traditional Knowledge	2	0	0	-	100	-	100
Total				**18**	**00**	**11**	**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**										
Industrial/Research Internship (Mandatory) 2 Months during summer vacation (to be evaluated during IV year, I Sem)										

IV B.Tech., I Semester

S.NO	Category	Course code	Course Title	Periods per week L	T	P	Credits	Scheme of Examination Max. Marks CIA	SEE	Total
1	PC	20AEE46	Power System Operation and Control	3	0	0	3	40	60	100
2	PE	**Professional Elective Courses-III**		3	0	0	3	40	60	100
		20AEE47	Utilization of Electrical Energy							
		20AEE48	PIC Microcontrollers							
		20AEE49	Energy Audit Conservation and Management							
		20AEE50	High Voltage Engineering							
		20AEE51	Power Quality							
3	PE	**Professional Elective Courses-IV**		3	0	0	3	40	60	100
		20AEE52	Advanced Control Systems							
		20AEE53	Design and Estimation of Electrical Systems							
		20AEE54	Distributed Generation and Micro-grid							
		20AEE55	Power System Automation							
		20AEE56	Power System Deregulation							
4	PE	**Professional Elective Courses-V**		3	0	0	3	40	60	100
		20AEE57	HVDC and FACTS							
		20AEE58	Power Electronics for Renewable Energy Systems							
		20AEE59	Power System Stability							
		20AEE60	Analysis of Electrical Machines							
		20AEE61	Medical Instrumentation							
5	OE/JOE	**Open Elective/ Job Oriented Elective -III**		3	0	0	3	40	60	100
		20AEC33	Digital Signal Processing							
		20AMB09	Intellectual Property Rights							
		20AEC68	Communication Systems							
		20AEE62	EV Charge Station Design							
		20AEE63	Electrical Power Plant Engineering							
6	OE/JOE	**Open Elective/ Job Oriented Elective -IV**		3	0	0	3	40	60	100
		20AEC32	VLSI Design							
		20AEE64	IOT for Electrical Engineering							
		20AME54	Optimization Techniques							
		20AEE65	Railway Traction Design							
		20AEE66	Industrial Automation							
7.	SC	20AEE67	Embedded Systems Design	1	0	2	2	40	60	100
8	MC	20AMB12	Professional Ethics	2	0	0	-	100	00	100
9	20AEE68		Industrial / Research Internship				3	40	60	100
TOTAL				21	00	4	**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

S. NO	Category	Course code	Course Title	Hours per week			Credits	Scheme of Examination Max. Marks		
				L	T	P		CIA	SEE	Total
1	Major Project	20AEE71	Project Project work, Seminar and Internship in Industry	0	0	24	12	40	60	100
	INTERNSHIP (6 MONTHS)									

HONORS DEGREE: Students has to acquire 20 credits with minimum one subject from each pool @ 4 credits per subject.

Semester	SUBJECT CODE	Course Name	L	T	P	C	PRE-REQ	Offering Department
POOL-I								
II-II (Any 1 Course from POOL-I)	20AEE72	Special Electrical Machines	3	1	0	4	Electrical Machines and Drives	EEE
	20AEE73	Micro Electronic Devices and Sensors	3	1	0	4	Industrial Electronics	EEE
	20AEE74	Industrial Electrical Systems	3	1	0	4	Control Engineering	EEE
	20AEE75	Electrical Distribution Systems	3	1	0	4	Power Systems	EEE
POOL-II								
III-I (Any 1 Course from POOL-II)	20AEE76	Electrical Machine Modelling & Analysis	3	1	0	4	Electrical Machines and Drives	EEE
	20AEE77	Power Systems Dynamics and Control	3	1	0	4	Industrial Electronics	EEE
	20AEE78	Modern Control Theory	3	1	0	4	Control Engineering	EEE
	20AEE79	Reactive Power Compensation & Management	3	1	0	4	Power Systems	EEE
POOL-III								
III-II (Any 1 Course from POOL-III)	20AEE80	Power Electronic Converters application for DC and AC Drives	3	1	0	4	Industrial Electronics	EEE
	20AEE81	Discrete Control Systems	3	1	0	4	Control Engineering	EEE
	20AEE82	Reliability Engineering and Applications	3	1	0	4	Power Systems	EEE
	20AEE83	EHV AC Transmission System	3	1	0	4	Power Systems	EEE
POOL-IV								
III-II (Any 1 Course from POOL-IV)	20AEE84	Power Semiconductor Devices and Protection	3	1	0	4	Industrial Electronics	EEE
	20AEE85	Micro Grid Technologies	3	1	0	4	Control Engineering	EEE
	20AEE86	Power System Optimization	3	1	0	4	Power Systems	EEE
	20AEE87	Real Time Control of Power Systems	3	1	0	4	Power Systems	EEE
POOL-V								
IV-I (Any 1 Course from POOL-V)	20AEE88	Advanced Machines Control	3	1	0	4	Electrical Machines and Drives	EEE
	20AEE89	Digital VLSI Testing	3	1	0	4	Industrial Electronics	EEE
	20AEE90	Fabrication Techniques for MEMS Based Sensors: Clinical Perspective	3	1	0	4	Control Engineering	EEE
	20AEE91	Advances in UHV Transmission and Distribution	3	1	0	4	Power Systems	EEE

<u>Minor Degree:</u> a student has to earn 20 extra credits (By studying FIVE theory and FIVE Laboratory courses@ 4 credits)

Year & Sem	Course Code	Name of the Subject and Lab	L	T	P	C	Offering Department
II-II	20AEE92	Basics of Electrical Power Systems	**3**	**0**	**2**	**4**	EEE
III-I	20AEE93	Solar and Wind Energy	**3**	**0**	**2**	**4**	EEE
III-II	20AEE94	Fundamentals of Power Electronics	**3**	**0**	**2**	**4**	EEE
	20AEE95	Electrical Measurements	**3**	**0**	**2**	**4**	EEE
IV-I	20AEE96	Embedded Systems Automation	**3**	**0**	**2**	**4**	EEE
Total						**20**	

1. **Minor Degree (Industry relevant Track) A student can opt Five subjects from each track @ 4 credits per subject**

TRACK-I RENEWABLE ENERGY AND SUSTAINABILITY

S.NO	Subject code	Subject	L	T	P	C	PRE-REQ	Offering Department
1	20AEE97	Renewable Energy Sources	3	1	0	4	Power Systems	EEE
2	20AEE98	Integration of Renewable Energy into Power Systems	3	1	0	4	Power Systems, Power Electronics	EEE
3	20AEE99	Energy Management Systems for Sustainability	3	1	0	4	Power Systems, Power Electronics	EEE
4	20AEEA0	Sustainable And Renewable Energy Technology	3	1	0	4	Power Systems & Power Electronics	EEE
5	20AEEA1	Modelling And Optimization of Energy Systems	3	1	0	4	Non-Conventional Energy Sources & Power Electronics	EEE
Total						**20**		

TRACK-II DESIGN OF ELECTRIC AND HYBRID VEHICLE

S.NO	Subject code	Subject	L	T	P	C	PRE-REQ	Offering Department
1	20AEEA2	Electrical and Hybrid Vehicles	3	1	0	4	Power Systems & Power Electronics	EEE
2	20AEEA3	Testing and Certification of Electric Hybrid Vehicles	3	1	0	4	Power Electronics	EEE
3	20AEEA4	EV Batteries & Charging System	3	1	0	4	Power Electronics	EEE
4	20AEEA5	Electric Vehicles in Smart Grid	3	1	0	4	Power Systems & Power Electronics	EEE
5	20AEEA6	Modelling and Simulation of EHV	3	1	0	4	Power Systems & Power Electronics	EEE
		Total				**20**		

TRACK-III SMART ELECTRIC GRID AND SMART CITIES

S.NO	Subject code	Subject	L	T	P	C	PRE-REQ	Offering Department
1	20AEEA7	Smart Electric Grid Technology	3	1	0	4	Electrical Power Systems	EEE
2	20AEEA8	Micro Grid Operation and Control	3	1	0	4	Electrical power Systems & Power System Operation	EEE
3	20AEEA9	Smart Grid Planning & Operation	3	1	0	4	Power Systems	EEE
4	20AEEB0	Smart Grid Technologies & IoT	3	1	0	4	Electrical Power Systems	EEE
5	20AEEB1	Smart Grid Communications and Protocols	3	1	0	4	Electrical Power Systems	EEE
Total						**20**		

TRACK-IV INDUSTRIAL DRIVES AND CONTROL

S.NO	Subject code	Subject	L	T	P	C	PRE-REQ	Offering Department
1	20AEEB2	Industrial Drives	3	1	0	4	Power Electronics	EEE
2	20AEEB3	Artificial Intelligence in Industrial Automation	3	1	0	4	Power Systems	EEE
3	20AEEB4	Sensors for Industrial Automation Applications	3	1	0	4	Power system & Power Electronics	EEE
4	20AEEB5	IoT for Industrial Automation	3	1	0	4	Power Electronics	EEE
5	20AEEB6	Robotics and Control	3	1	0	4	Power Electronics	EEE
Total						**20**		

SRI VENKATESWARA COLLEGE OF ENGINEERING AND 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

CO1: Classify and interpret the solution of ordinary differential equations.

CO2: Apply the principles of differential equations to the engineering and scientific problems.

CO3: Analyze the maxima and minima of functions of two or more variables.

CO4: Evaluate the double and triple integral to find surface area and volumes.

CO5: 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}, $Sinax$, $Cosax$, 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, 40th 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.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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 of the Course	3	2	-	2	-	-	-	-	-	-	-	-	-	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

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

L	T	P	C
3	0	-	3

20AHS04 ENGINEERING PHYSICS

COURSE OUTCOMES

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

CO1: Demonstrate strong fundamental knowledge in optic, lasers and optical fibers.

CO2: Comprehend and apply quantum mechanical principles towards the free electron theory.

CO3: Learn about the crystal structure, magnetic materials, semiconductors, superconductors and their applications.

CO4: Propose preparation methods for different nano-materials and relate structure of nano-materials 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 9 Hours

LASERS & FIBER OPTICS

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 9 Hours

SEMICONDUCTORS & SUPERCONDUCTORS

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 9 Hours

MAGNETISM & NANOMATERIALS

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 .

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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 of the Course	3	2	-	1	1	-	-	-	-	-	-	-	-	-	-

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 successful Completion of the course the student will be able to

CO1: Analyze the basic concepts of C Programming language.

CO2: Design applications in C, using functions, arrays, pointers and structures.

CO3: Apply the concepts of Stacks and Queues in solving the problems.

CO4: Explore various operations on Linked lists.

CO5: Demonstrate various tree traversals and graph traversal techniques.

CO6 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 andpointers, 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”, Thirdedition, 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, UniversityPress.
4. M.T. Somashekara, “Problem Solving Using C”, PHI, 2nd Edition 2009.

Mapping of CO’s- PO’s-PSO’s

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

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)

L	T	P	C
1	0	4	3

20AME01 COMPUTER AIDED ENGINEERING DRAWING

COURSE OUTCOMES:

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

CO1: Communicate his/her ideas effectively by using Auto CAD software.

CO2: Project the points,lines,planes,solids with digital environment

CO3: Represent sectional views of solids and develop the sectioned object surfaces.

CO4: 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 BOOKS:

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 2nd edition.

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: Withprimeron AUTO CAD, PHI Learning Pvt. Ltd.,

Mapping of CO's- PO's-PSO's

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

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

I B.Tech I Semester (**EEE**) **L T P C**

3 0 0 3

20ACE03 BASICS OF CIVIL AND MECHANICAL ENGINEERING

COURSE OUTCOMES:

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

CO1: Choose the correct methods, techniques and construction materials to solve the social problems related to various domains of civil engineering.

CO2 : Describe the fundamentals related to foundation, superstructure of the building and components of various Building Infrastructure

Part – A: CIVIL ENGINEERING

UNIT-I:

SURVEYING AND CIVIL ENGINEERING MATERIALS

Overview of Civil Engineering: Civil Engineering contributions to the welfare of society, specialized sub disciplines in Civil Engineering.

Surveying: Objectives, Classification and principles; Measurements – distances, angles, levels. Areas and volumes; contouring; Illustrative examples.

Civil Engineering Materials: Bricks, stones, concrete, steel, glass, timber, composite Materials.

Mechanics of Materials: Forces, system of forces, Laws of mechanics, moment of a force, equilibrium,

resultant, Internal and External forces, Stress, Strain, Hooke's law and Elasticity.

UNIT-II:

BUILDING COMPONENTS AND CIVIL ENGINEERING INFRASTRUCTURE BUILDING COMPONENTS:

Sub structure – Types of foundations, Bearing capacity and settlement, Requirement of good foundations.

Superstructure – Civil engineering construction – Brick masonry, Stone masonry, Beams, Columns, Lintels, Roofs, Floors, Stairs, Building bye-laws – bye-laws floor area, carpet area and floor space index, basics of interior design and

landscaping.

Civil Engineering Infrastructure – Types of Bridges and Dams, water supply and Sanitary systems, Rainwater
harvesting, Types of Highways and Railways, Ports and Harbours.

Part – B: MECHANICAL ENGINEERING

UNIT-III:

INTERNAL COMBUSTION ENGINES, TURBINES AND PUMPS

Overview of Mechanical Engineering: Introduction to Mechanical Engineering, specialized sub disciplines in Mechanical Engineering.

Internal Combustion Engines – Classification- Working principle of petrol and Diesel Engines – stroke engines – Comparision of four stroke and two stroke engines.

Turbines and Pumps – Classifications of Steam turbines – Impulse turbine, Reaction turbines; working principle of Reciprocating Pumps (single acting and double acting) and Centrifugal Pumps.

UNIT-IV

MECHANICAL POWER TRANSMISSION SYSTEMS

Power Transmission Systems: Belt, rope and chain drives, Gears and Transmission screw

Power Transmission by belts: Classification of belts, Length of the Belt (Open and Crossed-Belt Drives), Power Transmitted by Belt Drive, Tension due to Centrifugal Forces, Initial Tension, Maximum Power Transmitted.

Power transmission by Gear train: Gear terminology, classification of gears, Gear train- Simple Gear Train and Compound Gear Train, Power Transmitted by Simple Gear Train.

UNIT-V: MANUFACTURING PROCESSES

Manufacturing Processes: Elementary ideas of Casting, Forging, Rolling, Welding, Soldering and Brazing.

Machining processes: Lathe-Turning, Taper Turning, Thread cutting, Shapping, Drilling, Grinding and Milling (simple sketches and short notes).

TEXTBOOKS:

1. Shanmugam G and Palanichamy MS, Basic Civil and Mechanical Engineering, Tata McGraw Hill PublishingCo. NewDelhi, 1 stedition 2018.
2. R. Vaishnavi, Prof. M. Prabhakaran & Prof. V. Vijayan, Basic Civil and Mechanical Engineering, S. CHAND
   Publications, 2ndedition, 2013.
3. B.C Punmia, Ashok Kumar Jain, Arun Kumar Jain, Surveying (vol-I), Laxmi publications, 16th edition, 2005.
4. B.C Punmia, Ashok Kumar Jain, Arun Kumar Jain, Building Construction, Laxmi publications, 10th edition, 2005.

REFERANCES:

1. V. Ganesan, I.C. Engines, Noida, 4th Edition, Tata McGraw Hill, 2014.
2. Kalpakjain, Manufacturing Technology, Chennai, 4th Edition, Pearson Edition, 2002.
3. S.C. Arora &Domkudwar, A Corse in Refrigeration and Air Conditioning, Dhanapat Rai Publications, New Delhi,
   2016.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	--	--	--	--	--	--	--	--	--	--	3	--	2
CO2	3	2	--	--	--	--	--	--	--	--	--	--	3	3	2
CO3	3	2	--	--	--	--	--	--	--	--	--	--	3	2	1
CO4	2	3	3	--	--	--	--	--	--	--	--	--	3	3	1
CO5	3	--	3	--	--	--	--	--	--	--	--	--	3	3	1
Average	2.60	2.20	1.20	0.00	0.00	1.00	0.80	0.00	0.00	0.00	0.00	0.00	3.00	2.20	1.40
Level of Correlation of the Course	3	2	1			1	1						3	2	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

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

L	T	P	C
-	-	3	1.5

20AHS07 ENGINEERING PHYSICS LAB

COURSE OUTCOMES:

After successful completion of practical, student will be able to

CO1: Recognize the Importance of optical phenomenon like Interference and diffraction of light.

CO2: Gain the practical knowledge of optical fiber, semiconductor, magnetic materials, lasers and their relative parameters.

CO3: Recognize the importance of optical fibers in the field of 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.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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 of the Course	3	1	-	-	2	-	-	-	-	-	-	-	-	-	-

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 successful completion of the course the student will be able to

CO1: Demonstrate basic concepts of C programming language.
CO2: Develop C programs using functions, arrays, structures and pointers.
CO3: Apply the concepts Stacks and Queues using C Programming.
CO4: Ilustrate operations on Linked lists.
CO5: 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 linkedlist.

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 thefollowing 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 ofintegers 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 ApproachUsing C”, Third edition, CENGAGE Learning, 2016.
3. Richard F. Gilberg & Behrouz A. Forouzan, “Data Structures: A Pseudocode Approach withC”, Second Edition, CENGAGE Learning, 2011.

REFERENCE BOOKS:

1. PradipDey and ManasGhosh, 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.

Mapping of CO’s- PO’s-PSO’s

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

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

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

L	T	P	C
-	-	3	1.5

20AME02 ENGINEERING PRACTICE LAB

COURSE OUTCOMES:

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

CO1: Perform a different prototype models in the carpentry trade such as Mortise and ten on joint, and Table stand using wood turning lathe.

CO2: Prepare models such as Dove tail joint and Half Round joint using Fitting tools and rectangular ray, and funnel prototypes in the trade of Tin smithy.

CO3: 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.

CO4: Fabricate different models in a foundry shop such as single and two pieces patterns and prototypes in the trade of Welding suchas 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 given 300x 40x25mm soft wood stock.

b. Fittingshop

1. Preparea Dovetail joint from a given100x50x5mmM.S.stock.
2. Preparea Half Round joint from a given100x50x5mmM.S.stock.

c. Sheetmetal shop

1. Preparea Funnel from given G.I. sheet.
2. Preparea 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 different places).
2. Prepare a wiring for tube light (‘’Fluorescent Lamp ‘’)/ Focus light

3. Preparea mould for a single piece pattern (Connect in grod)
4. Preparea mould for a Double piece pattern(Stepped Pulley)

e. Welding

1. Preparea T-Joint from given M.S Flat pates using Arc Welding.
2. Preparea 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, GHF Nayler, Jaico Publishing House.

4 Engineering Work shop by Vishnu Universal Learning.

5 Engineering Work shop by GRIE institute.

Mapping of CO's- PO's-PSO's

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

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

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

L	T	P	C
2	-	-	-

20AHS09 ENVIRONMENTAL SCIENCES

(Mandatory Course)

COURSE OUTCOMES:

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

CO1: Aware of the complex relationships between environment and human system.

CO2: Develop critical thinking (or) observation skills and apply them in the analysis of a problem (or) question related to the environment.

CO3: Identify the major pollutants and abatement devices in order to protect the environment from pollution for effective environmental management.

CO4: 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, 15lh Edition, 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.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific 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	-	-	-	-	-	-	-	-
Average	2	-	-	-	-	-	3	-	-	-	-	-	-	-	-
Level of Correlation of the Course	2	-	-	-	-	-	3	-	-	-	-	-	-	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

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

CO1: Develop knowledge of basic grammatical concepts to understand asking and answering general questions on familiar topics and making paragraphs.

CO2: Interpret context, topic, and pieces of specific information from social or Transactional dialogues spoken by native speakers of English.

CO3: Examine language aspects to do role plays, to study graphic elements and information transfer.

CO4: Demonstrate discourse markers to make effective oral presentations and to write structured essays.

UNIT- I 10Hours

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. Becky Tarver, Heinley ELT; 2nd Edition, 2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Education.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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 of the Course	3	3	-	-	-	-	-	-	3	3	-	-	-	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

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

CO1: Understand the impact of hard water and its removal, apply the concept of estimation of hardness.

CO2: Analyze the selection of suitable engineering materials for specific applications.

CO3: Understand the Effect of corrosion and to know the designing of corrosion resistant articles.

CO4: 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 pHmetry, 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 an 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. Ravi Krishnan, 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.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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 of the Course	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND 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

CO1: Solve the system of linear equations and determine the eigen values and eigen vectors.

CO2: Apply the Laplace transform techniques to solve ordinary differential equations.

CO3: Apply Fourier series to expand periodic and elementary functions.

CO4: Evaluate Fourier sin and cosine transforms for given functions.

CO5: 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.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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 of the Course	3	2	-	2	-	-	-	-	-	-	-	-	-	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

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

20AEE04 ELECTRICAL CIRCUITS

COURSE OUTCOMES:

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

CO1: Understand the concept electrical circuit elements.
CO2: Understand the method of analysis of mesh and nodal for electrical circuits.
CO3: Study the system performance for steady state analysis.
CO4: Apply the concept of self and mutual inductance for magnetic circuits.
CO5: Understand the concepts of locus diagrams and resonance for electrical circuits

UNIT - I

INTRODUCTION TO ELECTRICAL CIRCUITS

Introduction of Electrical Current, Voltage, Power and Energy –Voltage and Current sources R-L-C parameters – Independent and dependent sources-Source transformation – Voltage – Current relationship for passive elements-Current division method and voltage division Method–Ohm’s law and Kirchhoff’s laws – Problems.

UNIT – II

NETWORK REDUCTION TECHNIQUES

Series, Parallel and Series- Parallel of R-L-C parameters- Star-to-Delta and Delta-to-Star transformation –Definition of Branch, Node, loop -Node analysis and Mesh analysis -–Mesh and Nodal analysis by inspection method-Concept of super node and super mesh for DC Circuits-Problems

UNIT – III

SINGLE PHASE A.C CIRCUITS

Generation of sinusoidal voltage,Phasor representation of alternating quantities, Definition of Average value, Root Mean Square value, Form Factor and Peak Factor-Periodic and Non Periodic wave forms-Steady state analysis of R, L and C (in series, parallel and series parallel combinations) with sinusoidal excitation – Concept of Reactance, Impedance, Susceptance and Admittance – Phase and Phase difference – Concept of Power factor, Construction of Power Triangle– J-notation, Complex and Polar forms of representation, Complex power-Problems

UNIT - IV

MAGNETIC CIRCUITS

Concept Magnetic Circuits – Faraday’s laws of electromagnetic induction – Lenzs law, concept of self and mutual inductance – dot convention – coefficient of coupling – composite magnetic circuit - Analysis of series and parallel magnetic circuits – Problems.

UNIT – V

RESONANCE AND LOCUS DIAGRAMS

Resonance – Series, parallel circuits, concept of band width and Q factor, Locus diagrams – series R-L, R-C, R-L-C and parallel combination with variation of various parameters – problems.

TEXT BOOKS:

1. Network Theory: - A sudhakar and shyammohan s palli,TMH publication 2nd edition 2004
2. Ravish R. Singh: network analysis and synthesis,tata mc graw hill company,1st edition 2013

REFERENCE BOOKS:

1. Engineering circuit analysis – by William Hayt and Jack E. Kimmerly, Mc Graw Hill Company, 6th edition.
2. Circuit theory -A. Chakrapathi, Dhanpat rai and co, 2nd edition 2015.
3. Fundamentals of Electric circuits, Alexander and sadiku, Mc-Graw Hill

Mapping of CO's- PO's-PSO's

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

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 successful ompletion of the course the student will be able to

CO1: Demonstrate knowledge in Basics of python programming

CO2: Use the data structure lists, Dictionaries and Tuples.

CO3: Solve the problems by applying the modularity principle.

CO4: Demonstrate knowledge in OOP.

CO5: 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, CharlesDierbach, 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.

Mapping of CO's- PO's-PSO's

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

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

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

L	T	P	C
-	-	3	1.5

20AHS05 COMMUNICATIVE ENGLISH LAB

COURSE OUTCOMES:

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

CO1: Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills

CO2: Develop communication skills through debates, oral presentations, group discussions and various language learning activities

CO3: Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and reading comprehension.

CO4: 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.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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	-	2	-	-	-
CO4	3	-	-	-	-	-	-	-	-	3	-	2	-	-	-
Average	2.75	2.33	-	-	-	-	-	-	3	3	-	2	-	-	-
Level of Correlation of the Course	3	2	-	-	-	-	-	-	3	3	-	2	-	-	-

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 successful completion of the course the student will be able to

CO1: Write, Test and Debug Python Programs

CO2: Implement Conditionals and Loops for Python Programs

CO3: Use functions and represent Compound data using Lists, Tuples and Dictionaries

CO4: 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 areaccepted 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 theresult 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 inascending order using if-else construct.

b. Write a python script to display Fibonacci sequence of numbers using while loop, for loopand 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 0^{th}, 4^{th} and 5^{th} 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 andlower cases.

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

Sample Input /Output

Input: Python – Output:

onononon Input: Exercises –

Output: eseseses

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 recursivefunctions.

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 inthe file in alphabetical order

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

WEEK 12

a. Write a program to demonstrate a) arrays b) array indexing such as slicing, integer arrayindexing and Boolean array indexing along with their basic operations in NumPy.
b. Write a program to compute summary statistics such as mean, median, mode, standarddeviation 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.

Mapping of CO's- PO's-PSO's

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

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

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

L	T	P	C
-	-	3	1.5

20AHS06 ENGINEERING CHEMISTRY LAB

COURSE OUTCOMES:

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

CO1: Estimate the amount of metal ions, hardness of water, chlorides in water, acidity, alkalinity, dissolved oxygen in water by using volumetric analysis.

CO2: Demonstrate the importance of viscosity index, flash point and fire point of lubricants and to prepare a polymer.

CO3: 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 acid Vs 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.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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 of the Course	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

I B.Tech II Semester (EEE)

20AMB01 DESIGN THINKING

(Mandatory Course)

(Common to all Branches)

L	T	P	C
2	0	0	0

COURSE OUTCOMES:

After completion of the course the student will be able to

CO1: Explain design thinking concepts and models to be used to perform human centered design (Understanding).
CO2: Apply design thinking tools techniques to produce good design (Applying).
CO3: Develop innovative products or services for a customer (Creating).
CO4: 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 humanthinking 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 PhysicalProducts", 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 of CO's- PO's-PSO's

Course	Program Outcomes												Program Specific Outcomes		
Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	2	3	-	-	-	-	-	-	-	-	-	1		
CO2	-	2	3	-	-	-	-	-	-	-	3	-		2	
CO3	-	-	3	-	-	-	-	-	-	-	-	-			1
CO4	-	-	3	2	-	-	-	-	-	-	-	-	1		
Average	-	2	3	2	-	-	-	-	-	-	-	-	0.50	1.25	0.25
Level of Correlation of the Course	-	2	3	2	-	-	-	-	-	-	3	-	1	2	1

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

I B.Tech II Semester (EEE)

20ANSS1/20ANCC1 NSS/NCC

(Common to all Branches)

L	T	P	C
0	0	2	0

SRI VENKATESWARA COLLEGE OF ENGINEERING AND 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

CO1: Classify the algebraic and non-algebraic equations and solve them using different iterative methods.

CO2: Apply numerical techniques to solve engineering problems.

CO3: Interpret the data and drawing the valid conclusion.

CO4: Evaluate the numerical solutions of ordinary differential equations using single step and multistep methods.

CO5: 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 Engineering Computation. New age International Publishers.
3. N. Bail, M.Goyal & C.Walking, A Text Book of Advanced Engineering Mathematics-AComputerApproach.
4. Pal, Mathematical Methods, Oxford University Press, 2009.
5. S.S. Sastry, Introductory Methods of Numerical Analysis, Printice Hall of India publications, 2011

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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 of the Course	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-

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	0	0	3

20AEC01 ELECTRONICS DEVICES AND CIRCUITS

COURSE OUTCOMES:

After successful completion of the course, the student 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, Pearson Prentice Hall, 2009.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific 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 of the Course	3	2	1	2	1	-	-	-	-	-	-	-	3	2	1

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech – I Semester, EEE

L	T	P	C
3	0	0	3

20AEE06 NETWORK ANALYSIS AND SYNTHESIS

COURSE OUTCOMES:

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

CO1: Analyze the concepts of three phase circuits in the electrical networks.
CO2: Analyze the network theorems in DC and AC Excitation networks.
CO3: Analyze transient response in solving the problems of DC and AC circuits.
CO4: Apply the network parameters and their relations of two port networks.
CO5: Apply the Knowledge different types of network synthesis.

UNIT-1:

THREE PHASE CIRCUITS:

Phase sequence- star and delta connection - relation between line and phase voltages and currents - analysis of balanced three phase circuits - measurement of active and reactive power. Analysis of three phase unbalanced circuits: Loop method, Star-Delta transformation technique, Two wattmeter method of 3 phase power measurement.

UNIT-2

NETWORK THEOREMS (WITH AC& DC EXCITATIONS)

Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Reciprocity Theorem, Millman's Theorem, Compensation Theorem, Tellegen's Theorem, Substitution Theorem – Problems.

UNIT-3:

TRANSIENT ANALYSIS IN DC & AC CIRCUITS:

Transient Analysis in DC circuits Transient response of R-L, R-C and R-L-C circuits for DC excitation, Solutions using Differential equations.

Transient Analysis in AC circuits: Transient response of R-L, R-C and R-L-C circuits for AC excitation, Solutions using Differential equations.

UNIT-4

TWO PORT NETWORKS & GRAPH THEORY:

Two Port network parameters-Z, Y, ABCD and Hybrid parameters and their relations, Cascaded networks. Poles and zeros of network functions.

Graph Theory – Graph – Tree - Incidence matrix, Cut set and Tie set matrices & Formation of equilibrium equations, Duality and Dual networks.

UNIT-5

NETWORK SYNTHESIS:

Introduction - Hurwitz polynomials, Positive real functions, Realization of passive RL, RC and LC networks using Foster and Cauer forms

TEXT BOOKS:

1. Fundamentals of Electric Circuits by Charles K. Alexander, Matthew N.O. Sadiku, McGraw-Hill Publications, 6th Edition, July 2019.
2. Engineering Circuit Analysis by Hayt, W. H, Kemmerly J. E. & Durbin, McGraw Hill Publications, 8th Edition, August 2018.

REFERENCE BOOKS:

1. Electric Circuits - Schaum's Outline Series, Joseph. A. Edminister, McGraw-Hill Publications, 5th Edition, July 2017.
2. Network Analysis and Synthesis, Ravish R Singh, McGraw-Hill publications, July, 2017
3. Network Theory: Analysis and Synthesis, Smarajit Ghosh, PHI publications, July 2015.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3		--	--	2	--	--	--	--	--	--	3	2	2
CO2	3	3		3	--	2	--	--	--	--	--	--	3	3	2
CO3	3	2		1	--	2	--	--	--	--	--	--	2	2	1
CO4	3	3	2	3	--	2	--	--	--	--	--	--	2	3	3
CO5	3	2	3	2	--	3	--	3	--	--	--	--	3	2	1
Average	3.00	2.60	1.00	1.80	0.00	2.20	0.00	0.60	0.00	0.00	0.00	0.00	2.60	2.40	1.80
Level of Correlation of the Course	3	3	1	2		2							3	2	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech – I Semester (EEE)

L	T	P	C
3	0	0	3

20AEE07 ELECTROMAGNETIC FIELDS

COURSE OUTCOMES:

After successful completion of the course student will be able to

- **CO1:** Analyze the basic concepts related to electric field, magnetic field and time varying fields.
- **CO2:** Apply the fundamental laws of electro statics, magneto statics and time varying fields.
- **CO3:** Analyze principles of electromagnetic fields in power transmission lines, DC and AC Machines.
- **CO4:** Analyze the electromagnetic fields from the Maxwell's equations, Boundary conditions, Poisson's and Laplace's equations.
- **CO5:** Analyze the potential, capacitance, inductance, force, torque, current density, energy and energy density.

UNIT-I

ELECTROSTATICS

Electro static Field-Coulomb's Law-Electric Field Intensity (EFI)-EFI due to various charge distributions-Work Done in Moving a Point Charge in an Electric Field-Electric Potential-Electric Potential due to various charge distributions-Potential Gradient- Electric Dipole and Dipole Moment-Potential and EFI due to Electric Dipole -Torque on Electric Dipole in an Electric Field-Electric Flux Density (EFD)-Gauss's Law and Its Applications-Maxwell's First Equation.

UNIT-II

CONDUCTORS, DIELECTRICS AND CAPACITANCE

Behaviour of Conductors in an Electric Field-Current and Current Density-Conduction and Convection Current Densities-Continuity Equation-Dielectrics-Polarization-Boundary Conditions-Capacitance-Capacitance of Parallel Plate, Coaxial and Spherical Capacitors with composite dielectrics- Energy Stored and Energy Density in an Electric Field- Poisson's and Laplace's Equations - Solution of Laplace's Equation in one Variable.

UNIT-III

MAGNETO STATICS

Magneto static Field-Magnetic Field Intensity (MFI)- Magnetic Flux Density(MFD)-Relation between MFD & MFI- Biot-Savart's Law - MFI due to a Straight Current Carrying conductor, Circular and Square loop conductors, Solenoid Current Carrying Wire-Maxwell's Second Equation-

Ampere’s Circuital Law and Its Applications-Maxwell’s Third Equation-Magnetic Dipole and Dipole moment -A Differential Current Loop as a Magnetic Dipole -Magnetic Scalar and Vector Potential – Laplace’s and Poisson’s Equations.

UNIT-IV MAGNETIC FORCE AND INDUCTANCE

Magnetic Force – Lorentz Force Equation – Force on Current Element in a Magnetic Field - Force on a Straight and Long Current Carrying Conductor - Force Between two Straight and Parallel Current Carrying Conductor – Torque on a Current Loop Placed in a Magnetic Field - Self and Mutual Inductances –Self Inductance of a Solenoid and Toroid - Mutual Inductance Between a Straight Long Wire and a Square Loop Wire in the Same Plane– Energy Stored and Energy Density in a Magnetic Field.

UNIT-V TIME VARYING FIELDS

Faraday’s Laws of Electromagnetic Induction in Point form and Integral form -Statically and Dynamically Induced e.m.f’s - Maxwell’s Fourth Equation - Displacement Current density - Modified Maxwell’s Equations for Time Varying Fields -Poynting Vector and its significance-Poynting’s Theorem.

TEXT BOOKS:

1. Sadiku, Principles of Electromagnetic, Oxford University Press, 6th Edition, 2015.
2. William.H.Hayt, JR. John A Buck , Engineering Electromagnetics, Mc.Graw – Hill, 8th Edition 2010.

REFERENCE BOOKS:

1. K.A.Gangadhar, Electromagnetic Field Theory, Khanna Publications, 2009.
2. Joseph Edminister, Electromagnetic, Tata Mc Graw Hill, 2006.

Online Learning Resources:

https://www.classcentral.com/course/youtube-electrical-electro-magnetic-fields-47689/classroom

https://onlinecourses.nptel.ac.in/noc21_ee83/preview

Mapping of CO’s- PO’s-PSO’s

Course Outcome	Program Outcomes											Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	--	2	--	2	2	--	--	--	--	--	3	--	2
CO2	2	3	--	2	--	3	2	--	--	--	--	--	3	3	2
CO3	3	3	--	2	2	--	2	--	--	--	--	--	3	2	1
CO4	2	3	3	1	2	--	--	--	--	--	--	--	3	3	1
CO5	2	--	3	1	2	--	--	--	--	--	--	--	2	2	2
Average	2.40	2.40	1.20	1.60	1.20	1.00	1.20	0.00	0.00	0.00	0.00	0.00	2.80	2.00	1.60
Level of Correlation of the Course	3	3	1	2	1	1	2						1	2	1

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

II B.Tech – I Semester (EEE)

L	T	P	C
3	0	0	3

20AEE08 DC MACHINES AND TRANSFORMERS

COURSE OUTCOMES:

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

CO1: Analyze the working principle and construction of DC machines, Single phase and three phase Transformers.
CO2: Apply the DC and AC machines properties and its application in solving of problems in domestic, industrial and power systems.
CO3: Analyze the DC machines, Single phase and three transformers and its performance characteristics with and without loads by conducting a suitable test.
CO4: Analyze the EMF equation, Back EMF, Equivalent circuits, regulation and phasor diagram for different load condition of DC and AC machines.
CO5: Analyze an armature winding and end connection of a DC machines.

UNIT – I

D.C GENERATORS: Constructional features - Principle of operation - Armature windings - E.M.F Equation - Armature reaction - Cross-magnetizing and de-magnetizing AT/pole – Commutation – Problems.

UNIT - II

TESTING OF DC GENERATOR: Types of Generators -Characteristics of Generators – Magnetization Characteristics –Determination of Critical field resistance and critical speed - Load characteristics of generators – Applications.

D.C MOTORS: - Principle of operation of DC Motor – Types of DC Motors - Back E.M.F - Torque equation - characteristics and ratings and its applications of motors - Speed control of D.C. Motors – Operation of 3-point and 4-point starters -Applications.

UNIT - III

TESTING OF D.C. Motor: Testing of D.C machines Losses - Constant & Variable losses - Calculation of efficiency - Condition for maximum efficiency - brake test - Swinburne’s test - Hopkinson test - Field’s test.

UNIT - IV

SINGLE PHASE TRANSFORMERS & IT’S TESTING: Types - constructional details - EMF equation – operation on no-load and on-load - Phasor diagrams - Equivalent circuit - losses and efficiency – Regulation - All day efficiency - Effect of variations of frequency & supply voltage on iron losses. OC and SC tests – Determination of Equivalent circuit parameters - Predetermination of efficiency and Regulation - Separation of losses - Sumpner's test - Parallel operation with equal and unequal voltage ratios- Nature of cooling.

UNIT - V

THREE PHASE TRANSFORMERS: Three phase connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ and open Δ- Third harmonics in phase voltages - Three winding transformers - Tertiary windings – Scott connection - Auto transformers - Principle of operation - Equivalent circuit - comparison with two winding transformers.

TEXT BOOKS:

1. Bimbra.P.S, Electrical Machinery, Khanna Publishers, 7$^{\text{th}}$ Edition, 2011.
2. J.B.Gupta, Theory and Performance of Electrical Machine, S.K.Kataria & Sons Publishers, 1$^{\text{st}}$ Edition, 2013.
3. B.L. Theraja and A.K.Theraja, Electrical Technology, Volume II, S.Chand Publishers, Third Edition

REFERENCE BOOKS:

1. Nagrath.I.J&Kothari.D.P, Electric Machines, Tata Mc Graw-Hill Publishers, 4$^{\text{th}}$ Edition, 2010.
2. Kamakshaiah.S, Electromechanics-I, Overseas Publishers Pvt. Ltd., 2004
3. A.E.Clayton&N.H.Hancock, The Performance and Design of D.C Machines, CBS Publishers, 1$^{\text{st}}$ Edition, 2004.

Online Learning Resources:

- https://onlinecourses.nptel.ac.in/noc21_ee71/preview
- https://onlinecourses.nptel.ac.in/noc21_ee24/preview

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	--	2	2	--	--	--	--	--	3	--	2
CO2	2	3	2	2	--	3	2	--	--	--	--	--	3	3	2
CO3	3	3	--	2	2	--	2	--	--	--	--	--	3	2	3
CO4	3	2	3	1	2	--	--	--	--	--	--	--	3	3	3
CO5	3	--	3	1	2	--	--	--	--	--	--	--	2	3	2
Average	2.80	2.20	2.20	1.60	1.20	1.00	1.20	0.00	0.00	0.00	0.00	0.00	2.80	2.20	2.40
Level of Correlation of the Course	3	2	2	2	1	1	2						3	2	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

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

L	T	P	C
0	0	3	1.5

20AEC05 ELECTRONICS DEVICES CIRCUITS LAB

COURSE OUTCOMES:

After successful 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

8. UJT Characteristics 10.SCR Characteristics 11.LED Characteristics

9.Plot the characteristics of Photo Diode

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	3	-	-	-	-	-	-	1	1	2	3	1
CO2	3	2	1	2	-	1	-	-	-	-	1	1	3	2	1
Average	3	2.50	1.5	2.50		0.5					1	1	2.5	2.5	1
Level of Correlation of the Course	3	3	2	3	-	1					1	1	3	3	1

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech – I Semester (EEE)

L	T	P	C
0	0	3	1.5

20AEE09 ELECTRICAL CIRCUITS AND SIMULATION LAB

COURSE OUTCOMES:

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

CO1: Analyze the verification of KCL, KCL, superposition, Maximum power, Thevenin‘s and Norton‘s theorems.

CO2: Analyze the concept of RLC series and parallel resonance, Locus diagrams and magnetic coupled circuits

CO3: Apply the Transient response of the series and parallel RLC circuits.

CO4: Analyze the various types of network parameters in two port networks.

CO5: Analyze the Simulation of the different types of electrical circuits using PSpice.

LIST OF EXPERIMENTS

NOTE: A minimum of TEN experiments should be conducted.

1. Verification of KCL & KVL
2. Verification of Thevenin ‘s Theorem
3. Verification of Maximum Power Transfer Theorem
4. Verification of Reciprocity Theorem
5. Verification of Thevenin ‘s Theorem
6. Verification of Norton ‘s Theorem
7. Determination of Self & Mutual Inductance
8. RLC Series & Parallel Resonance
9. Determination of Z & Y Parameters
10. Determination of ABCD Parameters
11. RL & RC Locus Diagrams
12. Digital simulation of an electric circuit (Including dependant sources) to find node voltages and branch currents using PSpice.
13. Digital simulation of an electric circuit to find transient response.
14. Digital simulation of series and parallel resonance using PSpice
15. Transient analysis of Series RL, RC circuits
16. Frequency response of single tuned coupled circuit

Online Learning Resources/Virtual Labs:
• http://vlabs.iitkgp.ernet.in/asnm/index.html • https://vlab.amrita.edu/?sub=1&brch=75 • http://vlabs.iitb.ac.in/vlabs-dev/labs/network_lab/labs/explist.php

Mapping of CO's- PO's-PSO's

Course Outcome	**Program Outcomes**												**Program Specific Outcomes**		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	--	--	--	3	2	--	--	--	--	--	3	--	2
CO2	3	3	--	--	--	2	2	--	--	--	--	--	3	3	2
CO3	3	3	--	2	--	--	--	--	--	--	--	--	3	2	2
CO4	3	2	2	--	--	--	--	--	--	--	--	--	3	3	1
CO5	3	--	3	2	--	--	--	--	--	--	--	--	3	3	2
Average	3.00	2.20	1.00	0.80	0.00	1.00	0.80	0.00	0.00	0.00	0.00	0.00	3.00	2.20	1.80
Level of Correlation of the Course	3	2	1	1		1	1						3	2	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech – I Semester (EEE)

L	T	P	C
0	0	3	1.5

20AEE10 DC MACHINES AND TRANSFORMERS LAB

COURSE OUTCOMES:

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

CO1: Analyze the various types of load tests on DC machines to determine the efficiency.

CO2: Analyze the OC and SC test on Transformers to determine the regulation.

CO3: Analyze the different types of performance characteristics of DC machines

CO4: Apply the concept of conversion of three phase to two single phase supply using scott connected Transformers

LIST OF EXPERIMENTS

Any TEN experiments are required to be conducted:

1. Magnetization characteristics (O.C.C) of DC shunt generator-determination of critical field resistance and critical speed.
2. Load test on DC series generator-External characteristics of generator
3. Load test on DC compound generator–Determination of performance curves.
4. Swinburne’s tests on DC shunt motor–Predetermination of efficiency as generator and motor.
5. Brake test on DC shunt motor-Determination of performance curves.
6. Brake test on DC compound motor.
7. Brake test on DC Series motor-Determination of performance curves.
8. Speed control of DC machine - Armature voltage control and Field control Methods
9. Hopkinson’s test
10. Field’s test on dc series motor-Determination of efficiency

11. OC and SC test on Single phase Transformer-Determination of equivalent circuit parameters and predetermination of efficiency and regulation.

11. Sumpner’s Test on a pair of single-phase transformers-Determination of efficiency.

12. Conversion of three-phase to two single phase supply using Scott connection of transformer.

13. Parallel operation of two single phase transformers.

REFERENCE BOOKS:

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

Online Learning Resources/Virtual Labs:

http://em-coep.vlabs.ac.in/List%20of%20experiments.html?domain=Electrical Engineering

http://vlabs.iitb.ac.in/vlabs-dev/vlab_bootcamp/bootcamp/Sadhya/experimentlist.html

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	3	--	--	1	--	--	--	--	--	3	2	3
CO2	3	3	3	3	--	--	2	--	--	--	--	--	1	3	3
CO3	3	2	3	1	--	--	2	--	--	--	--	--	2	2	2
CO4	3	3	2	3	--	--	2	--	--	--	--	--	2	3	3
Average	3.00	2.75	0.50	2.50	0.00	0.00	1.75	0.00	0.00	0.00	0.00	0.00	2.00	2.50	2.75
Level of Correlation of the Course	3	2	0	2			1						2	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech – I Semester (EEE)

L	T	P	C
1	0	2	2

20AEE11 ELECTRICAL CAD
(Skill Oriented Course)

COURSE OUTCOMES:

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

CO1: Apply the knowledge of electrical modules design with aid of ECAD Software.
CO2: Apply the concept of electrical networks and its performance using different component tools.
CO3: Analyze the electrical auditing tools, creating reports and Import/Export spreadsheet in the CAD.
CO4: Analyze electrical networks using PLC and optimize the economic control
CO5: Develop skill to use software to create modules of electrical systems and its components.

List of Experiments:

1. Draw and create a new Drawing Properties Insert a Component Connecting a component.
2. Create a Library Symbol Builder Circuit Builder of inserting a One-line Motor Circuit of inserting a Dual One-line Power Feed Circuit Copy circuitry save circuit to icon menu.
3. Draw and Create Wires ,Wire layers , Wire types , Insert wire , Modify wire using Component Attribute Tools .
4. Develop inserting Components, Relocating Components, Inserting a Child Components, Aligning and Editing the Components Catalog Information.
5. Develop Wire numbers, Automatic wire numbers o Wire tagging o PLC I/O wire numbers, Wire Number Edit, PLC Signal Arrows using Ladder tools.
6. Generate PLC Layout Modules o PLC parametric selection, Module layout o Insert PLC modules.
7. Draw the Connector Diagrams o Inserting Connectors o Editing & Modifying Connectors o Link components by dashed lines, Grouping Wires, using conversion tool.
8. Draw and Create Convert text, Convert block, Convert wires, Convert arrows o Special Explode, Panel Layout o Foot Prints o Footprints from Schematic list using electrical cad.
9. Develop the Footprints from icon menu, Din rails, Balloons, Wire Annotations, Create Assembly, Editing & Modifying Footprints using electrical cad.
10. Draw and create Electrical Audit, Signal Error,/ List Drawing Audit, Generate Reports and develop Types of schematic reports using Electrical Cad.

TEXT BOOKS:

1. Auto CAD Electrical 2020 Black Book Paperback – Import, 11 September 2019 by Gaurav_Verma (Author), Matt_Weber, CADCAM works.

REFERENCES BOOKS:

1. Auto CAD Electrical 2021: A Tutorial Approach, 2nd Edition By: Prof. Sham Tickoo, BSP publications

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	--	--	3	--	--	--	--	--	3	2	3
CO2	3	3	3	3	--	--	2	--	--	--	--	--	2	3	3
CO3	3	2	3	1	2	--	2	--	--	--	--	--	3	3	3
CO4	3	3	2	3	--	2	2	--	--	--	--	--	2	3	3
CO5	3	2	3	2	--	--	3	--	--	--	--	--	2	2	2
Average	3.00	2.60	1.00	2.40	0.40	0.40	2.40	0.00	0.00	0.00	0.00	0.00	2.40	2.60	2.80
Level of Correlation of the Course	3	3	1	3			3						3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech – I Semester

L	T	P	C
2	0	0	-

20AMB02 UNIVERSAL HUMAN VALUES

(Mandatory course)

(Common to all Branches)

COURSE OUTCOMES:

After completion of the course students will be able to

CO1: Apply the principles of natural acceptance to design a happy and Prosperous living with responsibility.

CO2: Analyse the elements of sentient 'I' and material human body to design a living with responsibility for happiness and prosperity.

CO3: Apply the principles of 'trust' and 'respect' for designing a society with universal human order.

CO4: Analyse the situations causing imbalance in nature and further design an ecosystem for peaceful co-existence.

CO5: 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.ISBN978-93-87034-47-1.

2. R Gaur ,R Asthana, GP Bagaria, “Teachers’ Manual for A Foundation Course in HumanValuesandProfessionalEthics”,2ndRevisedEdition,Excel Books,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).

Mapping of CO’s- PO’s-PSO’s

Course Outcome	Program Outcomes												Program Specific 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	3	2	-	-	-	2	-	-
CO3	-	-	-	-	-	3	3	3	2	-	-	-	3	-	-
CO4	-	-	-	-	-	3	3	3	2	-	-	-	2	-	-
CO5	-	-	-	-	-	3	3	3	-	-	-	-	2	-	-
Average	-	-	-	-	-	3	3	3	2	-	-	-	2.4	-	-
Level of Correlation of the Course	-	-	-	-	-	3	3	3	2	-	-	-	3	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

II B.Tech – I Semester

L	T	P	C
2	0	0	0

20AHS11 QUANTITATIVE APTITUDE AND REASONING – I
(Audit course)
(Common to all Branches)

COURSE OUTCOMES:

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

CO1: Develop the thinking ability to meet the challenges in solving Logical Reasoning problems.

CO2: Solve campus placements aptitude papers covering Quantitative Ability and Verbal Ability.

CO3: 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- nth Term – Sum of terms – Geometric Progression – Common Ratio – nth 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

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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 of the Course	2	2	-	-	-	-	-	-	-	2	-	-	-	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech – I Semester (EEE)

L	T	P	C
2	-	-	-

20ANSS1 / 20ANCC1 NSS/NCC

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech – II Semester (EEE)

L	T	P	C
3	1	-	3

20AHS12 COMPLEX ANALYSIS AND PROBABILITY DISTRIBUTIONS

COURSE OUTCOMES:

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

CO1: Use C-R equations and Milne Thomson method to solve analytic functions

CO2: Apply the line integrals using Cauchy's integral formula and expand the complex valued functions as Taylor's and Laurent series.

CO3: Utilize the Cauchy Residue Theorem to evaluate the improper integrals.

CO4: Demonstrate the properties of Beta and Gamma functions by their integral representation.

CO5: 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 PowerSeries - 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 & Sons Publications, 2012.

REFERENCES BOOKS:

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.

Mapping of CO’s- PO’s-PSO’s

Course Outcome	Program Outcomes												Program Specific 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	-	2	-	-	-	-	-	-	-	-	-	-	-
Average	3	3	-	2	-	-	-	-	-	-	-	-	-	-	-
Level of Correlation of the Course	3	3	-	2	-	-	-	-	-	-	-	-	-	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech – II Semester (EEE)

L	T	P	C
3	0	-	3

20AEE15 GENERATION, TRANSMISSION AND DISTRIBUTION OF ELECTRIC POWER

COURSE OUTCOMES:

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

CO1: Apply the concepts of conventional and non-conventional power plants.

CO2: Apply the economic power calculations and its tariff.

CO3: Analyze the concepts and performance of Transmission and Distribution Line Parameters.

CO4: Analyze fault locations and laying of UG Cables.

UNIT-I

ELECTRIC POWER GENERATION

Importance of Electricity - Sources of Energy - Types - Comparison-Advantages and disadvantages. Conventional Power Plants - Thermal –Hydro - Nuclear – Nonconventional Power Plant - Solar and Wind

UNIT-II

LOADS AND ECONOMICS OF POWER GENERATION

Load on power station-different types of Loads-Definitions: Load factor, Demand Factor, Diversity Factor, Plant capacity factor-Load curve and Load duration curve-Cost of generation-Numerical problems -Tariff-Characteristics-Types of Tariffs-Numerical problems

UNIT-III

TRANSMISSION LINE PARAMETERS AND ITS PERFORMANCE

Types of Conductors- Calculation of Resistance-Skin and Proximity effect Concept of GMR and GMD – Calculation of Inductance and capacitance for single phase and Three phase circuits – Single and double circuits – Performance of Short, Medium and Long Transmission line – Calculation of voltage regulation and efficiency-Numerical Problems-Ferranti effect-Surge impedance and Surge Impedance Loading.

UNIT-IV

EFFECTS AND INSULATION COORDINATION OF TRANSMISSIONLINE

Corona phenomena-factors affecting corona-Critical voltages and Power loss-Methods of reducing corona-Calculation of sag and Tension with equal and unequal heights of towers- Numerical Problems-Types of insulators-Potential distribution over suspension Insulator String-String efficiency-Methods of improving String efficiency-Numerical Problems.

CABLES: Construction of cables-Types of cables and its ratings-Insulation resistance of single core cable- Capacitance of single and three core cable-Dielectric stress in a single core cable-Grading of cables-Numerical Problems-Fault location of cables

UNIT-V

DISTRIBUTION SYSTEMS

DC Distribution-Classification-Methods of 3wire DC system-Radial and Ring Distribution systems-DC Distribution with concentration loads and uniform loading - Numerical Problems-AC Distribution-Classification –Layout and Selection of site-Power Factor Improvement method-Selection of Capacitor Bank

TEXT BOOKS:

1. Soni. M.L, Gupta. P.V, Bhatnagar.U.S and Chakraborti.A,A Text Book on Power Systems Engineering, Dhanpat Rai & Co. Pvt.Ltd., 2nd Edition, 2009.
2. Mehta.V.K and Rohit Mehta, Principles of power systems, S.Chand & Company Ltd, New Delhi, Revised Edition, 2005.

REFERENCES BOOKS:

1. Singh. S.N, Electrical power Generation Transmission and Distribution, PHI, 2ndEdition,2004.
2. Rai.G.D, Non Conventional energy sources, KhannaPublishers,5th Edition,2010.
3. Rajput. R.K, Power systems Engineering, Laxmi Publishers,1st Edition, 2006.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	--	1	--	--	--	--	--	--	3	3	2
CO2	3	3	3	3	--	2	--	--	--	--	--	--	1	3	2
CO3	3	2	3	1	--	2	--	--	--	--	--	--	3	2	2
CO4	3	3	2	3	--	2	--	--	--	--	--	--	2	3	3
Average	3.00	2.75	0.50	2.25	0.00	1.75	0.00	0.00	0.00	0.00	0.00	0.00	2.25	2.75	2.25
Level of Correlation of the Course	3	3		3		2							2	3	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

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

L	T	P	C
3	0	0	3

20AEE16 CONTROL SYSTEMS

COURSE OUTCOMES:

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

CO1: Apply the Mathematical Modeling of Control System in analyzing the transfer function of the mechanical and electrical systems.
CO2: Apply the time response and frequency response in analyzing the stability of the system.
CO3: Analyze the response of first and second order characteristics using different test signals
CO4: Analyze systems using Transfer functions and state space models.
CO5: Create Lead, Lag and Lead-Lag compensators to design the electrical networks.

UNIT – I

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 of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific 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	--	--	2	--	--	--	--	--	2	3	3
CO3	3	2	3	3	3	--	2	--	--	--	--	--	3	3	3
CO4	3	3	2	3	--	2	2	--	--	--	--	--	2	3	3
CO5	3	2	3	2	--	--	3	--	--	--	--	--	2	2	3
Average	3.00	2.60	1.00	2.80	0.60	0.40	2.40	0.00	0.00	0.00	0.00	0.00	2.40	2.80	3.00
Level of Correlation of the Course	3	3	1	3			3						3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech – II Semester (EEE)

L	T	P	C
3	0	0	3

20AEE17 INDUCTION AND SYNCHRONOUS MACHINES

COURSE OUTCOMES:

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

CO1: Analyze the construction and working principle Induction motors and Synchronous machines.
CO2: Apply the voltage regulation of synchronous generator with different loaded conditions.
CO3: Analyze the speed control methods to control the induction motor and select suitable machine to meet specific application requirement.
CO4: Analyze the performance characteristics of induction motor and synchronous machine under no load and load conditions by conducting Suitable test.
CO5: Analyze the armature winding for three phase Synchronous machine.

UNIT – I

THREE PHASE INDUCTION MOTORS:

Production of Rotating Magnetic Field-Construction details of squirrel cage and wound rotor Induction motors - principle of operation - Rotor EMF and rotor frequency - Rotor Reactance - Rotor Current - Power factor at standstill and running condition - Equivalent circuit - Phasor diagram - Torque equation - Torque slip characteristics - Rotor power input - Rotor copper loss and mechanical power developed - Expressions for starting torque and maximum torque - Crawling and Cogging.

UNIT – II

TESTING AND SPEED CONTROL OF INDUCTION MOTORS:

No load and Blocked rotor tests -Construction of Circle diagram - Predetermination of performance characteristics - Methods of starting - Calculation of starting current and torque - Methods of speed control - Change of frequency - Pole changing - Injection of an EMF into rotor circuit - Induction Generator - Principle of operation.

UNIT – III

SYNCHRONOUS GENERATOR

Constructional features of round rotor and salient pole machines – Armature windings as per IEEE Standards – Integral slot and fractional slot windings - Distributed and concentrated windings – Distribution, pitch and winding factors – E.M.F Equation – Characteristics - OCC & SC Test -

Harmonics – Armature reaction - Leakage reactance – Synchronous reactance and Impedance – Experimental Determination - Phasor diagram – Load characteristics – Ratings and its applications.

UNIT- IV

REGULATION OF SYNCHRONOUS GENERATOR:

Synchronous impedance method -M.M.F method - Z.P.F method and A.S.A methods – Salient-pole alternators – Two reaction analysis – Experimental Determination of Xd and Xq (Slip test) - Phasor diagrams – Regulation of Salient pole alternators. Synchronizing alternators with infinite bus bars – Synchronizing power, Torque – parallel operation and load sharing - Effect of change of excitation and mechanical power input – Introduction to cooling methods.

UNIT- V

SYNCHRONOUS MOTORS:

Principle Of Operation - Phasor diagram–Characteristics of Synchronous Motors - Variation of current and power factor with excitation – V and Inverted V Curves - Power developed – Synchronous Condenser - Hunting and its suppression – Methods of starting.

SINGLE PHASE MOTORS: Constructional features – Double revolving field theory – Elementary idea of cross-field theory –A.C. Series motor-Universal motor–AC Servo motor - stepper motor.

TEXT BOOKS:

1. Nagrath.I.J & Kothari.D.P, Electric Machines, Tata Mc Graw-Hill Publishers, 4th Edition, 2010.
2. Bimbra.P.S, Electrical Machinery, Khanna Publishers, 7th Edition, 2011.

REFERENCE BOOKS:

1. Alexander S Leinsdorf, Theory of Alternating Current Machinery, Tata Mc Graw-Hill, 2nd Edition, 1984.
2. B.L.Theraja, Electrical Technology, Chand Publications, 5th Edition, 2009

Online Learning Resources:

https://onlinecourses.nptel.ac.in/noc21_ee13/preview

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3		--	--	1	--	--	--	--	--	--	3	2	2
CO2	3	3		3	--	2	--	--	--	--	--	--	1	3	2
CO3	3	2		1	--	2	--	--	--	--	--	--	2	2	1
CO4	3	3	2	3	--	2	--	--	--	--	--	--	2	3	3
CO5	3	2	3	2	--	1	--	--	--	--	2	2	1	2	1
Average	3.00	2.60	1.00	1.80	0.00	1.60	0.00	0.00	0.00	0.00	0.40	0.40	1.80	2.40	1.80
Level of Correlation of the Course	3	3	1	2		2							2	3	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech – II Semester (EEE)

L	T	P	C
3	0	0	3

20AEC15 ANALOG AND DIGITAL CIRCUITS

COURSE OUTCOMES:

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

CO1: Analyze Wave Shaping Circuits.
CO2: Design and Analyze Multi vibrator Circuits for different applications.
CO3: Understand differential amplifiers and op-amp operations.
CO4: Design various combinational logic circuits and sequential logic circuits.

UNIT- I LINEAR & NON-LINEAR WAVESHAPING-CLIPPERS & CLAMPERS

High Pass, Low Pass RC circuits and their response for Sinusoidal, Step, Pulse, Square and Ramp inputs. Diodes Clippers, Transistor Clipper, Clipping at two independent levels, Transfer Characteristics of Clippers, Clamping operation, Clamping circuits using diode with different inputs, Practical Clamping circuits.

UNIT- II MULTIVIBRATORS

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- II DIFFERENTIAL AMPLIFIERS AND OPAMPS

Differential Amplifiers: Differential amplifier configurations, Balanced and unbalanced output differential amplifiers, current mirror, level Translator.

Operational amplifiers: Introduction, Block diagram, Ideal op-amp, Equivalent Circuit, Voltage Transfer curve& open loop op-amp configurations

UNIT- IV 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 logicfamilies, Familiarity with standard 74XX and CMOS 40XX series-ICs and its Specifications

UNIT- V COMBINATIONAL & SEQUENTIAL LOGICDESIGN:
Adders, Subtractors, Decoders, Encoders, Multiplexers, Demultiplexers, EX- OR gates, Parity Circuitsand Comparators. Latches, Flip-Flops and their VHDL models.

TEXT BOOKS:

1. AnandKumar,Pulse&DigitalCircuits,PHIPublication,2ndEdition,2009.
2. D.Roy Chowdhury, Linear Integrated Circuits, New Age International (p) Ltd, 2nd Edition,2003.
3. John F.Wakerly, Digital Design principles & Practices, PHI/Pearson Education Asia, 3rd Edition,2005.

REFERENCE BOOKS:

1. Millman.J Halkias.C, Integrated Electronics, Tata Mc-graw Hill Edition,2008.
2. A.Gayakwad Ramakanth, Op-Amps & Linear ICs, PHI, 4th Edition,2009.
3. H.Roth.Jr, Digital System Design using VHDL, Charles Cengage Publications, 2nd Edition,2008.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	2	-	-	-	-	-	-	-	-	-	3	2	2
CO2	2	2	-	1	-	-	-	-	-	-	-	-	1	3	2
CO3	3	-	1	-	-	-	-	-	-	-	-	-	2	2	1
CO4	2	2	-	-	-	-	-	-	-	-	-	-	2	3	3
Average	2.5	2	1.5	1	-	-	-	-	-	-	-	-	1.8	2.4	1.8
Level of Correlation of the Course	3	2	2	1	-	-	-	-	-	-	-	-	2	3	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

II B.Tech – II Semester (EEE)

L	T	P	C
-	-	3	1.5

20AEE18 CONTROL SYSTEMS AND SIMULATION LAB

COURSE OUTCOMES:

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

CO1: Apply second order systems using P, PI, PID controllers.
CO2: Analyze the performance of synchros, AC servo motor and DC servo motor.
CO3: Apply performance of D.C motor using Transfer function
CO4: Analyze PLC controllers in Electrical System
CO5: Design Lag, Lead, Lag-Lead compensation.

LIST OF EXPERIMENTS

Any TEN experiments are required to be conducted:

1. Time response of Second order system using P, PI & PID controller.
2. Transfer function of DC Motor using Armature voltage control and field control.
3. Characteristics of Synchros
4. Characteristics of AC servo motor
5. Position control on DC servo motor
6. Lag , Lead & Lead- Lag compensation – Magnitude and phase plots
7. Simulation of Transfer function using OP-AMP.
8. Characteristics of magnetic amplifiers
9. Temperature controller using PID
10. Programmable logic controller-study and verification of truth tables of logic gates simple Boolean expressions and application of speed control of the motor
11. Transfer function of DC generator
12. Effect of P,PI,PID controllers on a second order systems

MAPPING OF CO'S- PO'S-PSO'S

Course Outcome	Program Outcomes												Program Specific 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	--	--	2	--	--	--	--	--	2	3	3
CO3	3	2	3	3	3	--	2	--	--	--	--	--	3	3	3
CO4	3	3	2	3	--	2	2	--	--	--	--	--	2	3	3
CO5	3	2	3	2	--	--	3	--	--	--	--	--	2	2	3
Average	3.00	2.60	1.00	2.80	0.60	0.40	2.40	0.00	0.00	0.00	0.00	0.00	2.40	2.80	3.00
Level of Correlation of the Course	3	3	1	3			3						3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech – II Semester (EEE)

L	T	P	C
-	-	3	1.5

20AEE19 INDUCTION AND SYNCHRONOUS MACHINES LAB

COURSE OUTCOMES:

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

CO1: Analyze the performance characteristics of 3 phase Induction motor.
CO2: Apply efficiency of 3-phase Induction motor at various loads.
CO3: Apply regulation and efficiency of three phase alternator at different loads.
CO4: Analyze the performance Characteristics of synchronous machines.
CO5: Analyze the equivalent circuit parameters and circle diagram of an induction motor.

LIST OF EXPERIMENTS

Any TEN experiments are required to be conducted:

1. No-load and Blocked Rotor tests on a three phase induction motor-Predetermination of performance curves by drawing circle diagram.
2. Brake Test on Three-phase squirrel cage Induction Motor-Determination of performance curves.
3. OC and SC tests on three phase alternator- predetermination of regulation and efficiency by EMF and MMF.
4. No load and load tests on a three phase synchronous motor-Determination of V-Curves and Λ -curves.
5. Determination of X_d and Xq on a salient pole synchronous machine.
6. No load and blocked rotor tests on single phase capacitor start and run Induction Motor - Determination of equivalent circuit parameters.
7. Synchronization of alternator with infinite bus bar using Dark & Bright lamp method
8. Brake Test on Three-phase wound rotor Induction Motor-Determination of performance curves.
9. Load test on 3 phase alternator and draw performance characteristics
10. Analysis of torque - slip characteristic of a 3 phase induction motor.
11. Synchronization of alternator with infinite bus bar using synchroscope method
12. OC and SC tests on three phase alternator- predetermination of regulation and efficiency by Potier triangle methods.

REFERENCES BOOKS:

1. D. P.Kothari and B. S. Umre, "Laboratory Manual for Electrical Machines" I.K International Publishing House Pvt. Ltd, 2017.
2. D.R. Kohli and S.K. Jain, "A Laboratory Course in Electrical Machines" NEM Chand & Bros.

Online Learning Resources/Virtual Labs:

http://vem-iitg.vlabs.ac.in/

http://em-coep.vlabs.ac.in/List%20of%20experiments.html?domain=Electrical Engineering

http://vlabs.iitb.ac.in/vlabs-dev/vlab_bootcamp/bootcamp/Sadhya/experimentlist.html

Mapping of CO's- PO's-PSO's

Course Outcome	**Program Outcomes**												**Program Specific Outcomes**		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	--	2	1	--	--	--	--	--	--	3	3	3
CO2	3	3	2	3	--	3	--	--	--	--	--	--	2	3	3
CO3	3	3	2	1	2	3	--	--	--	--	--	--	2	2	2
CO4	3	3	2	3	--	2	--	--	--	--	--	--	2	3	3
CO5	3	2	3	2	2	3	--	--	--	--	--	--	1	2	1
Average	3.00	2.80	1.00	1.80	1.20	2.40	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.60	2.40
Level of Correlation of the Course	3	3	1	3	1	3							3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech – II Semester (EEE)

L	T	P	C
0	0	3	1.5

20AEC16 ANALOG AND DIGITAL CIRCUITS LAB

COURSE OUTCOMES:

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

CO1: Analyze linear & Non-linear wave shaping circuits.

CO2: Design and analysis various multivibrator circuits.

CO3: Analyze basic logic gates and its applications.

CO4: Design combinational circuits.

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

1. Linear wave shaping.
2. Non-Linear wave shaping – Clippers.
3. Non-Linear wave shaping – Clamper's
4. Transistor as a switch.
5. Multivibrator. (Any one)
6. Adder, Subtractor (op amp application)
7. Study of Logic Gates & Some applications.
8. Design and implement Full Adder using basic logic gates.
9. Design and implement Full subtractor using basic logic gates.
10. Design and implement Combinational Circuits Using MSI Devices: Parity Generator/Checker
11. 4-bit comparator-74X85
12. Design and implementation of a simple digital system (Mini Project).

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	-	-	3	3	3
CO2	2	-	2	-	-	-	-	-	-	-	-	-	2	3	3
CO3	2	2	-	-	-	-	-	-	-	-	-	-	2	2	2
CO4	2	-	1	-	-	-	-	-	-	-	-	-	2	3	3
Average	2.25	2	1.5	-	-	-	-	-	-	-	-	-	2.25	2.75	2.75
Level of Correlation of the Course	2	2	2	-	-	-	-	-	-	-	-	-	3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech – II Semester (EEE)

L	T	P	C
1	0	2	2

20AEE20 PLC AND SCADA

(Skill oriented Course)

COURSE OUTCOMES:

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

CO1: Apply the knowledge hardware and Software used in the PLC.
CO2: Analyze the different timers and Counters.
CO3: Apply the process of Substation automation using PLC.
CO4: Analyze the implementation of PID Controllers and Logic Gates.
CO5: Analyze the operation of DOL Starter using PLC and SCADA.

LIST OF EXPERIMENTS/PROGRAMMES:

1. Study hardware and software used in PLC.
2. Implementation of PLC Arithmetic Instructions.
3. Development of 11KV/433 volts substation automation scheme using PLC for normal load operation.
4. Development of 11KV/433 volts substation automation scheme using PLC for timer ON/OFF Load control.
5. Development of 11KV/433 volts substation automation scheme using PLC for cyclic ON/OFF Load control.
6. Implementation of PID Controller.
7. Implementation of Logic Gates.
8. Implementation of DOL Starter.
9. Implementation of On-Delay Timer.
10. Implementation of Off-Delay Timer.
11. Implementation of Up-Down Counter

REFERENCES BOOKS:

1. PLC and SCADA Applications 2019 by Anup_Dakre
2. Plcs & Scada - Theory and Practice by Vij Vikrant and Prof Rajesh Mishra

WEB REFERENCE: vlab.co.in

MAPPING OF CO'S- PO'S-PSO'S

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	--	2	1	--	--	--	--	--	--	3	2	3
CO2	3	3		3	--	2	--	--	--	--	--	--	1	3	3
CO3	3	2		1	3	2	--	--	--	--	--	--	2	2	2
CO4	3	3	2	3	--	2	--	--	--	--	--	--	2	3	3
CO5	3	2	3	2	3	1	--	--	--	--	--	--	1	2	2
Average	3.00	2.60	1.00	1.80	1.60	1.60	0.00	0.00	0.00	0.00	0.00	0.00	1.80	2.40	2.60
Level of Correlation of the Course	3	3	1	2	2	2							2	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

II B.Tech – II Semester (EEE)

L	T	P	C
2	-	-	-

20AHS15 QUANTITATIVE APTITUDE AND REASONING – II

(Audit course) (Common to all Branches)

COURSE OUTCOMES:

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

CO1: Develop the thinking ability to meet the challenges in solving Logical Reasoning problems.

CO2: Solve campus placements aptitude papers covering Quantitative Ability and Verbal Ability.

CO3: 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.

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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 of the Course	2	2	-	-	-	-	-	-	-	2	-	-	-	-	-

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)

20AMB03 MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

L	T	P	C
3	0	0	- 3

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

CO1: Explain the fundamental concepts and theoretical principles of the Economics
CO2: Apply economic principles for problem solving.
CO3: Identify market structures and types of business organizations.
CO4: List features, steps, merits, uses & limitations of Pay Back, ARR, NPV, PI & IRR methods of Capital Budgeting
CO5: 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), Capital Structure 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.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	2	-	-	-	-	3	-	3	--	3
CO2	-	-	2	-	-	-	-	-	-	-	-	-	3	3	3
CO3	-	-	-	-	-	2	-	-	-	-	3	-	3	2	3
CO4	-	-	-	-	-	-	-	-	-	-	3	-	3	3	3
CO5	-	-	-	-	-	-	-	-	-	-	3	-	3	3	3
Average	-	-	2	-	-	2	-	-	-	-	3	-	3.00	2.20	3.00
Level of Correlation of the Course	-	-	2	-	-	2	-	-	-	-	3	-	3	2	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B.Tech –I Semester (EEE)

L	T	P	C
3	-	-	3

20AEE21 ELECTRICAL AND ELECTRONICS MEASUREMENTS

COURSE OUTCOMES:

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

CO1: Demonstrate knowledge Calibration of various measuring instruments
CO2: Apply the different type measurement of various electrical quantities.
CO3: Analyze various types of DC and AC bridges for measuring instruments.
CO4: Design for extension of meter ranges of various measuring instruments.
CO5: Apply various electrical and electronics measuring instruments and their applications.

UNIT-I

MEASURING INSTRUMENTS

Classification – deflecting, controlling and damping systems ,Ammeters and Voltmeters – PMMC, Dynamometer, moving iron type instruments –Expression for the deflecting torque and control torque – Errors and compensation -Extension of range using shunt and series resistance – Introduction to Digital meters.

UNIT-II

INSTRUMENT TRANSFORMERS AND P.F METER AND MEASUREMENT OF POWER & ENERGY:

Current Transformers and Potential Transformers – Ratio and phase angle errors – Design considerations - Types of Power Factor Meters – Dynamometer and moving iron type – 1-Φ and 3-Φ meters, Rotating field and alternating field types-Frequency Meters- Single phase and three phase dynamometer wattmeter - LPF and UPF - Double element and three element Dynamometer wattmeter - Expression for Deflecting and control torques –Single phase and three phase Induction type Energy Meter –Errors and compensation.

UNIT-III

POTENTIOMETERS and MAGNETIC MEASUREMENTS

Principle and operation of D.C. Crompton’s potentiometer – standardization – Measurement of unknown resistance, current, voltage and power - A.C. Potentiometers: Polar and coordinate types - Standardization-Ballistic galvanometer – Equation of motion – Flux meter – Constructional details-Comparison with Ballistic Galvanometer - Determination of B-H Curve - Method of reversals – step by step method - A.C. testing, CRT and CRO-DSO.

UNIT-IV

D.C & A.C BRIDGES

Measurement of low, medium and high resistances – Kelvin's double bridge - Wheatstone's bridge, Sensitivity-Loss of charge method - measurement of inductance - Maxwell's bridge, Anderson's bridge - Measurement of capacitance – Desauty bridge, Schering Bridge– Wien's Bridge.

UNIT-V

TRANSDUCERS &MEASUREMENT OF NON-ELECTRICAL QUANTITIES

Classification of transducers - Advantages -Characteristics and choice of transducers – Principle of operation resistor, inductor, LVDT and capacitor transducers - LVDT Applications - Strain gauge – Principle of operation - gauge factor – Thermistors – Thermocouples – Synchros, Piezo electric transducers – photovoltaic – photo conductive cells, photo diodes – Hall effect – Current and voltage sensors.

TEXT BOOKS:

1. Sawhney.A.K, Electrical & Electronic Measurement & Instruments, Dhanpat Rai & Co.Publications, 2015.
2. Golding.E.W and Widdis.F.C, Electrical Measurements and Instrumentation, Reem Publications, 5th Edition, 1993.

REFERENCE BOOKS:

1. R. K. Rajput, Electrical & Electronic Measurement & Instrumentation, S. Chand & Co, 2nd Edition, 2008.
2. Reissland, M.U, Electrical Measurements: Fundamentals, Concepts, Applications, New Age International (P) Limited, Publishers, 2006.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	2	--	--	--	--	--	--	--	--	3	1	3
CO2	3	3	2	2	--	--	--	--	--	--	--	--	3	2	2
CO3	3	3	3	3	--	2	--	--	--	--	--	--	2	2	2
CO4	3	3	2	3	--	2	--	--	--	--	--	--	2	2	3
CO5	3	2	3	2	--	3	--	3	--	--	--	--	3	3	2
Average	3.00	2.80	2.2	2.40	0.00	1.4	0.00	0.60	0.00	0.00	0.00	0.00	2.60	2	2.40
Level of Correlation of the Course	3	3	2	3		1							3	2	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B.Tech – I Semester (EEE)

L	T	P	C
3	0	0	3

20AEE22 POWER ELECTRONICS AND DRIVES

COURSE OUTCOMES:

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

CO1: Analyze the various structures, operating characteristics of the power semiconductor devices.

CO2: Analyze various power converters like Controlled rectifier, AC voltage regulators and Cycloconverters

CO3: Develop the power electronic circuit for DC DC choppers.

CO4: Analyze the concept of different type of switching mode regulators.

CO5: Analyze the speed control of Drive systems using Power electronic converters for industrial and domestic applications.

UNIT – I

INTRODUCTION TO POWER ELECTRONIC DEVICES

POWER SEMICONDUCTOR DEVICES: Thyristors– Silicon Controlled Rectifiers (SCR's) – Power MOSFET – Power IGBT and their characteristics - Basic theory of operation of SCR - Ratings – Static & Dynamic characteristics of SCR – Turn on and turn off methods -Two transistor analogy – SCR Firing Circuits – R, RC and UJT firing circuits – Series and parallel connections of SCR's – Snubber circuit design – Commutation Methods.

UNIT- II

CONTROLLED RECTIFIERS AND AC CONTROLLERS

Single phase – Three phase – Half controlled – Fully controlled rectifiers – Dual converters -Effect of source and load inductance – single phase AC voltage controllers with R and RL load – step up and step down Cycloconverters with R and RL load – Numerical problems

UNIT- III

DC TO DC CONVERTERS

Step up and Step down Chopper – Chopper classification - quadrant of operation – Switching mode Regulators – Buck, Boost, Buck-Boost, and Cuk Regulators- Numerical problems

UNIT- IV

INVERTERS

Voltage source Inverters – Half bridge – Full bridge – Three Phase Bridge Inverters – Voltage control– PWM Techniques – Current Source Inverters: Capacitor Commutated Inverter- Resonant inverters: Series, Parallel, ZVS, ZCS.

UNIT V

DRIVES AND CONTROL

Static and Dynamic equations of dc and ac machines – Electrical braking – Rectifier and chopper control of DC drives – Principles of v/f control of AC drives – Open loop and Closed loop schemes for DC and AC drives(Block diagram approach only) .

TEXT BOOKS:

1. Muhammad H. Rashid, "Power Electronics: Circuits, Devices & Applications", Pearson Education, 2013.
2. P S Bimbhra , "Power Electronics", Khanna Publications, 2001.

REFERENCE BOOKS:

1. Singh, M.D and Kahanchandani, K. B., "Power Electronics , 2nd Edition., Tata McGraw-Hill
2. G.K.Dubey & C.R.Kasaravada,"Power Electronics & Drives", Tata McGraw Hill,1993.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific 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	1	1	--	--	--	--	--	--	--	--	3	3	3
CO3	3	3	3	3	--	--	--	--	--	--	--	--	2	3	3
CO4	3	3	2	2	--	--	--	--	--	--	--	--	1	3	3
CO5	3	2	2	2	2	2	--	--	--	--	--	--	3	3	3
Average	3.00	2.80	1.6	1.6	1.40	0.40	0.00	0.00	0.00	0.00	0.00	0.00	2.40	2.80	3.00
Level of Correlation of the Course	3	3	1	1									3	2	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B.Tech –I Semester (EEE)

L	T	P	C
3	0	0	3

20AEE23 REAL-TIME EMBEDDED SYSTEMS CONCEPTS AND PRACTICES

(Professional Elective - I)

COURSE OUTCOMES:

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

CO1: Analyze real time parameters and design a software model for embedded Systems.

CO2: Apply different policies and RTOS options for embedded systems.

CO3: Apply the concept of embedded systems and RTOS for real time applications

C**O4:** Analyze the real time Hardware architecture of embedded systems.

UNIT I :

EXPLORATION OF RT CHALLENGES AND CONCEPTS:

This module gives an introduction to real-time theory, challenges faced in designing real-time systems and scheduling policies implemented while comparing the Linux POSIX real-time threads to RTOS and MFE systems.

UNIT II :

QUALITY OF SERVICE THEORY FROM BEST EFFORT TO HARD REAL-TIME:

This module describes the utility curves used for analysis of real-time systems along with Rate Monotonic Scheduling Policy and its Least Upper Bound Condition. It also describes the absolute time and date standards which are critical parameters for real-time services.

UNIT III :

SCHEDULING AND CONCEPT OF REAL-TIME SERVICES:

This module covers the methods of sequencing of service requests along with software scheduling and real-time scheduling policies.

UNIT IV :

OVERVIEW OF REAL-TIME HARDWARE ARCHITECTURES:

This module discusses the use of multi core microprocessors for real-time applications and gives an overview of RTOS Options (Open and Proprietary).

UNIT V :

SOFTWARE STACKS:

OS with POSIX Real-Time Extensions for real-time systems.

TEXT BOOKS:

1. Embedded System Design: A Unified Hardware / Software Introduction Paperback – 1 January 2006

   by, Tony Givargis Frank Vahid (Author)

2. Embedded / Real-Time Systems: Concepts, Design and Programming Black Book, New - Paperback – 1 January 2003, by Dr. K.V.K Prasad (Author)

REFERENCE BOOKS:

1. An Embedded Software Primer, 1e Paperback – 1 January 2002, by SIMON (Author)

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	2	--	-	--	--	--	--	--	--	3	3	3
CO2	3	3	2	3	--	3	--	--	--	--	--	--	3	3	3
CO3	3	2	3	2	--	--	--	--	--	--	--	--	2	2	3
CO4	3	3	2	3	--	--	--	--	--	--	--	--	2	3	3
Average	3.00	2.75	1.75	2.75	0.00	0.75	0.00	0.00	0.00	0.00	0.00	0.00	2.50	2.75	3.00
Level of Correlation of the Course	3	3	2	3	0	1							3	2	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B.Tech –I Semester (EEE)

L	T	P	C
3	0	0	3

20AEE24 POWER SYSTEM COMPONENTS
(Professional Elective – I)

COURSE OUTCOMES:

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

CO1: Analyze the basic working principle of Circuit Breakers and function of various circuit Breakers.

CO2: Demonstrate the power flow control in transmission system using FACTS devices.

CO3: Analyze the VAR generation using shunt compensators for transient stability of power system.

CO4: Analyze the series and shunt compensators for the reactive power control.

CO5: Analyze the functions of different regulators for unified power flow.

UNIT-I

CIRCUIT BREAKER:

Introduction, Operating Principle, Detail study on VCB and SF6 Circuit breaker, Ratings, Selection. Surge Arrester & Surge Absorber. Insulation Co-ordination, BIL.

UNIT-II

FACTS:

Concepts and general system consideration: Opportunities for FACTS. Basic types of FACTS controllers. Brief description and definition of FACTS controllers. Shunt connected controllers. Series Connected controllers. Combined Shunt and Series connected controllers.

UNIT-III

STATIC SHUNT COMPENSATORS:

Objectives of Shunt Compensations. Midpoints voltage regulation for line segmentation. Improvements of transient stability, Methods of controllable VAR generation. Variable impedance type static VAR generation, TCR and TSR, FC-TCR (Fixed Capacitor, Thyristor Controlled Reactor), Hybrid VAR Generators. Static VAR Compensator (SVC & STATCOM). Transfer Function and Dynamic Performance. Power Oscillation, Damping. Transient Stability.

UNIT-IV

STATIC SERIES COMPENSATORS:

GCSC, TSSC, TCSC and SSSC: Basic Operating Control Schemes for GCSC, TSSC and TCSC.

UNIT-V

STATIC VOLTAGE AND PHASE ANGLE REGULATORS:

TCVR and TCPAR, Unified power flow controllers

TEXT BOOKS:

1. Understanding FACTS by Narain G. Hingorani & Laszlo Gyugyi: IEEE Press.

REFERENCE BOOKS:

1.Power System Switchgear & Protection by Sunil S. Rao.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific 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	--	3	--	--	--	--	--	--	--	--	3	3	3
CO3	3	2	--	1	--	--	--	--	--	--	--	--	2	2	3
CO4	3	3	2	2	--	--	--	--	--	--	--	--	2	3	3
CO5	3	2	2	2	--	--	--	--	--	--	--	--	3	2	3
Average	3.00	2.60	0.8	1.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	2.60	2.40	3.00
Level of Correlation of the Course	3	3	1	1									3	2	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B.Tech – I Semester (EEE)

L	T	P	C
3	0	0	3

20AEE25 DISTRIBUTION SYSTEM AUTOMATION
(Professional Elective - I)

COURSE OUTCOMES:

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

CO1: Apply the knowledge of power system for Distribution system planning.

CO2: Analyze automation and distribution systems protection

CO3: Analyze the best capacitor location for power factor improvement and optimum capacitor allocation.

CO4: Design different types of primary and secondary distribution feeders for power transmission applicatons .

CO5: Analyze the fault currents, voltage drop and power loss in distribution lines.

UNIT -I

DISTRIBUTION SYSTEM PLANNING AND AUTOMATION:

Introduction - Distribution Planning – Facts affecting system planning - present distribution system planning techniques – distribution system planning models – Distribution system planning in the future – Future nature of Distribution planning – The central role of the computer in distribution planning – distribution system automation.

UNIT -II

DESIGN CONSIDERATION OF PRIMARY AND SECONDARY SYSTEMS:

Introduction – Primary network – Primary feeder voltage levels – Primary feeder loading – Tie lines – the design of radial Primary distribution systems – Primary systems costs – introduction – secondary voltage levels – The present design practice – secondary Banking – the secondary networks – Economic Design of Secondaries.

UNIT -III

VOLTAGE DROP AND POWER LOSS CALCULATIONS:

Three Phase Balanced Primary Links – non three phase primary Lines – four wire multi grounded common neutral distribution system – A method to analyze distribution costs – Economic analysis of Equipment losses.

UNIT -IV

APPLICATION OF CAPACITORS TO DISTRIBUTION SYSTEMS:

Power Capacitors – effects of series and shunt capacitors – power factor correction – Economic justification for capacitors - A practical procedure to determine the best capacitor location – A mathematical procedure to determine the optimum capacitor allocations.

UNIT -V

DISTRIBUTION SYSTEM PROTECTIONS:

Basic definitions – over current protections devices – objective of Distributions system protection – coordination of protective devices – fuse to – fuse coordinator – Recloser to Recloser coordinator – Recloser to fuse coordinators – Fuse to circuit breaker coordinator – Recloser to coordinators fault current calculations.

TEXT BOOKS:

1. Turan Gonen, Electric Power Distribution System Engineering, CRC Press publication, 2nd Edition, 2007.
2. A.S Publa, Electric Power Distribution, Tata Mc Graw – Hil Publishing Company Ltd, 4th edition, 2001.

REFERENCE BOOKS:

1. S.Sivanagaraju, V.Sankar, Electrical Power Distribution and Automation, Dhanapat Rai & Co, Reprint 2010.
2. V.K.Mehatha, Principles of power system, S Chand publication, 2nd Edition, 2005.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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	2	3	--	--	--	--	--	--	--	3	3	3	3
CO3	3	2	2	3	--	--	--	--	--	--	--	--	3	3	1
CO4	3	3	3	3	--	3	--	--	--	3	--	--	2	3	3
CO5	3	2	3	2	--	2	--	--	--	--	--	--	3	3	1
Average	3.00	2.60	2	2.80	0.00	1.00	0.00	0.00	0.00	0.60	0.00	0.60	2.80	3.00	2.20
Level of Correlation of the Course	3	3	2	3		1							3	3	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B.Tech – I Semester (EEE)

L	T	P	C
3	0	0	3

20AEE26 ADVANCED POWER SYSTEM PROTECTION
(Professional Elective - I)

COURSE OUTCOMES:

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

CO1: Understand the construction of static relay and identify the advantages of static relay over electromagnetic relay.

CO2: Explore the operation of rectifier bridge comparators, instantaneous comparators, phase comparators, multi-input comparators, static differential and distance relays

CO3: Analyze instantaneous, definite time and inverse definite minimum time over current relays.

CO4: Analyze the concept of power swings on distance relays using multi-input comparators.

CO5: Identify the microprocessor based protective relays and their operation.

UNIT-I:

STATIC RELAYS

Advantages of static relays – Basic construction of static relays – Level detectors – Replica impedance – Mixing circuits – General equation for two input phase and amplitude comparators - Duality between amplitude and phase comparators. Amplitude Comparators: Circulating current type and opposed voltage type – rectifier bridge comparators, Direct and Instantaneous comparators.

UNIT-II:

PHASE COMPARATORS

Coincidence circuit type – block spike phase comparator, techniques to measure the period of coincidence – Integrating type – Rectifier and Vector product type – Phase comparators. Static Over Current Relays: Instantaneous over-current relay – Time over-current relays-basic principles – definite time and Inverse definite time over-current relays.

UNIT-III:

STATIC DIFFERENTIAL RELAYS

Analysis of Static Differential Relays – Static Relay schemes – Duo bias transformer differential protection – Harmonic restraint relay. Static Distance Relays: Static impedance-reactance – MHO and angle impedance relay-sampling comparator – realization of reactance and MHO relay using sampling comparator.

UNIT-IV

MULTI-INPUT COMPARATORS

Conic section characteristics -Three input amplitude comparator – comparator-switched distance schemes – Poly phase distance schemes – phase fault scheme – three phase scheme – combined and ground fault scheme. Power Swings: Effect of power swings on the performance of distance relays –

Power swing analysis – Principle of out of step tripping and blocking relays – effect of line and length and source impedance on distance relays.

UNIT-V:

MICROPROCESSOR BASED PROTECTIVE RELAYS

Block diagram and flowchart approach only – Over current relays – impedance relays – directional relay – reactance relay – Generalized mathematical expressions for distance relays -measurement of resistance and reactance – MHO and offset MHO relays – Realization of MHO characteristics – Realization of offset MHO characteristics – Basic principle of Digital computer relaying.

TEXT BOOKS:

1. Badri Ram and D. N. Vishwakarma, "Power system protection and Switch gear ", TMH publication New Delhi 1995.

REFERENCE BOOKS:

1. T.S. Madhav aRao , "Static relays", TMH publication, second edition, 1989.
2. Protection and Switchgear, Bhavesh Bhalja, R. P. Maheshwari, Nilesh G. Chothani, Oxford University Press.
3. Electrical Power System Protection, C. Christopoulos and A. Wright, Springer International.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes											Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	--	3	--	2	--	--	--	--	--	--	3	3	3
CO2	3	3	--	3	--	2	--	--	--	--	--	--	3	3	3
CO3	3	2	--	1	2	--	--	--	--	--	--	--	2	3	1
CO4	3	3	2	3	2	--	--	--	--	--	--	--	2	3	3
CO5	3	2	3	2	3	--	--	--	--	--	--	--	3	2	1
Average	3.00	2.60	1	2.40	1.40	0.80	0.00	0.00	0.00	0.00	0.00	0.00	2.60	2.80	2.20
Level of Correlation of the Course	3	3	1	3	1	1							3	3	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B.Tech – I Semester (EEE)

L	T	P	C
3	0	0	3

20AEE27 RELIABILITY ENGINEERING AND APPLICATIONS TO POWER SYSTEMS
(Professional Elective - I)

COURSE OUTCOMES:

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

CO1: Apply probability theory, distribution, network modeling and reliability analysis.

CO2: Analyze the reliability functions with their relationships in connection to power sytems.

CO3: Evaluate reliability models using frequency and duration techniques

CO4: Analyze Power System Reliability using different techniques

CO5: Analyze the performance indices of reliable composite systems and distribution systems.

UNIT–I

BASICS OF PROBABILITY THEORY, DISTRIBUTION & NETWORK MODELLING: Basic Probability Theory – Rules for Combining Probabilities of Events – Bernoulli's Trials – Probability Density and Distribution Functions – Binomial Distribution – Expected Value and Standard Deviation of Binomial Distribution. Analysis of Series, Parallel, Series-Parallel Networks – Complex Networks – Decomposition Method.

UNIT–II

RELIABILITY FUNCTIONS:

Reliability Functions F(T), F(T), R(T), H(T) and Their Relationships – Exponential Distribution – Expected Value and Standard Deviation of Exponential Distribution – Bath Tub Curve – Reliability Analysis of Series Parallel Networks Using Exponential Distribution – Reliability Measures MTTF, MTTR, MTBF

UNIT–III

MARKOV MODELLING AND FREQUENCY & DURATION TECHNIQUES:

Markov Chains – Concept of Stochastic Transitional Probability Matrix, Evaluation of Limiting State Probabilities – Markov Processes One Component Repairable System – Time Dependent Probability Evaluation Using Laplace Transform Approach – Evaluation of Limiting State Probabilities Using Stpm – Two Component Repairable Models. Frequency and Duration Concept – Evaluation of Frequency of Encountering State, Mean Cycle time, For One, Two Component Repairable Models – Evaluation of Cumulative Probability and Cumulative Frequency of Encountering of Merged States – Approximate System Reliability analysis – series parallel configuration – Basic probability indices – cutest approach

UNIT–IV

APPLICATIONS TO POWER SYSTEMS-I:

Generation System Reliability Analysis: Reliability Model of a Generation System– Recursive Relation for Unit Addition and Removal – Load Modeling - Merging of Generation Load Model – Evaluation of Transition Rates for Merged State Model – Cumulative Probability, Cumulative Frequency of Failure Evaluation – LOLP, LOLE, LOEE.

UNIT–V

APPLICATIONS TO POWER SYSTEMS-II:

Basic Techniques - Radial Networks – Evaluation of Basic Reliability Indices, Performance Indices – Load Point and System Reliability Indices – Customer Oriented, Loss and Energy Oriented Indices -Examples single feeder - parallel configuration RDS – Network reduction technique – cut set approaches – weather effects – repairable and non – repairable effects modeling and evaluation of basic probability indices.

TEXT BOOKS:

1. Reliability Evaluation of Engg. System – R. Billinton, R.N.Allan, Plenum Press, New York, reprinted in India by B.S.Publications, 2007.

2. Reliability Evaluation of Power systems – R. Billinton, R.N.Allan, Pitman Advance Publishing Program, New York, reprinted in India by B.S.Publications, 2007.

REFERENCE BOOKS:

1. System Reliability Concepts by Dr.V.Sankar, Himalaya Publishing House Pvt.Ltd,, Mumbai

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	--	3	--	--	--	--	--	--	--	--	3	2	3
CO2	3	3	--	3	--	--	--	--	--	--	--	--	3	3	3
CO3	3	2	--	1	2	--	--	--	--	--	--	--	2	3	3
CO4	3	3	2	3	2		--	--	--	--	--	--	2	3	3
CO5	3	2	1	2	3		--	--	--	--	--	--	3	2	2
Average	3.00	2.60	3.00	2.40	1..4	1.00	0.00	0.60	0.00	0.00	0.00	0.00	2.60	2.60	2.80
Level of Correlation of the Course	3	3	3	3	1	1							3	3	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

II B.Tech I Semester CSE, IT, CSE (DS), CSE (AI & ML)
III B.Tech I Semester EEE & ECE

L	T	P	C
3	0	0	3

20ACS07 OBJECT ORIENTED PROGRAMMING THROUGH JAVA
(Open Elective-I)

Course Outcomes:
After successful completion of the course the student will be able to
CO1: Demonstrate basic principles of OOP in java programming.
CO2: Apply the concepts of inheritance packages and interfaces in code reusability.
CO3: Apply the principles of exception handling in designing the customized exception to handleerrors in application software.
CO4: Apply concepts of multithreading to solve problems in parallelism.
CO5: 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, interthread 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.

MAPPING OF CO'S- PO'S-PSO'S

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	2	1	2	-	-	-	-	-	-	-	3	2	2
CO3	3	3	3	3	2	-	-	-	-	-	-	-	3	1	2
CO4	3	3	2	3	2	-	-	-	-	-	-	-	3	2	-
CO5	2	3	1	3		-	-	-	-	-	-	-	-	2	1
Average	2.8	3	2	2.5	2	-	-	-	-	-	-	-	3	1.75	1.66
Level of Correlation of the Course	3	3	2	3	2	-	-	-	-	-	-	-	3	2	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B.Tech I Semester

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

L	T	P	C
3	0	0	3

20ACS17 COMPUTER NETWORKS
(Open Elective-I)

COURSE OUTCOMES:

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

CO1: Describe various components and topologies of computer networks

CO2: Use the network reference model layered structure for real time applications.

CO3: Implement various routing protocols from different layers.

CO4: Design, implement and test an efficient algorithmic solution for the give problem.

CO5: Analyse network security mechanics and other issues in the application layer.

UNIT- I 13 hrs

Introduction: Uses of Computer Networks, Network Hardware, Network Topologies, Network Software, References Models.

The Data Link Layer: Data link Layer Design Issues, Elementary Data Link Protocols, and Sliding Window Protocols.

UNIT-II 10 hrs

The Medium Access Control Sublayer: Channel allocation Problem, Multiple Access Protocols, Ethernet: Classic Ethernet physical layer, Ethernet MAC Sublayer Protocol, Ethernet Performance, Switched Ethernet, Fast Ethernet, Gigabit Ethernet,10-Gigabit Ethernet, Wireless LANs: The 802.11 Protocol Stack, 802.11 Physical Layer,802.11 MAC Sublayer Protocol, 802.11 Frame Structure,

UNIT-III 10hrs

The Network Layer: Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, Internetworking, Network Layer in the Internet.

UNIT-IV 8 hrs

The Transport Layer: Transport Service, Elements of Transport Protocols, Internet Transport Protocols: UDP, Internet Transport Protocols: TCP.

UNIT-V 5 hrs

The Application Layer: Domain Name System, Electronic Mail. World Wide Web,

TEXT BOOK:

1. Computer Networks, Fifth Edition, Andrew S. Tanenbaum, David J WetherallPearson Education, 2011.

REFERENCE BOOKS:

1. Data Communications and Networking, Fifth Edition, Behrouz A. Forouzan, TataMcGraw Hill,2012.
2. Computer Networking: A Top ,Down Approach Featuring the Internet, Six Edition,James F. Kurose, K.W. Ross, Pearson Education,2013
3. Computer Communications and Networking Technologies, Michael A. Gallo, William M. Hancock, Cengage Learning, 2001.

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	3	2	2
CO2	3	3	2	-	-	-	-	-	-	-	-	-	3	2	1
CO3	3	3	3	1	-	-	-	-	-	-	-	-	3	2	2
CO4	3	3	3	1	-	-	-	-	-	-	-	-	3	2	2
CO5	3	3			-	-	-	-	-	-	-	-	3	1	1
Average	3	3	2.66	1	-	-	-	-	-	-	-	-	3	2	2
Level of Correlation of the Course	3	3	2	1	-	-	-	-	-	-	-	-	3	2	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

IV B.Tech - I – Semester ECE
III B.Tech I Semester (Common to CSE, IT,CSD , CSM & EEE)
III B.Tech - I – Semester ME

20AME18	ROBOTICS AND ARTIFICIAL INTELLIGENCE	L	T	P	C
	(Open Elective - I)	3	0	0	3

COURSE OUTCOMES:

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

CO1: Demonstrate the knowledge in an application of AI, and select strategies based on application requirement.

CO2: 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.

CO3: Summarize the perception about robot components, actuators, sensors and machine vision.

CO4: Analyze the manipulator kinematics, dynamics for typical robots which will be used for complex operations and analyze the path planning for typical robots.

CO5: 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

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

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

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: IV Manipulator Kinematics and Trajectory Planning

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: V Robot Applications and Programming

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.

TEXTBOOKS

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.

MAPPING OF COS WITH POS & PSOS

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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	3										3	2	
CO4	3	3	3	3									3		2
CO5	3	3											3		2
Average	3	3	3	3									3	2	2
Level of Correlation of the Course	3	3	3	3									3	2	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B.Tech – I Semester (EEE)

L	T	P	C
3	0	0	3

20AEE28 TECHNICAL TRANSFORMER DESIGN

(Job Oriented Elective –I)

COURSE OUTCOMES:

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

CO1: Analyze the operation of the transformers with different tests.

CO2: Analyze the magnetic characteristics of Transformers

CO3: Analyze the impedance and type calculation of Transformers

CO4: Determine the eddy and Hysteresis losses of the Transformers

CO5: Design the Short Circuit Currents Thermal Capability of the Transformer.

UNIT: I

TRANSFORMER FUNDAMENTALS

Applications and Types of Transformers-Principles and Equivalent Circuit of a Transformer Representation of Transformer in Power System-Open-Circuit and Short-Circuit Tests-Voltage Regulation and Efficiency-Parallel Operation of Transformers.

UNIT: II

MAGNETIC CHARACTERISTICS

Construction-Hysteresis and Eddy Losses-Excitation Characteristics-Over-Excitation-Performance-No-Load Loss Test-Impact of Manufacturing Processes on Core Performance Inrush Current - Influence of Core Construction and Winding-Connections on No-Load Harmonic Phenomenon Transformer Noise

UNIT: III

IMPEDANCE

Reactance Calculation-Different Approaches for Reactance Calculation-Two-Dimensional Analytical Methods-Numerical Method for Reactance Calculation-Impedance -Characteristics of Three-Winding Transformer-Reactance Calculation for Zigzag Transformer-Zero-Sequence Reactance Estimation-Stabilizing Tertiary Winding

UNIT: IV

EDDY CURRENTS AND WINDING STRAY LOSSES

Field Equations-Pointing Vector-Eddy Current and Hysteresis Losses-Effect of Saturation Eddy Loss in a Transformer Winding-Circulating Current Loss in Transformer Windings

STRAY LOSSES IN STRUCTURAL COMPONENTS

Factors Influencing Stray Losses - Overview of Methods for Stray Loss Estimation- Core Edge Loss-Stray Lossin Frames-Stray Loss in Flitch Plates-Stray Loss in Tank-Stray Loss in Bushing Mounting Plates-Evaluation of Stray Loss Due to High Current Leads-Measures for Stray Loss Control-Methods for Experimental Verification-Estimation of Stray Losses in Over excitation Condition-Load Loss Measurement

UNIT: V

SHORT CIRCUIT STRESSES AND STRENGTH

Short Circuit Currents-Thermal Capability at Short Circuit-Short Circuit Forces-Dynamic Behavior under Short Circuits-Failure Modes Due to Radial Forces-Failure Modes Due to Axial Forces-Effect of Pre-Stress-Short Circuit Test-Effect of Inrush Current-Split-Winding Transformers-Short Circuit Withstand-Calculation of Electro dynamic Force Between-Parallel Conductors-Design of Clamping Structures

TEXT BOOKS:

1. Transformer Engineering Design, Technology, and Diagnostics Second Edition, S.V. Kulkarni S.A. Khaparde CRC Press.
2. A course in electrical machine Design – A. K. Sawhney

REFERENCE BOOKS:

1. Electrical Machine Design – R. K. Agrawal
2. Design of Electrical Machine- V. N. Mittle
3. Transformer and inductor design handbook Third Edition, Revised and Expanded, COLONEL WM. T. MCLYMAN Kg Magnetics, Inc. Idyllwild, California, U.S.A.

Mapping of CO’s- PO’s-PSO’s

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	--	2	--	--	--	--	--	--	3	2	3
CO2	3	3	2	3	--	2	--	--	--	--	--	--	3	3	3
CO3	3	2	3	1	--	2	--	--	--	--	--	--	2	3	1
CO4	3	3	2	3	2	--	--	--	--	--	--	--	2	3	3
CO5	3	2	3	2	3	--	--	--	--	--	--	--	3	2	3
Average	3.00	2.60	2.4	2.2	1.00	1.20	0.00	0.00	0.00	0.00	0.00	0.00	2.60	2.60	2.60
Level of Correlation of the Course	3	3	3	2	1	1							3	2	1

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B.Tech – I Semester (EEE)

L	T	P	C
3	0	0	3

20AEE29 ELECTRICAL LOAD ESTIMATION AND DESIGN

(Job Oriented Elective –I)

COURSE OUTCOMES:

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

CO1: Estimate economics of electrical load using the rules formulated in Indian Eletricity act

CO2: Design the distribution systems for electrification of residential building

CO3: Apply the concepts of load estimation, power system protection for the design of Commercial electric installations

CO4: Interpret the knowledge of different service connections for testing of wiring Installations

CO5: Determine the input rating of various power circuits for protection of electrical Installation

UNIT I

GENERAL PRINCIPLES OF ESTIMATION

Introduction to estimation & costing, Electrical Schedule, Catalogues, Market Survey and source selection, Recording of estimates, Determination of required quantity of material, Labor conditions, Determination of cost material and labour, Contingencies, Overhead charges, Profit, Purchase system, Purchase enquiry and selection of appropriate purchase mode, Comparative statement, Purchase orders, Payment of bills, Tender form, General idea about IE rule, Indian Electricity Act and major applicable I.E rules.

UNIT II

RESIDENTIAL BUILDING ELECTRIFICATION

General rules guidelines for wiring of residential installation and positioning of equipments, Principles of circuit design in lighting and power circuits, Procedures for designing the circuits and deciding the number of circuits, Method of drawing single line diagram, Selection of type of wiring and rating of wires and cables, Load calculations and selection of size of conductor, Selection of rating of main switch, distribution board, protective switchgear ELCB and MCB and wiring accessories, Earthing of residential Installation, Sequence to be followed for preparing estimate, Preparation of detailed estimates and costing of residential installation.

UNIT III

ELECTRIFICATION OF COMMERCIAL INSTALLATION

Concept of commercial installation, Differentiate between electrification of residential and commercial installation, Fundamental considerations for planning of an electrical installation system for commercial building, Design considerations of electrical installation system for commercial building, Load calculation and selection of size of service connection and nature of supply, Deciding the size of the cables, busbar and bus bar chambers, Mounting arrangements and positioning of switchboards, distribution boards main switch etc, Earthing of the electrical installation, Selection of type wire, wiring system and layout, Sequence to be followed to prepare estimate, Preparation of detailed estimate and costing of commercial installation.

UNIT IV

SERVICE CONNECTION, INSPECTION AND TESTING OF INSTALLATION

Concept of service connection, Types of service connection and their features, Method of installation of service connection, Estimates of underground and overhead service connections, Inspection of internal wiring installations, Inspection of new installations, Testing of installations, Testing of wiring installations, Reason for excess recording of energy consumption by energy meter.

UNIT V

ELECTRICAL INSTALLATION FOR POWER CIRCUITS

Introduction, Important considerations regarding motor installation wiring, Determination of input power, Determination of input current to motors, Determination of rating of cables, determination of rating of fuse, Determination of size of Condit, distribution Board main switch and starter.

TEXT BOOKS:

1. "K. B. Raina, S. K. Bhattacharya", "Electrical Design Estimating and Costing", New Age International Publisher, 2010.
2. "Er. V. K. Jain, Er. Amitabh Bajaj", "Design of Electrical Installations", University Science Press.

REFERENCE BOOKS:

1. Code of practice for Electrical wiring installations, (System voltage not exceeding 650 volts), Indian Standard Institution, IS: 732-1983.
2. Guide for Electrical layout in residential buildings, Indian Standard Institution, IS: 4648-1968.
3. Electrical Installation buildings Indian Standard Institution, IS: 2032.

Code of Practice for selection, Installation of Maintenance of fuse (voltage not exceeding 650 V), Indian Standard Institution, IS: 3106-1966.

MAPPING OF CO'S- PO'S-PSO'S

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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	3	3
CO3	3	2	3	1	--	--	--	--	--	--	--	--	2	3	3
CO4	3	3	2	3	--	--	--	--	--	--	--	--	2	3	3
CO5	3	2	3	2	--	--	--	--	--	--	--	--	3	2	3
Average	3.00	2.60	2.80	2.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.60	2.60	3.00
Level of Correlation of the Course	3	3	3	3									3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B.Tech – I Semester (EEE)

L	T	P	C
0	0	3	1.5

20AEE30 TRANSMISSION AND DISTRIBUTION LAB

COURSE OUTCOMES:

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

CO1: Demonstrate the knowledge to determine parameters of transmission lines.

CO2: Demonstrate skills in cable size calculation and fault location of underground cables.

CO3: Analyze the Ferranti effect in transmission line.

CO4: Determine the voltage distribution, string efficiency

CO5: Analyze the performance characteristics of distribution system.

LIST OF EXPERIMENTS

Any TEN experiments are required to be conducted:

1. Determination of the ABCD parameters of Short Transmission Line.
2. Determine the ABCD parameters of Medium Transmission Line for T and Π Network.
3. Determine the ABCD parameters for long transmission line.
4. To observe the Ferranti effect in a model of transmission line.
5. Determination of voltage distribution and string efficiency of string of insulators
6. Measurement of Capacitance of 3 core cable.
7. Fault location of Underground Cables.
8. Operation and constructional features of a Distribution Transformer (11kv/430v).
9. Substation Equipments and its one line diagram.
10. Cable Size Calculation for the given load.
11. Performance characteristics of typical DC distribution system in radial & ring main configuration.
12. To study radial feeder performance when a) fed at one end b) fed at both ends.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	--	--	--	--	--	3	--	--	--	3	3	3
CO2	3	3	3	3	--	--	--	--	2	--	--	--	3	3	2
CO3	3	2	3	1	--	--	--	--	--	--	--	--	2	3	3
CO4	3	3	3	3	--	3	--	--	--	--	3	--	2	3	3
CO5	3	2	3	2	--	2	--	--	2	--	--	3	3	2	2
Average	3.00	2.60	3.00	1.80	0.00	0.00	0.00	0.00	1.4	0.00	0.60	0.60	2.60	2.80	2.60
Level of Correlation of the Course	3	3	3	2					1				3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B.Tech – I Semester (EEE)

L	T	P	C
0	0	3	1.5

20AEE31 ELECTRICAL AND ELECTRONICS MEASUREMENTS LAB

COURSE OUTCOMES:

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

CO1: Demonstrate the calibration of measuring instruments.

CO2: Analyze various bridges for measurement of resistance,inductance and capacitance

CO3: Perform measurement of power and energy.

CO4: Analyze different measuring instruments in the field of electrical engineering.

CO5: Apply various bridges for measurement of inductance and capacitance.

LIST OF EXPERIMENTS

Any TEN experiments are required to be conducted:

1. D.C. Potentiometer – Calibration of PMMC ammeter and PMMC voltmeter.
2. Measurement of % ratio error and phase angle error of given C.T by comparison.
3. Resistance strain gauge and LVDT- Calibration and measurement of Resistance & Capacitance.
4. Calibration and testing of single phase energy meter (Analog & Digital).
5. Kelvin's double Bridge & Wheat stone's bridge - Measurement of low & medium resistance.
6. Schering Bridge & Anderson bridge-Measurement of capacitance & inductance.
7. Measurement of 3 phase power using Two watt meter method (Balanced).
8. Characteristics of Thermistor, Thermo couple and Piezo Electric Transducers.
9. Calibration of dynamometer type power factor meter.
10. Measurement of parameters of choke coil using three voltmeter and three ammeter method.
11. Measurement of dielectric strength of air and oil using H.T. testing Kit.
12. Calibration of LPF wattmeter – by Phantom testing

MAPPING OF CO'S- PO'S-PSO'S

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	3	--	2	--	--	3	--	--	--	3	3	2
CO2	3	3	2	3	--	2	--	--	1	--	--	--	3	3	3
CO3	3	2	3	3	--	2	--	--	3	--	--	--	2	3	3
CO4	3	3	2	3	3	2	--	--	2	--	--	--	2	3	3
CO5	3	2	2	2	3	3	--	--	2	--	--	--	3	2	1
Average	3.00	2.60	1.8	2.80	1.20	2.20	0.00	0.60	2.2	0.00	0.00	0.00	2.60	2.80	2.40
Level of Correlation of the Course	3	3	2	2	1	2			2				3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

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

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

CO1: Understand language fluency through conversational practices and demonstrate appropriate body language during communication.

CO2: Apply synonyms, antonyms, one-word substitutes, prefixes and suffixes to develop vocabulary to comprehend oral and written communication.

CO3: Analyze reading and writing techniques in preparing letters, resumes and technical reports by examining and applying guessing meaning, scanning, skimming and interfering meaning.

CO4: 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.

MAPPING OF CO'S- PO'S-PSO'S

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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 of the Course	2	3	-	-	-	2	-	-	3	3	-	-	-	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

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

20AHS21 INDIAN CONSTITUTION (MANDATORY COURSE)

L	T	P	C
2	0	0	0

COURSE OUTCOMES:

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

CO1: Understand the historical background of the constitution making and its importance for building a democratic India.

CO2: Examine the importance of Preamble of the Indian Constitution and Parliamentary Structure.

CO3: Analyze decentralization of power among central, state and local self government.

CO4: 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

MAPPING OF CO'S- PO'S-PSO'S

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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 of the Course	2	-	-	-	-	3	-	3	-	-	-	-	-	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND 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
(Audit Course)

COURSE OUTCOMES

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

CO1: Develop the thinking ability to meet the challenges in solving Logical Reasoning problems.

CO2: Solve campus placements aptitude papers covering Quantitative Ability and Verbal Ability.

CO3: 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

MAPPING OF CO’S- PO’S-PSO’S

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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 of the Course	2	2	-	-	-	-	-	-	-	2	-	-	-	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

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

L	T	P	C
2	0	0	0

20AHS18 FRENCH LANGUAGE
(Audit Course)

Course Outcomes:

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

CO1: Understandbasic knowledge of French language and analyze Several core competencies.

CO2: Develop and improve comprehensive capabilities and apply simple phrases & sentences in real-life conversation.

CO3: Analyze ability to ask and answer questions about the self, personal interest, everyday life, and the immediate environment.

CO4: Demonstrate knowledge of tenses in making sentences for day-to-day conversations in different 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, CLE International 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.

MAPPING OF CO'S- PO'S-PSO'S

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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 of the Course	2	-	-	-	-	-	-	-	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

20AHS19 GERMAN LANGUAGE

(Audit Course)

COURSE OUTCOMES:

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

CO1: Understand fundamental knowledge to learn German language, sounds, pronunciations, sentence structures and the verb conjugation.

CO2: Comprehend and apply the knowledge of vocabulary and phrases in day-to-day real-life conversation.

CO3: Analyze various sentence structures by examining the rules of grammar in speaking and writing.

CO4: 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.

MAPPING OF CO'S- PO'S-PSO'S

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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 of the Course	2	-	-	-	-	2	-	-	-	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

20AHS20 JAPANESE LANGUAGE
(Audit Course)

COURSE OUTCOMES:

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

CO1: Remember and understand Japanese alphabet and demonstrate basic structures of sentences in reading and writing.

CO2: Examine the limitations of language by examining pronouns, verbs form, adjectives and conjunctions.

CO3: Analyze the skills of vocabulary and apply it to learn time and dates and express them in Japanese.

CO4: 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.

Mapping of CO’s- PO’s-PSO’s

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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 of the Course	3	-	-	-	-	-	-	-	-	3	-	-	-	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B.Tech – I Semester (EEE)

L	T	P	C
0	0	0	1.5

20AEE32 / 20AEEB7 SUMMER INTERNSHIP / COMMUNITY SERVICE PROJECT 2 MONTHS (MANDATORY) AFTER SECOND YEAR

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B.Tech II Semester EEE

IV B.Tech I Semester CSE, IT, CSE (AI&ML), & CSE (DS),CE, ME & ECE

L	T	P	C
3	0	0	3

20AMB04 CREATIVITY AND INNOVATION

COURSE OUTCOMES:

After successful completion of the course student will be able to

CO1: Explain innovation and creativity management from the perspective of obtaining a sustainable competitive advantage and integrating innovation into the business strategy.

CO2: Explain the attributes of successful innovation strategies including an in-depth understanding of the dynamics of innovation

CO3: Identify the role that innovation plays in the competitive dynamics of industries and how these innovations affect society.

CO4: Explain the factors and drivers that predict creativity and innovation of individuals, groups, and organizations

CO5: 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.

MAPPING OF CO'S- PO'S-PSO'S

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	2	-	2	-	-	-	-	-	-	-	3	3	2
CO2	-	-	2	-	2	-	-	-	-	-	-	-	3	3	3
CO3	-	-	2	-	2	-	-	-	-	-	-	-	2	3	3
CO4	-	-	2	-	2	-	-	-	-	-	-	-	2	3	3
CO5	-	-	2	-	-	2	-	-	-	-	2	-	3	2	1
Average	-	-	2	-	2	2	-	-	-	-	2	-	2.60	2.80	2.40
Level of Correlation of the Course	-	-	2	-	2	2	-	-	-	-	2	-	2	3	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech II Semester EEE

IV B.Tech I Semester CSE, IT, CSE (AI&ML), & CSE (DS),CE,ME & ECE

L	T	P	C
3	0	0	3

20AMB05 LEADERSHIP ESSENTIALS

COURSE OUTCOMES:

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

CO1: Identify the concepts and theories of leadership and analyse its relevance to the organizations.

CO2: Analyze various sources of power, politics and conflict management.

CO3: Adapt theories of leadership to cases and contexts in organisation.

CO4: Interpret change, sustainable development and implications of cultural factors in organizations.

CO5: 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.

MAPPING OF CO'S- PO'S-PSO'S

Course Outcome	**Program Outcomes**												**Program Specific Outcomes**		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	3	-	3	-	-
CO2	-	-	-	-	-	-	-	-	3	-	3	-	3	-	-
CO3	-	-	-	-	-	-	-	-	-	-	3	-	2	-	-
CO4	-	-	-	-	-	-	-	-	3	-	3	-	2	-	-
CO5	-	-	-	-	-	-	-	-	3	-	2	-	3	-	-
Average	-	-	-	-	-	-	-	-	3	-	2.8	-	2.60	-	-
Level of Correlation of the Course	-	-	-	-	-	-	-	-	3	-	3	-	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 CSE, IT, CSE (AI&ML), & CSE (DS), CE, ME & ECE				

20AMB06 LAW FOR ENGINEERS

COURSE OUTCOMES:

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

CO1: Explain the essential principles of the law relevant to engineering practice

CO2: Apply the relevant provisions of contract law

CO3: Use effective contract laws for decision making and problem-solving techniques in different scenarios

CO4: Recognize and explore key legal requirements for engineering including health & safety, privacy, and professional indemnity.

CO5: 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.

MAPPING OF CO'S- PO'S-PSO'S

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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	3
CO3	-	-	-	-	-	3	-	-	-	-	3	-	2	3	3
CO4	-	-	-	-	-	3	-	-	-	-	3	-	2	3	3
CO5	-	-	-	-	-	3	-	-	-	-	2	-	3	2	1
Average	3	-	-	3	-	3	-	-	-	-	2.6	-	2.60	2.80	2.40
Level of Correlation of the Course	3	-	-	3	-	3	-	-	-	-	3	-	2	3	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

III B.Tech II Semester EEE

IV B.Tech I Semester CSE, IT, CSE (AI&ML), & CSE (DS),CE,ME & ECE

L	T	P	C
3	0	0	3

20AMB07 ENTREPRENEURSHIP ESSENTIALS

COURSE OUTCOMES

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

CO1: Explain the Fundamentals and specifics of Entrepreneurship.

CO2: Apply theoretical concepts in developing an idea and startup a new technology-based company.

CO3: Prepare marketing and financial plans that are viable in nature.

CO4: Apply marketing research methods and tools to forecast and to analyze the trend.

CO5: 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.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	3	-	3	-	-
CO2	-	-	-	-	-	-	-	-	-	-	3	-	3	-	-
CO3	-	1	1	-	-	-	-	-	-	-	3	-	2	-	-
CO4	-	1	1	-	-	-	-	-	-	-	3	-	2	-	-
CO5	-	1	1	-	-	-	-	-	-	-	3	-	3	-	-
Average	-	1	1	-	-	-	-	-	-	-	3	-	2.60	-	-
Level of Correlation of the Course	-	1	1	-	-	-	-	-	-	-	3	-	2	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech II Semester EEE

IV B.Tech I Semester CSE, IT, CSE (AI&ML), & CSE (DS),CE,ME & ECE

L	T	P	C
3	0	0	3

20AMB08 ESSENTIALS OF MANAGEMENT SCIENCE

COURSE OUTCOMES:

After successful completion of the course student will be able to

CO1: Apply various areas of functional management for the prospects of business organization.

CO2: Apply management principles for decision making.

CO3: Apply various functions of Hr manager.

CO4: Use tools and techniques to become an effective manager.

CO5: 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

MAPPING OF CO’S- PO’S-PSO’S

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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	3
CO3	-	-	-	-	-	-	-	-	3	-	3	-	2	3	3
CO4	-	-	-	-	-	-	-	-	3	-	3	-	2	3	3
CO5	-	-	-	-	-	-	-	-	3	-	3	-	3	3	3
Average	-	-	-	-	-	-	-	-	3	-	3	-	2.60	3.00	2.80
Level of Correlation of the Course	-	-	-	-	-	-	-	-	3	-	3	-	2	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech – II Semester EEE

L	T	P	C
3	0	0	3

20AEE34 POWER SYSTEM ANALYSIS

COURSE OUTCOMES:

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

CO1: Analyze the impedance network for a power system and compute per unit quantities.

CO2: Find the load flow solution of a power system using different methods..

CO3: Interpret Z - bus in order to calculate fault current for all types of faults to design protective devices.

CO4: Analyze the sequence components of currents for unbalanced power system network..

CO5: Analyse the steady state, transient and dynamic stability concepts of a power system

UNIT –I:

PER UNIT REPRESENTATION & TOPOLOGY

Per Unit Quantities–Single line diagram– Per Unit Impedance diagram and Reactance diagram of a power system–Graph theory definition –Formation of element node incidence and bus incidence matrices – Primitive network representation –Formation of Y–bus matrix by singular transformation and direct inspection methods.

UNIT –II:

POWER FLOW STUDIES

Bus Classification-Necessity of power flow studies – Derivation of static power flow equations – Power flow solution using Gauss Seidel Method – Newton Raphson Method (Rectangular and polar coordinates form) –Decoupled and Fast Decoupled methods – Algorithmic approach –Problems on 3–bus system only.

UNIT –III:

Z–BUS FORMULATION:

Formation of Z–Bus: Partial network– Algorithm for the Modification of Zbus: Addition of element from a new bus to reference– Addition of element from a new bus to an old bus– Addition of element between an old busto reference and Addition of element between two old buses. – Modification of Z–Bus for the changes in network (Problems).

SYMMETRICAL FAULT ANALYSIS:

Transients on a Transmission line-Short circuit of synchronous machine (on no-load) - 3–Phase short circuit currents and reactance's of synchronous machine–Short circuit MVA calculations -Series reactors – selection of reactors.

UNIT –IV:

UNSYMMETRICAL FAULT ANALYSIS

Definition of symmetrical components - symmetrical components of unbalanced three phase systems – Power in symmetrical components – Sequence impedances – Synchronous generator – Transmission line and transformers – Sequence networks –Various types of faults LG– LL– LLG and LLL on unloaded alternator.

UNIT – V:

STABILITY ANALYSIS

Classification of Power System Stability-Synchronizing Power Coefficient –Power Angle Curve and Derivation of Swing Equation–Determination of Transient Stability by Equal Area Criterion–Applications of Equal Area Criterion–Methods to improve steady state and transient stability.

TEXT BOOKS:

1. I.J. Nagrath & D. P. Kothari, Modern Power System Analysis, Tata McGraw-Hill Publishing Company, 4^{th} Edition, 2011.
2. D.Das, Electrical Power Systems, New Age International Publishers, 2009.
3. Stagg and EI-Abiad, Computer Methods in Power Systems, International Student Edition, McGraw-Hill, 1^{st} Edition, 1968.

REFERENCE BOOKS:

1. LP Singh, Advanced Power System Analysis and Dynamics, New Age International Publishers, 6^{th} Edition, 2012.
2. William D.Stevension Jr., Elements of Power System Analysis, McGraw Hill, 4^{th} Edition, 1995.
3. Hadi Saadat, Power System Analysis, TMH Edition, 3^{rd} Edition, 2002.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	--	2	--	2	--	--	--	--	--	--	3	2	3
CO2	3	3	2	3	--	2	--	--	--	--	--	--	3	3	3
CO3	3	2	3	3	2	--	--	--	--	--	--	--	2	2	3
CO4	3	3	2	3	2	--	--	--	--	--	--	--	2	3	3
CO5	3	2	3	2	3	--	--	--	--	--	--	--	3	2	3
Average	3.00	2.60	2	2.80	1.40	0.80	0.00	0.00	0.00	0.00	0.00	0.00	2.60	2.40	3.00
Level of Correlation of the Course	3	2	2	3	1	1							3	2	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMUS)

	L	T	P	C
III B. Tech I ECE				
III B. Tech II EEE	3	0	0	3

20AEC19 MICROPROCESSORS AND MICROCONTROLLERS

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 an array, 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, serialdata 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 of 8051, 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

Mapping of CO's- PO's-PSO's

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

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech – II Semester (EEE)

L	T	P	C
3	0	0	3

20AEE35 SOFT COMPUTING TECHNIQUES

(Professional Elective - II)

COURSE OUTCOMES:

After successful completion of the course student will be able to

CO1: Comprehend the knowledge on various Artificial intelligence techniques like artificial neural networks (ANN), fuzzy logic controller (FLC), genetic algorithm (GA)

CO2: Analyze various supervised learning techniques and Training algorithms.

CO3: Analyze various algorithms using ANN, fuzzy logic controller and GA

CO4: Develop skills in evaluating solutions for electric drives applications.

CO5: Analyze the load foreasting using soft computing methodologies.

UNIT - I

ARTIFICIAL NEURAL NETWORKS: Introduction - Biological Neuron - Artificial Neuron - Basic concepts of Neural Networks - Basic Models of ANN Connections - McCulloch-Pitts Model - Characteristics of ANN - 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),

UNIT - II

SUPERVISED LEARNING NETWORKS: Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules - Types of Application Perceptron Network - Perceptron Learning Rule – Architecture - Perceptron Training Algorithm - ADALINE, MADALINE - Back Propagation Network - BP Learning Rule, Input Layer Computation, Hidden Layer Computation, Output Layer Computation - Radial Basis Function.

UNIT - III

ASSOCIATIVE MEMORY NETWORK: Training Algorithms for Pattern Association - Auto Associative Memory Network - Hetero Associative Memory Network – Bidirectional Associate Memory - Hopfield Networks.

UNIT - IV

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 - Defuzzification to crisp sets - Defuzzification methods.

UNIT - V

GENETIC ALGORITHMS: Introduction - Basic Operators and Terminologies in GA - Traditional Vs Genetic Algorithm - Encoding, Fitness Function, Reproduction, Crossover, Mutation Operator.
Applications to Electrical Systems: ANN based Short term Load Forecasting - Load flow Studies - Fuzzy logic based Unit Commitment and Genetic Algorithm based Economic Dispatch.

TEXT BOOKS:

1. Sivanandam.S.N and Deepa.S.N, Principles of Soft Computing, Wiley India, 2nd Edition, 2007.
2. Rajasekharan and Pai, Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and Applications, PHI Publications, 2nd Edition, 2017.

REFERENCES BOOKS:

1. James A Freeman and Davis Skapura, Neural Networks, Pearson Education, 2002.
2. Solving the unit commitment problem using Fuzzy Logic, Assad Abu-Jasser: International Journal of Computer and Electrical Engineering, Vol. 3, No.6, December 2011.
3. Short term load forecasting using Artificial Neural Network: A comparison with Genetic Algorithm Implementation, Pradeepta Kumar Sarangi, Nanhay Singh, R.K.Chauhan and Raghuraj Singh: ARPN Journal of Engineering and Applied Sciences, Vol. 4, No. 9, November 2009.
4. Economic dispatch solution using a Genetic Algorithm based on Arithmetic crossover, T.Yalcinoz, H.Altun and M.Uzam: IEEE Porto Power Tech Conference, 10th – 13th September 2001.

Mapping of CO’s- PO’s-PSO’s

Course Outcome	Program Outcomes												Program Specific 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	--	2	--	--	--	--	--	--	--	--	3	3	3
CO3	3	2	3	1	2	--	--	--	--	--	--	--	2	3	2
CO4	3	3	2	3	3	--	--	--	--	--	--	--	2	3	3
CO5	3	2	3	2	1	--	--	--	--	--	--	--	3	3	2
Average	3.00	2.60	1.6	2	1.2	0.00	0.00	0.60	0.00	0.00	0.00	0.00	2.60	3.00	2.60
Level of Correlation of the Course	3	3	2	2	1								3	2	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech – II Semester (EEE)

L	T	P	C
3	0	0	3

20AEE36 DIRECT ENERGY CONVERSION SYSTEMS

(Professional Elective - II)

COURSE OUTCOMES:

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

CO1: Interpret concepts of basic physics to predict solar radiation using empirical relations

CO2: Apply the single and multi crystals manufacturing technologies in photovoltaic

CO3: Design and develop PV modules based on electrical and environmental conditions

CO4: Interpret the knowledge PV systems for applications in power systems

CO5: Apply energy carrier concepts to fuel cell technologies for domestic and industrial applications

UNIT-I

SOLAR ENERGY :

Energy Balance of the earth – The Greenhouse effect – Physical Source of sunlight – Planck's black-body radiation distribution from different black body temperatures – The earth and Solar Constant – Spectral distribution of extra-terrestrial radiation – Basic earth-sun angles – Solar time and equation of time – attenuation of solar radiation by the atmosphere – Direct and diffuse radiation at the ground – Empirical equations for predicting the availability of solar radiation.

UNIT-II

PHOTO VOLTAICS:

Photovoltaics (PV): Semiconductor physics and Operating principle – Silicon as PV material - Direct and indirect band-gap material – Flow of Silicon material – Single crystal Silicon Solar cell – Structure – Important electrical parameters – Ideal and approximate equivalent circuits - Manufacturing processes (wafer and cell) of single crystal, multi-crystalline and Edge Defined Film Fed Growth Silicon - Temperature and Irradiation effects.

UNIT-III

PV MODULES AND ARRAYS:

Design requirements of PV modules – Rating of PV modules – Standard Test Conditions (STC), Normal Operating Cell Temperature (NOCT) and Standard Operating Conditions (SOC) – Output curves ('Current Voltage' or 'I-V' and 'Power-Voltage' or 'P-V') under various irradiance and temperature conditions – Mounting structure for PV modules/arrays – Orientation and array layout – Effects of shading - Other balance of systems (BOS) and protective devices: blocking and bypass diodes, movistors – Roof mounted arrays – Building integrated PV (BIPV)

UNIT –IV

PV BASED POWER SYSTEMS:

Stand alone and grid connected – Load estimation – Daily load demand – Solar radiation/irradiance table for a particular location - Sizing of the PV array, battery, inverter and other BOS – Maximizing efficiency of sub-systems – Balance of systems – Single axis and two axis tracking at optimum inclination of the PV array – Power conditioning and control.

UNIT-V

FUEL CELL TECHNOLOGIES:

Advantages of hydrogen as an energy carrier – Components of the hydrogen economy - Generation of hydrogen - Transport and storage of hydrogen: physical and chemical - Fuel Cells – Classification of fuel cells based on (a) Type of electrolyte (b) Type of the fuel and oxidant (c) operating temperature (d) application and (e) chemical nature of electrolyte

TEXT BOOKS:

1. Solar Electricity /Edited by Tomas Markvart/John Wiley and Sons.
2. Solar Cells – Operating Principles, Technology and System Applications /Martin A.Green/Prentice Hall Inc.

REFERENCE BOOKS:

1. Modelling Photovoltaic Systems using P Spice/Luis Castaner and Santiago Silvestre/John Wiley and Sons
2. Solar Energy – Fundamentals and Applications/H.P. Garg and J. Prakash/Tata McGraw-Hill

Mapping of CO’s- PO’s-PSO’s

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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	3
CO3	3	2	3	2	--	--	--	--	--	--	--	--	2	3	3
CO4	3	3	2	3	--	3	--	--	--	--	--	--	2	3	3
CO5	3	2	2	2	--	3	--	--	--	--	--	--	3	3	2
Average	3.00	2.60	1.4	2.60	0.00	1.20	0.00	0.00	0.00	0.00	0.40	1.20	2.60	3.00	2.80
Level of Correlation of the Course	3	3	1	3		1						1	3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech – II Semester (EEE)

L	T	P	C
3	0	0	3

20AEE37 INSTRUMENTATION

(Professional Elective - II)

COURSE OUTCOMES:

After completion of the course student will be able to

CO1: Demonstrate Knowledge of Characteristic parameters of various measuring instruments.

CO2: Analyze the performance characteristics of various measuring instruments

CO3: Apply the different types of application in various measuring instruments

CO4: Demonstrate various types of transducers, signal analyzers, storage oscilloscopes and its applications.

CO5: Develop skills to evaluate various non electrical quantities and performance characteristics of measuring instruments.

UNIT-I

CHARACTERISTICS OF SIGNALS AND THEIR REPRESENTATION: Measuring Systems, Performance Characteristics, - Static Characteristics, Dynamic Characteristics; Errors in Measurement – Gross Errors, Systematic Errors, Statistical Analysis of Random Errors. Signal and Their Representation: Standard Test, Periodic, A periodic, Modulated Signal, Sampled Data, Pulse Modulation and Pulse Code Modulation.

UNIT-II

DATA TRANSMISSION, TELEMETRY AND DAS: Methods of Data Transmission – General Telemetry System. Frequency Modulation System (FM), Pulse Modulation (PM), Pulse Amplitude Modulation (PAM), Pulse Code Modulation (PCM) Telemetry. Comparison of FM, PM, PAM and PCM. Analog and Digital Acquisition Systems – Components of Analog DAS – Types of Multiplexing Systems: Time Division and Frequency Division Multiplexing – Digital DAS – Block Diagram — Modern Digital DAS (Block Diagram)

UNIT-III

SIGNAL ANALYZERS: Wave Analyzers- Frequency Selective Analyzers, Heterodyne, Application of Wave Analyzers and Harmonic Analyzers, Total Harmonic Distortion, Spectrum Analyzers, Basic Spectrum Analyzers, Spectral Displays, Vector Impedance Meter, Q Meter. Peak Reading and RMS Voltmeters Digital Voltmeter-Successive Approximation, Ramp and Integrating Type-Digital Frequency Meter-Digital Multimeter-Digital Tachometer

UNIT-IV

TRANSDUCERS: Definition of Transducers, Classification of Transducers, Advantages of Electrical Transducers, Characteristics and Choice of Transducers; Principle Operation of Resistor, Inductor, LVDT and Capacitor Transducers; LVDT Applications, Strain Gauge and Its Principle of Operation, Gauage Factor, Thermistors, Thermocouples, Synchros, Piezo Electric Transducers, Photovoltaic, Photo Conductive Cells, Photo Diodes.

UNIT-V

MEASUREMENT OF NON-ELECTRICAL QUANTITIES: Measurement of strain, Gauge Sensitivity, Displacement, Velocity, Angular Velocity, Acceleration, Force, Torque, Temperature, Pressure, Flow, Liquid level.

TEXT BOOKS:

1. A.K. Sawhney, A course in Electrical and Electronic Measurements and Instrumentation, Dhanpat Rai & Co, 2015.
2. D.V.S Murthy, Transducers and Instrumentation, Prentice Hall of India, 2nd Edition, 2008.

REFERENCE BOOKS:

1. H.S.Kalsi, Electronic Instrumentation, Tata MC Graw-Hill, 3rd Edition, 2010.
2. A.D Helfrick and W.D.Cooper, Modern Electronic Instrumentation and Measurement techniques, Pearson/Prentice Hall of India, 1st Edition, 2016.
3. T. R. Padmanabhan, Industrial Instrumentation – Principles and Design, Springer, 2000.

Mapping of CO’s- PO’s-PSO’s

Course Outcome	Program Outcomes												Program Specific 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	--	--	--	--	--	--	--	3	3	3
CO3	3	2	3	2	2	--	--	--	--	--		--	2	2	3
CO4	3	3	2	3	3	--	--	--	--	--	--	--	2	3	3
CO5	3	2	2	2	--	--	--	--	--	--	--	--	3	3	2
Average	3.00	2.60	1.4	2	1.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.60	2.80	2.80
Level of Correlation of the Course	3	2	1	2	2								3	3	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech – II Semester (EEE)

L	T	P	C
3	0	0	3

20AEE38 ELECTRICAL MACHINE DESIGN

(Professional Elective -II)

COURSE OUTCOMES

After completion of the course student will be able to

CO1: Understand the principle of machine design by analysing different mechanical and electrical parameters

CO2: Develop capability to choose and design the parameters of DC Machines

CO3: Develop capability to design the different mechanical and electrical parameters of Transformers, Induction and synchronous machines

CO4: Analyze the design aspects of DC and AC machines under specific loading conditions

CO5: Apply computer aided techniques in the design of Electrical machines.

UNIT - I

PRINCIPLES OF ELECTRICAL MACHINE DESIGN

General design considerations - specifications of machines - types of enclosures - types of ventilation - heating - short time rating - overload capacity - temperature rise time curve - hot spot rating. Magnetic circuit calculation - calculation of field ampere turns - air gap MMF - effect of slot and ventilating duct - active iron length – MMF for teeth - real and apparent flux densities – MMF per pole Magnetic Leakage Calculation- Effects of Leakage. Armature Leakage –Components. Unbalanced Magnetic Pull-Practical aspects of unbalanced magnetic pull.

UNIT - II

DESIGN OF DC MACHINES

DC Machine output equation - specific loading - choice of speed and no of poles - calculation of main dimensions - choice of type of winding - number of slots - number of conductors per slot-current density - conductor section - slot insulation - 8 15% length of air gap - design of field winding - conductor cross section - height of pole - design of inter pole - flux density under inter pole - calculation of turns of inter polar winding – design of compensating winding – brushes and commutators.

UNIT - III

DESIGN OF AC MACHINES: Single phase and three phase transformers - distribution and power transformers - output equation - core design - window area - window space factor - overall dimensions of core. Windings – no. of turns - current density - conductor section - Cooling of transformers Design of three phase induction motors - main dimensions - stator design - squirrel cage and slip ring types - number of stator and rotor slots - rotor bar current - design of rotor bar - end ring current - design of end ring - design of slip ring rotor winding.

UNIT - IV

DESIGN OF SYNCHRONOUS MACHINES

specific loading - output equation - main dimensions - types of winding - number of turns - number of slots and slot design - field design for water wheel and turbo alternators - cooling of alternators.

UNIT - V

COMPUTER AIDED MACHINE DESIGN

Analysis and synthesis methods -hybrid techniques. Introduction to Finite element method - historical background, applications, advantages. Study of new computer aided machine software using Finite Element

TEXTBOOKS:

1. A K Sawhney, "A Course in Electrical Machine Design", Dhanpat rai and sons, Delhi.
2. R. K. Agarwal, "Principles of Electrical Machine Design", Essakay Publications, Delhi.

REFERENCE BOOKS:

1. M. V. Deshpande, "Design and Testing of Electrical Machines", Wheeler Publishing.
2. Ramamoorthy M, "Computer Aided Design of Electrical Equipment", East-West Press.
3. M. N. O. Sadiku, " Numerical techniques in Electromagnetics", CRC Press Edition-2001

MAPPING OF CO'S- PO'S-PSO'S

Course Outcome	Program Outcomes												Program Specific 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	--	--	--	--	--	--	--	--	3	3	3
CO3	3	2	3	3	--	--	--	--	--	--	2	2	2	3	3
CO4	2	3	2	2	2	3	--	--	--	--	--	2	2	3	3
CO5	3	2	2	3	3	3	--	--	--	--	--	2	3	3	2
Average	2.80	2.60	2	2.2	0.00	1.20	0.00	0.00	0.00	0.00	0.40	1.20	2.60	3.00	2.80
Level of Correlation of the Course	3	3	2	2		1						1	3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech – II Semester (EEE)

L	T	P	C
3	0	0	3

20AEE39 MODELING OF POWER SYSTEM COMPONENTS

(Professional Elective -II)

COURSE OUTCOMES:

After completion of the course student will be able to

CO1: Develop power system components modeling and analyze their performance

CO2: Analyze the modeling of synchronous machine and its performance

CO3: Apply the steady state and dynamic analysis of synchronous machine using simulation.

CO4: Analyze configuration and functioning of synchronous machine excitation system.

CO5: Analyze the load and transmission modeling.

UNIT-I

MODELING OF POWER SYSTEM COMPONENTS:

The need for modeling of power system, different areas of power system analysis. Models of non-electrical components like boiler, steam & hydro-turbine & governor system. Transformer modeling such as auto-transformer, tap-changing & phase shifting transformer.

UNIT-II

SYNCHRONOUS MACHINE MODELING:

Model required for steady-state analysis. The development of model required for dynamic studies. The current & flux linkage models using Park's transformation leading to simulation as linear model.

UNIT-III

ANALYSIS OF SYNCHRONOUS MACHINE MODELING:

Synchronous machine connected to an infinite bus, its simulation for steady-state condition.

UNIT-IV

EXCITATION SYSTEMS:

Simplified view of excitation control. Excitation configuration, primitive systems, Definitions of voltage response ratio & exciter voltage ratings.

UNIT-V EXCITATION SYSTEM MODELING:

Excitation control systems using dc generator exciter, alternator-rectifier, alternator SCR, and voltage regulators such as electro-mechanical and solid state. Modeling of excitation systems. **Transmission line, SVC and load modeling:** Transmission line modeling, Modeling of static V AR compensators, load modeling.

TEXTBOOKS

1. P. Kundur, “Power System Stability and Control”, McGraw-Hill, 1993.

2. R.Ramunujam,” Power System Dynamics Analysis and Simulation, PHI Learning Private Limited, New Delhi, 2009.

REFERENCE BOOKS

1. Electric Power Systems: B.M. Weddy and B.J. Cory, John Wiely and Sons, Fourth edition (2002).

2. Power System Analysis and Design :J. Duncan Glover, MulukutlaS. Sarma, Thomson Brooks/cole/ Third Edition (2003)

Mapping of CO’s- PO’s-PSO’s

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	--		-	-	-	-	-	-	-	3	2	2
CO2	3	3	2	2		-	-	-	-	-	-	-	3	2	2
CO3	3	3	2	3	3	-	-	-	-	-	-	-	3	2	2
CO4	3	2	--	2	2	-	-	-	-	-	-	-	3	2	3
CO5	3	2	3	3	1	-	-	-	-	-	-	-	3	2	3
Average	3.00	2.60	1.80	2	1.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.00	2.00	2.40
Level of Correlation of the Course	3	2	2	2	1							3	3	2	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

II B.Tech I Semester CSE, IT, CSE (AI&ML), & CSE (DS)

III B.Tech II Semester EEE

L	T	P	C
3	0	0	3

20ACS08 – RELATIONAL DATABASE MANAGEMENT SYSTEMS

(Open Elective-II)

COURSE OUTCOMES

At the end of the course the student will be able to:

CO1: Demonstrate the basic elements of a relational database management system.

CO2: Design entity relationship model and convert entity relationship diagrams into RDBMS and formulate SQL queries.

CO3: Apply the concepts of ER-modelling and normalization to design practical data models

CO4: Analyze transaction processing, concurrency control and storage methods for database management.

UNIT –I

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

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

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

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

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.

Mapping of CO's- PO's-PSO's

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

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

III B.Tech I Semester ECE

III B.Tech II Semester EEE

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

20AEC24 NANOTECHNOLOGY AND APPLICATIONS

(Open Elective-II)

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 nano technology 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 ofNano 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 livingSystems, 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. Rathand James Munday, University Press-IIM.
2. Fundamentals of nanotechnology – Gabor L. Hornyak, John J. Moore, H.F. Tibbals, Joydeep dutta, 1stEdition, CRC Press Dec 22,2008 (II & III unit)
3. Introductionto Nanotechnology– Charles P. Poole, Jr., and Frank J. Owens, Wley India Edition, 2012.

REFERENCES BOOKS:

1. Nano: The Essentials by T. Pradeep, Mc Graw- Hill Education. Nanomaterials, Nanotechnologies andDesign by Michael F. Ashby, Paulo J. Ferreira and Daniel L. Schodek.
2. Transport in Nano structures- David Ferry, Cambridge University press 2000

Mapping of CO’s- PO’s-PSO’s

Course Outcome	Program Outcomes												Program Specific 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	0.5	-	0.5	-	-	-	-	-	-	-	3	-	-
Level of Correlation of the Course	3	2	1		1	-	-	-	-	-	-	-	3	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B.Tech I Semester ME, ECE

III B.Tech II Semester EEE

L	T	P	C
3	0	0	3

20AEC25 MEMS AND NEMS
(Open Elective-II)

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 OF MEMS AND MICROSYSTEMS:

Introduction to MEMS and Microsystems, Typical MEMS and Microsystems products, Evolution of Micro fabrication, Microsystems and Microelectronics, The Multidisciplinary nature of Micro system 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:

Micro sensors: 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 Micro fluidics.

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,LIGA and 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 ofMEMS" Pearson Education India Limited, 2009.

REFERENCES:

1. Marc Madou, "Fundamentals ofMicrofabrication" CRC press 2002.
2. Stephen D. Senturia, "RF Microelectronics", Kluwer Academic Publishers, 2001.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	3	-	-	-	-	-	-	-	-	2	-	2
CO2	3	3	3	2	-	-	-	-	-	-	-	-	-	2	2
CO3	3	1	3	3	-	-	-	-	-	-	-	-	2	2	-
CO4	3	3	3		-	-	-	-	-	-	-	-	2	-	2
Average	2.75	2.25	3	2	-	-	-	-	-	-	-	-	2	1	2
Level of Correlation of the Course	3	2	3	2	-	-	-	-	-	-	-	-	2	1	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech – II Semester (EEE)

L	T	P	C
3	0	0	3

20AEE40 SOLAR POWER PLANT DESIGN

(Job Oriented Elective -II)

COURSE OUTCOMES:

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

CO1: Understand the design aspects of Photovolataic systems..

CO2: Interpret the site inspection considerations, shade calculations and roof assessments for the design of solar installations.

CO3: Enumerate system sizing considerations and calculation for the the integration of power electronic systems.

CO4: Analyze electrical considerations for the solar electrical systems.

CO5: Analyze aesthetics recommendations and tools for PV planning.

UNIT –I

SOLAR DESIGN BASICS:

Initial Site Inspection, Shade Calculations, Roof Assessments, Solar Panel Location and Spacing, Floodplains, Power Line and Battery Locations, Circuit Boxes, Pros and Cons of Rooftop Systems, Ground Mounts and Building Integrated PV, Large Commercial, Community, and Utility-Scale Solar.

UNIT –II

SOLAR DESIGN CONSIDERATIONS:

Load, Efficiency, Wind Loading, Lag Bolt Calculations, Weight Loading, Measuring Excess Capacity, Ballast System, System Sizing Calculation, Full Sun Hours Chart, Efficiency Calculation,

UNIT –III

SOLAR ELECTRICAL SYSTEM DESIGN - I:

Load and Size, Inverters and Solar Panels, Code, String Size, Pathways, and Module Curves, Temperature Coefficient, Inverter Capacity, Types of Inverters.

UNIT –IV

SOLAR ELECTRICAL SYSTEM DESIGN - II:

System Design Calculation, Voltage Drop Overview, Wire Run and Voltage Drop, Ampacity, Conduits in Different Scenarios, Managing Current, Shut Off. Evaluating Loads, Trina Spec Sheet, Calculating Voltage Change.

UNIT –V

SOLAR RECOMMENDATIONS:

Voltage Drop Calculation, De-Rating Calculations, Ampacity Calculation, Ambient Temperature Adjustments, Micro-Inverter, PV Aesthetics, Codes, Clean Energy Goals, and Costs, Design Considerations, Planning Calculations , Planning Tools.

TEXT BOOKS:

1. Dr. Dharmendra singh & Nikhil yadav, Designing & Application Of Solar System, Standard Book House, 1st edition, 2021.
2. Peter Gevorkian, Large-Scale Solar Power System Design, McGraw Hill; 1st edition, 2011.

REFERENCES:

1. H Garg & J Prakash, Solar Energy: Fundamentals and Applications, McGraw Hill; 1st edition, 2017.
2. Taleb Al-theanat, Solar Power Systems Design: From the Sun into Electricity, GIEE, 1st edition, 2017.

MAPPING OF CO'S- PO'S-PSO'S

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	--	-	--	--	--	--	--	--	3	3	3
CO2	3	3	3	3	--	--	--	--	--	--	--	--	3	3	3
CO3	3	2	3	2	2	--	--	--	--	--		2	2	2	2
CO4	3	3	2	3	2	--	--	--	--	--	--	1	2	3	3
CO5	3	2	3	2	3	--	--	--	--	--	--	2	3	3	2
Average	3.00	2.60	2.4	2.4	1.8	0.00	0.00	0.00	0.00	0.00	0.00	1	2.60	2.80	2.60
Level of Correlation of the Course	3	3	3	3	2							1	3	2	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech – II Semester (EEE)

L	T	P	C
3	0	0	3

20AEE41 ELECTRICAL SUBSTATIONS AND SWITCH YARDS

(Job Oriented Elective -II)

COURSE OUTCOMES

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

CO1: Apply safety rules for substation and its maintainence

CO2: Understand the Substation Earthing and neutral grounding

CO3: Analyze the design aspects of 11 KV, 33KV and 132 KV Substation.

CO4: Analyze the maintainence issues of 11 KV, 33KV and 132 KV Substation.

CO5: Interpret the single line diagram for gas insulated Substation.

UNIT I:

SUBSTATION – SITE SELECTION

Select the site for substation for the given /situation with justification-Classify the substation based on the given/situation-Interpret of symbols used in the given single line diagram-Describe the procedure to maintain the earth resistance as per IE rules for the given data/situation-Describe the procedure to undertake the relevant safety practices in substation for the given data/Situation.

UNIT II

DESIGN ASPECTS OF 11KV SUBSTATION

Draw the layout diagram for the pole mounted/plinth mounted substation for the given data/situation-Interpret the given single line diagram of the pole mounted /plinth mounted substation for the given data / situation – Select the relevant equipment and accessories required for the 11KV pole mounted substation for the given data /situation with justification-Describe the procedure to measure the insulation resistance earth resistance as per IS for the pole mounted / plinth mounted substation for the given data / situation- Describe the procedure to undertake the relevant safe routine / preventive maintenance for the specified 11KV substation equipment – Describe the procedure to maintain the given 11KV equipment.

UNIT III :

DESIGN ASPECTS OF 33KV SUBSTATION

Draw the layout diagram for the 33KV Substation for the given data/ situation- Interpret the given single line diagram of the 33KV substation for the given data / Situation- Select the relevant equipment and accessories required for the 33KV data / situation with justification- Describe the procedure to undertake the relevant safe routine / preventive maintenance for the BDV of the transformer oil for the given data/ Situation- Describe the procedure to use the relevant firefighting equipment for the given situation - Describe the procedure to maintain the given 33KV equipment.

UNIT IV :

DESIGN ASPECTS OF 132KV SUBSTATION

Interpret the given single line diagram of the 132KV substation for the given data / situation – Select the relevant equipment and accessories required for the given data / situation for the given data / situation with justification- Describe the procedure to undertake the relevant safe routine / preventive maintenance for the given 132 KV substation equipment - Describe the procedure to use the relevant firefighting equipment for the given situation - Describe the procedure to maintain the given components of the 132KV substation - Describe the procedure to locate and record the hot spots in 132KV substation

UNIT V:

GIS EQUIPMENT

Interpret the single line diagram of the GIS for the given data / situation – Describe the function of the given parts of the GIS – Describe the procedure to undertake the relevant safe routine / preventive maintenance for the given GIS equipment – Describe the procedure to use the relevant firefighting equipment for the given situation- Describe the procedure to maintain the given GIS equipment

TEXT BOOKS:

1. Generation of Electrical Energy, Gupta. B.R, Eurasia Publishing House (PVT), LTD, 1996. ISBN:81-219-0102-2.
2. Principles of Power System, Mehta.V.K., S.Chand & Co Ltd, New Delhi 2011, ISBN: 81-219-0594-X .
3. A Course in Electrical Power , Soni.M.L.Gupta.P.V.U.S.Bhatnagar, Dhanpat Rai & Co(P) Ltd., New Delhi 2016, ISBN:9788177000207.

REFERENCE BOOKS:

1. Switchgear protection and Power Systems, Sunil S.Rao, Khanna Publisher, New Delhi,2008, ISBN: 978-8174092328.
2. Power Plant Engineering, Nagpal, G.R.S.C. Sharma, Khanna Publishers-Delhi, 2012, ISBN: 978-8174093097.

MAPPING OF CO'S- PO'S-PSO'S

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	_	_	_	_	_	_	_	_	2	3	2	2
CO2	3	2	2	2	2	_	_	1	_	_	_	2	2		3
CO3	2	2		1	-	2	_	_	_	_	_	_	1	1	_
CO4	3	2	1	_	_	_	_	_	_	_	_	1	1	1	3
CO5	3	2	1	_	_	_	_	_	_	_	_	1	1	1	3
Average	2.80	2.00	1.00	0.60	0.40	0.40	0.00	0.20	0.00	0.00	0.00	1.00	1.60	1.00	2.20
Level of Correlation of the Course	3	2	1									1	2	2	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech – II Semester (EEE)

L	T	P	C
0	0	3	1.5

20AEE42 POWER ELECTRONICS AND SIMULATION LAB

COURSE OUTCOMES:

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

CO1: Analyze semiconductor devices and compare performance of various power semiconductor devices, passive components and switching circuits.

CO2: Analyze switching sequence and operation of AC to DC, DC to AC and AC to AC converters

CO3: Interpret the operation of single phase converters to realize the switching sequence and operation of three phase converters

CO4: Design power converter circuit for the speed control of Induction machines

CO5: Design and Analyze the converter circuits in digital simulation environment.

List of Experiments

1. Characteristics of SCR, MOSFET & IGBT.
2. Gate firing circuits for SCR's- R, RC and UJT firing circuits.
3. Single Phase Half wave & controlled rectifier with R & RL load.
4. Single Phase Cycloconverter with R and RL loads.
5 Single phase Full Bridge Inverter with R and RL loads.
6. Three phase half and full controlled bridge converter with R & RL loads
7. Closed loop speed control of DC shunt motor using single phase control rectifier
8. Speed control of inverter fed single phase induction motor
9. Buck & Boost converter with R and RL loads.
10. Speed control of single phase Cycloconverter fed induction motor
11. PSPICE simulation of single phase full converter using RLE loads and single phase AC voltage controller using RLE load
12. Simulation of single phase two level PWM inverter.
13.PSPICE Simulation of switch mode regulators

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	--	-	--	--	2	--	--	--	3	3	3
CO2	3	3	3	3	2	--	--	--	3	--	--	--	3	3	3
CO3	3	2	3	2	2	--	--	--	2	--		2	2	2	2
CO4	3	3	2	3	--	--	--	--	3	--	--	1	2	3	3
CO5	3	2	3	2	--	--	--	--	3	--	--	--	3	3	2
Average	3.00	2.60	2.80	2.60	0.80	0.00	0.00	0.00	2..6	0.00	0.00	0.60	2.60	2.80	2.60
Level of Correlation of the Course	3	3	3	3	1				3				3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMUS)

III B.Tech I Semester (ECE)

III B.Tech – II Semester (EEE)

L	T	P	C
0	0	3	1.5

20AEC27 MICROPROCESSORS AND MICROCONTROLLERS LAB

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: Apply 8051 Assembly Language Programs.

CO5: Use built-in timer of 8051 Microcontroller

List of Experiments

Part - A (Minimum 7 Experiments to be conducted)

8086 Microprocessor Programs using MASM/TASM SoftwareBy 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 ASCIIconversion.
8. String Operations-Move block, Reverse string, String comparison, Lengthofstring.
9. ALPs (8086) for (i) DOS interrupts (ii)

BIOS interrupts **<u>Part - B (Minimum 2 Experiments to be conducted)</u>** Interfacing Programs using 8086:

1. ALPs (8086) for generating ramp wave, triangular wave, and stair case wave forms using DAC.
2. ALP (8086) for traffic light controller.
3. ALP (8086) for stepper motor control.

<u>Part - C (Minimum 3 Experiments to be conducted)</u>

8051 Microcontroller:

1. (a) ALP (8051) to determine the addition

   (a) ALP (8051) to determine the subtraction
2. (a) ALP (8051) to determine the largest of N bytes

   (b) ALP (8051) to determine the smallest of N bytes.
3. (a) ALP (8051) to multiply a 16-bit number by an 8-bit number.

   (b) ALP (8051) to find square root of an 8-bit number.
4. (a) ALP (8051) to determine LCM of two 8- bit numbers.

   (b) ALP (8051) to determine GCD of two 8- bit numbers.
5. (a) ALP (8051) to generate even numbers.

   (b) ALP (8051) to generate odd numbers.
6. Timer/Counters (8051) in different modes.

MAPPING OF CO'S- PO'S-PSO'S

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	-	-	-	2	-	-	3	3	3	3
CO2	3	3	3	3	-	-	-	-	2	-	-	3	3	3	3
CO3	3	3	-	-	-	-	-	-	2	-	-		2	3	3
CO4	3	3	3	3	3	-	-	-	3	-	-	3	2	3	2
CO5	3	3	3	3	-	-	-	-	3	-	-	3	3	3	2
Average	3	3	2.4	2.4	1.2	-	-	-	2	-	-	2.4	2.60	3.00	2.60
Level of Correlation of the Course	3	3	3	3	1	-	-	-	2	-	-	3	3	3	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B.Tech – II Semester (EEE)

L	T	P	C
0	0	3	1.5

20AEE43 ELECTRICAL POWER SYSTEMS AND SIMULATION LAB

COURSE OUTCOMES:

After successful completion of the course student will be able to

CO1: Demonstrate knowledge about electrical circuits.

CO2: Simulate different types of Converters and controller for various loads using PSPICE and MATLAB.

CO3: Analysis of time domain, frequency domain and steady state error of second order equations.

CO4: Explain-single and two area control and speed control of AC and DC machines.

CO5: Simulate different types of Converters and controller for various loads using MATLAB.

LIST OF EXPERIMENTS

Any TEN experiments are required to be conducted:

1. PSPICE simulation of DC circuits (Thevenin's equivalent, Transfer function).
2. PSPICE simulation of transient and parameter analysis of RLC circuits to an input
   i) Pulse ii) Step and iii) sinusoidal signals
3. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system using MATLAB
4. Time domain analysis of second order system-Determination of time domain specifications and steady state error using MATLAB.
5. PSPICE simulation of single phase full converter using RLE loads and single phase AC voltage controller using RLE loads
6. Simulation of Dynamical systems (Single area and Two area power systems) using SIMULINK
7. Simulation of speed control of separately excited dc motor using MATLAB Simulink.
8. Simulation of single phase two level PWM inverter.

9. PSPICE Simulation of switch mode regulators
10. Analysis of 3-phase circuit representing the generator transmission line and load. Plotting three phase currents & Neutral current using PSPICE
11. Simulation of RL & RC series circuits.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	--	-	--	--	2	--	--	--	3	3	3
CO2	3	3	3	3	3	--	--	--	2	--	--	--	3	3	3
CO3	3	2	3	2	2	--	--	--	2	--		2	2	2	2
CO4	3	3	2	3	2	--	--	--	3	--	--	1	2	3	3
CO5	3	2	3	2	2	--	--	--	3	--	--	2	3	3	2
Average	3.00	2.60	2.80	2.60	1.8	0.00	0.00	0.00	2.6	0.00	0.00	1.00	2.60	2.80	2.60
Level of Correlation of the Course	3	3	3	2	2				3			1	3	2	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech – II Semester (EEE)

L	T	P	C
1	0	2	2

20AEE44 SWITCH GEAR AND PROTECTION

(Skill Oriented course)

COURSE OUTCOMES:

After successful completion of the course student will be able to

CO1: Demonstrate the different type of relays.

CO2: Analyze the field of power system protection and circuit breakers

CO3: Analyze the transformer and generator protection

CO4: Demonstrate the performance of switchgear devices

CO5: Identify the transmission lines fault and analyze the transient stability.

List of Experiments:

1. Differential protection of Transformer.
2. Electro mechanical type 3 – Q over current relay.
3. Directional over current relay.
4. Electro mechanical type over voltage relay.
5. Electro mechanical type under voltage relay.
6. Earth fault relay.
7. Fault analysis of 3 phase alternator (LG, LL, LLG and LLLG Faults).
8. Analyze the different types of fuses used in protection scheme.
9. Analyze the characteristics of Transient stability and fault analysis in transmission line.
10. Analyze the characteristics of different types of circuit breakers.

TEXT BOOKS:

1. Badari Ram, Viswakarma.D.N, Power System Protection and Switchgear, Tata MC Graw Hill Publications, 2nd Edition, 2011.
2. A.Chakrabarti, M.L.Soni, P.V.Gupta, U.S.Bhatnagar, A Text Book on Power system Engineering, Dhanpat Rai & Co. Pvt Ltd, 2nd Edition, 2009.

REFERENCES:

1. Wadhwa.C.L, Electrical Power Systems, New Age international (P) Limited, 6th Edition, 2010.
2. Bhuvanesh Oza, Power System protection and switch gear, Tata MCGraw Hill, 2010.
3. Paithankar.Y.G, Transmission network protection, Taylor and Francis, 2009

MAPPING OF CO'S- PO'S-PSO'S

Course Outcome	Program Outcomes												Program Specific 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
CO3	3	3	3	3	--	3	--	--	3	--	--	2	2	3	3
CO4	3	3	2	3	--	3	--	--	3	--	--	2	2	3	3
CO5	3	3	3	2	--	3	--	--	2	--	--	2	3	3	3
Average	3.00	3.00	2.80	2.80	0.00	1.80	0.00	0.00	2.8	0.00	0.00	1.20	2.60	3.00	3.00
Level of Correlation of the Course	3	3	3	3		2					1	1	3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B. Tech II Semester (Common to all Branches)

20AHS23 ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

L	T	P	C
2	0	0	0

COURSE OUTCOMES:

After successful completion of the course student will be able to

CO1: Identify various aspects of Traditional knowledge and its importance.

CO2: Explain briefly to understand the needs and importance of protecting traditional knowledge.

CO3: Analyze the various systems, concepts and strategies of traditional knowledge.

CO4: 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/

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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 of the Course	3	-	-	-	-	3	3	-	-	-	-	-	-	-	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B.Tech – I Semester

L	T	P	C
3	0	0	3

20AEE46 POWER SYSTEM OPERATION AND CONTROL

COURSE OUTCOMES:

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

- **CO1:** Apply optimum solution for generators operation and hydro-thermal scheduling problems.
- **CO2:** Analyze the output parameters variation of the generating system by the modeling of turbine and governor system.
- **CO3:** Interpret the machine modeling to analyze the model of turbine and governors
- **CO4:** Analyze the frequency & tie line control of an isolated power system and two area system.
- **CO5:** Apply the different types of compensating schemes for transmission systems.

UNIT – I ECONOMIC OPERATION OF POWER SYSTEMS

Optimal operation of Generators in Thermal Power Stations - Heat rate curve – cost curve – Incremental fuel and Production costs, Input-Output characteristics, Optimum generation allocation with line losses neglected, Optimum generation allocation including the effect of transmission line losses – Loss Coefficients, General transmission line loss formula.

UNIT – II HYDROTHERMAL SCHEDULING

Optimal scheduling of Hydrothermal System - Hydroelectric power plant models - Scheduling problems - Short term and Long term Hydrothermal scheduling problem.

UNIT – III MODELING OF TURBINE AND GOVERNOR

Modeling of Turbine - First order Turbine model, Block Diagram representation of Steam Turbines and Approximate Linear Models - Modeling of Governor- Mathematical Modeling of Speed Governing System – Derivation ofsmall signal transfer function – Block Diagram.

UNIT – IV LOAD FREQUENCY CONTROL

Necessity of keeping frequency constant - Definitions of Control area – Single area control – Block diagram representation of an isolated power system – Steady state analysis – Dynamic response – Uncontrolled case. Proportional plus Integral control of single area and its block diagram representation - steady state response – Load Frequency Control and Economic dispatch control - Load frequency control of two Area system – uncontrolled case and controlled case, tie-line bias control.

UNIT – V REACTIVE POWER CONTROL

Overview of Reactive Power control – Reactive Power compensation in transmission systems – Advantages and disadvantages of different types of compensating equipment for transmission systems - load compensation – Specifications of load compensator - Uncompensated and compensated transmission lines - shunt and Series Compensation.

TEXT BOOKS:

1. Chakravarthi. A and Halder.S, Power System Analysis Operation and Control,PHI, 3rd Edition, 2010.
2. Nagrath.I.J & Kothari.D.P, Modern Power System Analysis, Tata M Graw – Hill Publishing Company Ltd, 3rd Edition, 2003.

REFERENCE BOOKS:

1. Duncan Glover. J and Sarma. M.S, Power System Analysis and Design, Brooks/Cole Publishing Co, 4th Edition, 2008.
2. Nasar.S.A, Electric Power Systems, Schaum's Outline Series TMH, Revised 1st Edition,1989.
3. Singh.S.N, Electric Power Generation, Transmission and Distribution, PHI, 2nd Edition,2008.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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	3
CO3	3	3	3	3	--		--	--	--	--	--	--	2	3	3
CO4	3	2	2	3	2		--	--	--	--	--	--	2	3	3
CO5	3	2	3	2	3		--	--	--	--	--	--	3	2	3
Average	3.00	2.60	1.6	2.80	1	0.00	0.00	0.00	0.00	0.00	0.00	1.20	2.60	2.80	3.00
Level of Correlation of the Course	3	3	2	3	1					1	1	1	3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B.Tech – I Semester

L	T	P	C
3	0	0	3

20AEE47 UTILIZATION OF ELECTRICAL ENERGY

(Professional Elective -III)

COURSE OUTCOMES:

After successful completion of the course student will be able to

CO1: Design illumination of different lighting systems.

CO2: Understand the concept of electric heating, electric welding and electrolytic process.

CO3: Analyze the selection of appropriate motor for drive applications.

CO4: Apply concepts of electric traction and various methods of electric braking.

CO5: Apply the concepts of Electrical traction to design and analyze speed time curve in Locomotives

UNIT- I ILLUMINATION

Definition – Laws of illumination – Polar curves – Calculation of Mean Horizontal Candle power (MHCP) and Mean Spherical Candle Power(MSCP) LAMPS: Incandescent lamp, Sodium Vapour lamp, LED lamp luminars Fluorescent lamp. Requirement of good lighting scheme – Types, Design and Calculation of illumination - Street lighting and Factory lighting – comparison between Sodium Vapour lamp, LED lamp - Numerical Problems.

UNIT- II ELECTRIC HEATING & WELDING

Advantages - Methods of Electric heating – Resistance, Arc, Induction and Dielectric heating. Types of welding – Resistance, Electric arc, gas welding - Ultrasonic, Welding electrodes of various metals, Defects in welding.

Electrolytic process: Electrolysis - Faradays laws, Application of Electrolysis, Power supply for Electrolysis Lead acid batteries.

UNIT-III ELECTRIC DRIVES

Types of DC and AC Motors and their Characteristics – Applications - Speed Control of DC and AC Motors – Temperature rise and Load Equalization – Selection of Motors.

UNIT- IV ELECTRIC TRACTION–I

Introduction – Systems of Electric Traction - Comparison between AC and DC Traction – Special features of Traction Motors - Methods of Electric Braking – Plugging, Rheostatic and Regenerative types -Mechanics of train movement.

UNIT-V ELECTRIC TRACTION – II

Speed-time curves of different services – trapezoidal and quadrilateral, speed-time curves – Numerical Problems. Calculations of tractive effort, Power, specific energy consumption - effect of varying acceleration and braking retardation - Adhesive weight and coefficient of adhesion – Problems.

TEXT BOOKS:

1. Partab, Art & Science of Utilization of electrical Energy, Dhanpat Rai & Co., 2014.

2. J.B.Gupta, Utilization of Electric Power and Electric traction, S.K.Kataria & sons, 10th Edition, 1968

REFERENCE BOOKS:

1. Openshaw Taylor.E and Rao.V.V.L, Utilization of Electric Energy, Universities Press,Reprint 2006.

2. Suryanarayana.N.V, Utilization of Electrical Power including Electric drives and Electric traction, New Age International (P) Limited, Publishers, 1996.

3. Uppal.S.L, Power systems, 2009.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	1	--	3	1	--	--	--	--	--	3	3	3
CO2	3	1	--	--	--	--	--	--	--	--	--	--	3	2	3
CO3	3	2	1	2	--	--	--	--	--	--	--	--	2	1	3
CO4	3	3	2	3	--	--	--	--	--	--	--	--	2	2	3
CO5	3	2	3	2	--	2	--	--	--	--	--	--	3	3	3
Average	3.00	2.00	1.8	1.6	0.00	1	0.20	0.00	0.00	0.00	0.00	0.00	2.60	2.2	3.00
Level of Correlation of the Course	3	2	2	2		1							3	2	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B.Tech – I Semester

L	T	P	C
3	0	0	3

20AEE48 PIC MICROCONTROLLERS

(Professional Elective -III)

COURSE OUTCOMES:

After successful completion of the course student will be able to

CO1: Interpret the knowledge of microcontrollers to understand the architecture of PIC18 family.

CO2: Analyze the Instructional set and I/O programming in PIC and Flash microcontrollers

CO3: Implement the concept of connecting PIC controllers with various interfacing devices for practical Societal applications.

CO4: Develop program for PIC18 Timers, Serial port and Interrupts using "C" programming.

CO5: Interface LCD, Keyboard, ADC, DAC, Sensors, Relays, DC motor and Stepper motor with PIC18 Microcontroller for digital control of electric drives.

UNIT – I PIC Microcontrollers: Features and Architecture

Microcontrollers and Embedded Processors - Overview of the PIC18 Family -PIN connection - Configuration Registers -The WREG Register in PIC18 - The File Register and access Bank- Use of Instructions with the Default Access Bank - Status Register. Data Format and Directives. The Program Counter and Program ROM Space - RISC Architecture.

UNIT– II Classification of Instructions and I/O Port Programming

Arithmetic Instructions - Signed Number Concepts and Arithmetic Operations - Logic and Compare Instructions - Rotate Instruction and Data Serialization - BCD and ASCII Conversion -Branch Instructions and Looping - Call Instructions and Stack - PIC18 Time Delay and Instruction Pipeline - I/O Port Programming in PIC18 - I/O Bit Manipulation Programming.

UNIT – III PIC18 Programming in C

Data Types and Time Delays in C - I/O Programming in C - Logic Operations in C - Data Serialization in C - Program ROM Allocation in C - Data RAM Allocation in C.

UNIT – IV

PIC18 Programming in C: Timer, Serial Port and Interrupt

Programming Timers 0, 1, 2 and 3 in C - Counter Programming - Basics of Serial Communication - PIC18 connection to RS232 - PIC18 Serial Port Programming in C - PIC18 Interrupts - Programming Timer, External Hardware, Serial communication and Port B change.

UNIT – V

PIC18 Interfacing

LCD Interfacing - Keyboard Interfacing - ADC Characteristics - ADC Programming in the PIC18 - DAC Interfacing - Sensor Interfacing and Signal Conditioning - Relays and Optoisolators - Stepper Motor Interfacing - DC Motor interfacing and PWM.

TEXT BOOKS:

1. PIC Microcontroller And Embedded Systems , Mazidi M. A., McKinlay, R. D., Causey D, Pearson Education International, 2008.
2. PIC Microcontroller ,Gaonkar R. S. ,Penram International Publishing (India) Pvt. Ltd.
3. PIC Microcontrollers – Programming in C ,Verle Milan Mikroelektronika, 1 st Edition, 2009.

REFERENCE BOOKS:

1. PIC Microcontroller, Matic Nebojsa Mikroelektronika, 1st edition 2008.
2. Embedded C Programming and The Microchip PIC, Barnett R. H., Cox S., O'cull L. Cengage; Pap/Cdr edition 2003
3. Design with PIC Microcontrollers, Peatman John B., Pearson Education

Mapping of CO’s- PO’s-PSO’s

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	--	--	--	--	--	--	--	--	--	--	3	1	3
CO2	3	3	--	--	--	--	--	--	--	--	--	--	3	2	3
CO3	3	3	2	3	--	--	--	--	--	--	--	--	2	2	3
CO4	3	2	2	3	--	--	--	--	--	--	--	--	2	3	3
CO5	3	2	3	2	--	--	--	--	--	--	--	--	3	3	3
Average	3.00	2.60	1.4	1.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.60	2.2	3.00
Level of Correlation of the Course	3	3	1	2									3	2	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B.Tech – I Semester

L	T	P	C
3	0	0	3

20AEE49 ENERGY AUDIT CONSERVATION AND MANAGEMENT

(Professional Elective -III)

COURSE OUTCOMES:

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

CO1: Understand the concepts of energy auditing and energy conservation.

CO2: Analyze the Energy efficient motors and lighting instruments.

CO3: Design efficient lighting system for conservation of energy.

CO4: Apply energy economics to develop cash flow model and resolve taxations issues of power systems.

CO5: Develop power exchange models for energy conservation by analyzing economic aspects at the demand side

UNIT- I

INTRODUCTION OF ENERGY AUDITING: Introduction-Energy situation in world and India, energy consumption, conservation, Codes, standards and Legislation. **-** Energy audit- Definitions, concept, types of audit, energy index, cost index, pie charts, Sankey diagrams, load profiles, Energy conservation schemes. Measurements in energy audits, presentation of energy audit results.

UNIT- II

ENERGY EFFICIENT MOTORS: Energy efficient motors- factors affecting efficiency, loss distribution, constructional details, characteristics - variable speed , variable duty cycle systems, RMS hp- voltage variation-voltage unbalance- over motoring- motor energy audit, power factor motor controllers.

UNIT- III

LIGHTING AND ENERGY INSTRUMENTS: Good lighting system design and practice, lighting control ,lighting energy audit - Energy Instruments- wattmeter, data loggers, thermocouples, pyrometers, lux meters, tongue testers , application of Programmable Logic Control(PLC).

UNIT- IV

ENERGY ECONOMIC ANALYSIS: The time value of money concept, developing cash flow models, payback analysis, depreciation, taxes and tax credit – numerical problems.

UNIT- V

DEMAND SIDE MANAGEMENT: Introduction to DSM, concept of DSM, Benefits of DSM, different techniques of DSM – Time of day pricing, Multi-utility power exchange model, time of day models for planning, Load priority technique, peak clipping, peak shifting, valley filling, strategic conservation, energy efficient equipment, Management and Organization of Energy Conservation awareness Programs.

TEXT BOOKS:

1.Paul.O, Callaghan, Energy management, Mc-graw Hill Book Company, 1^{st} Edition, 1998.

2.Murphy, W.R. and Mckay, G.., Energy management, Butter worthpublications, 1^{st} Edition,1982.

REFERENCE BOOKS:

1.John .C. Andreas, Energy efficient electric motors, Marcel Dekker Inc Ltd, 2^{nd} Edition,1995.

2.Arry, C. White, Philip S. Schmidt, David. R,Brown, Industrial Energy managementSystems, Hemisphere Publishing Corporation, New York , 1^{st} Edition, 1994.

3.Pabla, A.S., Electrical Power Distribution, TMH Publishers, 5^{th} Edition, 2004.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific 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	1	3
CO3	3	3	3	2	--	--	--	--	--	--	--	2	2	2	3
CO4	3	2	2	2	--	--	--	--	--	--	--	2	2	2	3
CO5	2	2	3	3	--	--	--	--	--	--	--	2	2	2	3
Average	2.80	2.60	1.6	2.0	0.00	0.00		0.00	0.00	--	--	1.20	2.40	2	3.00
Level of Correlation of the Course	3	3	2	2						1	1	1	3	2	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

IV B.Tech – I Semester

L	T	P	C
3	0	0	3

20AEE50 HIGH VOLTAGE ENGINEERING
(Professional Elective -III)

COURSE OUTCOMES:

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

CO1: Apply concepts of basic power systems in high voltage technologies.

CO2: Analyze the breakdown strength of gas, liquid and solid insulation systems.

CO3: Apply the knowledge of circuits and ac machines to generate high DC and AC impulse voltage and currents

CO4: Interpret the knowledge of high voltage and current to conduct the accelerated tests on electrical apparatus.

CO5: Analyze the performance of dynamic response analysis of high voltage measurement systems.

UNIT-I INTRODUCTION

Introduction to HV technology, Need for generating high voltages in laboratory, Industrial applications in high voltage, Electrostatic precipitation and Separation.

UNIT-II BREAKDOWN MECHANISM OF GASES, LIQUID AND SOLID MATERIALS

Gases as insulating media- Collision process - Ionization process—Townsend's criteria for break down in gases - Paschen's Law -Application of Gases in Power System – Pure and Commercial liquids – Conduction and breakdown in commercial liquids - Suspended Solid Particle Mechanism- Cavity Breakdown-Stressed oil volume theory- Breakdown in Solid dielectrics- Intrinsic breakdown - Electromechanical Breakdown - Breakdown Due to Treeing and Tracking - Thermal Breakdown.

UNIT-III GENERATION OF HIGH D.C. AND A.C. IMPULSE VOLTAGES AND IMPULSE

CURRENTS: Voltage doubler Circuit -Cockroft -Walton Voltage Multiplier Circuit - Electrostatic Generator- Cascaded Transformers- Resonant transformers- Tesla coil- Definitions - Impulse Generator

Circuits -Multistage Impulse Generator Circuit- Impulse Current Generation.

UNIT-IV MEASUREMENT OF HIGH VOLTAGES AND CURRENTS

Generating Voltmeter - Electrostatic Voltmeter - The Chubb-Fortescue Method - Impulse Voltage Measurements using Voltage Dividers – Sphere gap measurement -Measurement of High dc and Impulse Currents- Hall Generators- High Power Frequency Currents - High Frequency and Impulse Currents.

UNIT-V HIGH VOLTAGE TESTING OF ELECTRICAL EQUIPMENT

Testing of Overhead Line Insulators - Testing of Cables -Testing of Bushings - Testing of Power Capacitors - Testing of Power Transformers - Testing of Circuit Breakers.

TEXT BOOKS:

1.M. S. Naidu and V. Kamaraju, High Voltage Engineering, TMH Publications, 4^{th} Edition,2009.

2.C.L.Wadhwa, High Voltage Engineering, NewAge Internationals (P) Limited, 2^{nd}Edition, 2007.

REFERENCE BOOKS:

1.Begamudre.R.D,High VoltageEngineering Problems& Solutions, New AgeInternational Publishers, 1^{st} Edition, 2010.

2.E.Kuffel, W.S.Zaengl, J.Kuffel, High Voltage Engineering: Fundamentals, Elsevier, 2^{nd} Edition, 2008.

3.Alston L. L., High Voltage Technology, Oxford University Press, New Delhi, 1^{st} IndianEdition, 2006.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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	1	3
CO3	3	3		3	2	--	--	--	--	--	--	2	2	2	3
CO4	3	2	2	3	3	--	--	--	3	--	--	2	2	2	3
CO5	2	2	3	2	3	--	--	--	--	--	--	2	3	3	3
Average	2.80	2.60	1	2.80	1.6	0.00	0.00	0.00	0.6	0.00	0.00	1.20	2.60	2.2	3.00
Level of Correlation of the Course	3	3	1	3	2		2					1	3	2	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B.Tech – I Semester

L	T	P	C
3	0	0	3

20AEE51 POWER QULAITY

(Professional Elective -III)

COURSE OUTCOMES:

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

CO1: Analyze power quality issues in connection with standards

CO2: Apply the concepts of transients for sags and swells using voltage regulating devices

CO3: Analyze the harmonic distortion and its mitigation.

CO4: Interpret the knowledge of power systems for power quality assessment and monitoring

CO5: Apply custom power devices towards power quality enhancement for sustainable development

UNIT I

INTRODUCTION: Definition of Power Quality- Power Quality Terminology – Classification of Power Quality Issues-Magnitude Versus Duration Plot - Power Quality Standards - Responsibilities of Suppliers and Users of Electric Power-CBEMA and ITI Curves.

UNIT II

TRANSIENTS, SHORT DURATION AND LONG DURATION VARIATIONS:

Categories and Characteristics of Electromagnetic Phenomena in Power Systems-Impulsive and Oscillatory Transients-Interruption - Sag-Swell-Sustained Interruption - Under Voltage – Over Voltage– Outage. Sources of Different Power Quality Disturbances- Principles of Regulating the Voltage-Conventional Devices for Voltage Regulation.

UNIT III

FUNDAMENTALS OF HARMONICS & APPLIED HARMONICS:

Harmonic Distortion, Voltage Versus Current Distortion, Harmonics Versus Transients, Power System Quality Under Non Sinusoidal Conditions, Harmonic Indices, Harmonic Sources from Commercial Loads, Harmonic Sources from Industrial Loads. Applied Harmonics**:** Effects Of Harmonics, Harmonic Distortion Evaluations, Principles of Controlling Harmonics, Devices for Controlling Harmonic Distortion.

UNIT-IV

POWER QUALITY MONITORING:

Power Quality Benchmarking-Monitoring Considerations- Choosing Monitoring Locations- Permanent Power Quality Monitoring Equipment-Historical Perspective of Power Quality Measuring Instruments- Power Quality Measurement Equipment-Types of Instruments- Assessment of Power Quality Measurement Data- Power Quality Monitoring Standards.

UNITV

POWER QUALITY ENHANCEMENT USING CUSTOM POWER DEVICES

Introduction to Custom Power Devices-Network Reconfiguring Type: Solid State Current Limiter (SSCL)-Solid State Breaker (SSB) -Solid State Transfer Switch (SSTS) – Compensating Type: Dynamic Voltage Restorer (DVR)-Unified Power Quality Conditioner (UPQC)-Principleof Operation Only.

TEXT BOOKS:

1.Electrical Power Systems Quality, Roger C. Dugan, Mark F. McGranaghan, SuryaSantoso,

2.H.Wayne Beaty, Mc Graw Hill Education (India) Pvt. Ltd., 3rd Edition, 2012. Power quality, C. Sankaran, CRC Press, 2001.

REFERENCE BOOKS:

1.Understanding Power quality problems – Voltage Sags and Interruptions, Math H. J. Bollen IEEE Press Series on Power Engineering, WILEY, 2007.

2.Power quality – VAR Compensation in Power Systems, R. Sastry Vedam, Mulukutla S. Sarma, CRC Press, 2009, First Indian Reprint 2013.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific 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		2	--	--	--	--	--	--	--	--	3	3	3
CO3	3	3	2	3	--		2	--	--	--	--	2	2	3	3
CO4	3	2	2	3	--		3	--	--	--	--	2	2	3	3
CO5	2	2	3	2	--		3	--	--	--	--	2	3	3	3
Average	2.80	2.60	1.4	2	0.00	0.00	1.60	0.00	0.00	0.00	0.00	1.20	2.60	3.00	3.00
Level of Correlation of the Course	3	3	1	2			2			1	1	1	3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

IV B.Tech – I Semester

L	T	P	C
3	0	0	3

20AEE52 ADVANCED CONTROL SYSTEMS
(Professional Elective -IV)

COURSE OUTCOMES:

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

CO1: Apply the design concepts of control system, tuning of PID controller and Two-Degrees-of-Freedom control, non-linear system stability, Modal and optimal control.

CO2: Analyze stability of a non-linear system using functions and phase plane.

CO3: Demonstrate design skills in compensators and controllers using Root locus and Bode plot, controllers, observer and regulators using state space.

CO4: Develop problem solving skills in evaluating stability of systems using describing functions.

CO5: Analysis of non-linear system stability using Lypunov's stability criterion,

UNIT-I

STATE SPACE ANALYSIS: Review of State Space Representation - Canonical Forms: Controllable Canonical Form - Observable Canonical Form - Jordan Canonical Form.

UNIT-II

CONTROLLABILITY AND OBSERVABILITY: Tests for controllability and observability for continuous time systems – Controllable Phase Variable form and Observable Phase Variable form - Design of State Feedback Control through Pole placement - Full order observer and reduced order observer.

UNIT-III

ANALYSIS OF NON-LINEAR SYSTEMS: Introduction to nonlinear systems - Types of nonlinearities - Describing functions - Describing function analysis of nonlinear control systems - Introduction to phase-plane analysis - Method of Isoclines & Delta for Constructing Trajectories - singular points - phase-plane analysis of nonlinear control systems.

UNIT-IV

STABILITY ANALYSIS: Stability in the sense of Lyapunov - Lyapunov's stability and Lypanov's instability theorems - Direct method of Lyapunov for the Linear and Nonlinear continuous time autonomous systems.

UNIT-V

OPTIMAL CONTROL: Introduction to optimal control, formulation of optimal control problems, calculus of variations, minimization of functional of single function, functional involving n independent functions, constrained minimization.

TEXT BOOKS:

1. Gopal.M, Modern Control System Theory, New Age International (P) Ltd, 2nd edition,1996.

REFERENCES BOOKS:

1.Ogata.K, Modern Control Engineering, Prentice Hall of India, 5th edition, 1998

2.Nagarath.I.J and Gopal.M, Control Systems Engineering, New Age International (P)Ltd, 2017.

3.Nagoor Kani, Advanced Control Systems, RBA Publications, 2nd Edition, 2014.

4.Stainslaw H. Zak, Systems and Control, Oxford Press, 2nd Edition, 2003.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	2	--	--	--	--	--	--	--	--	3	2	1
CO2	3	3	2	1	--	--	--	--	--	--	--	--	3	2	2
CO3	3	3	3	1	--	--	--	--	--	--	--	--	2	2	1
CO4	3	3	3	2	--	--	--	--	--	--	--	--	2	1	3
CO5	3	2	3	1	--	--	--	--	--	--	--	--	3	2	2
Average	3.00	2.6	2.4	1.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.60	1.80	1.80
Level of Correlation of the Course	3	3	3	1									3	2	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B.Tech – I Semester

L	T	P	C
3	0	0	3

20AEE53 DESIGN AND ESTIMATION OF ELECTRICAL SYSTEMS

(Professional Elective - IV)

COURSE OUTCOMES:

After successful completion of the course student will be able to

CO1: Apply the knowledge of electrical systems for the design of industrial and domestic installations.

CO2: Design different types of power system earthing.

CO3: Analyze the power quality issues and resonance problems.

CO4: Apply various techniques for energy economics, depreciation and taxes.

CO5: Analyze the types of Domestic wiring and installation equipments

UNIT I

DESIGN ASPECTS OF ELECTRICAL SYSTEMS AND DOMESTIC BUILDINGS: Role of Statutes in Electrical System Design - Classification of Building Services - Design Aspects of Lighting - Design Aspects of Ventilation - Design Aspects of Climate Control - Design Aspectsof Vertical Transportation - Design Aspects of Minor Building Services. Classification Of Domestic buildings - Estimation of Load Requirements - Selection of Type of Wiring - Special Features Applicable for High -Rise Apartment Buildings - Pre-commissioning Tests.

UNIT II

INDUSTRIAL INSTALLATIONS: Classification of Industrial Installation - General Characteristics - Selection of Distribution Architecture - Selection of Transformers and Sub Stations. Short Circuit Studies - Fault Current Calculations - Earthing Design - Selection of Switch Gears - Electrical Protection, Protection of Circuit Elements, Persons & Life stack, Equipment, Electrical Isolation, Switch Gear Control, Switching Devices, Uses, Selective Co- ordination, Circuit Breakers and their Selection..

UNIT III

POWER SYSTEM EARTHING: Introduction – Earthing - Types of System Earthing - Reasons for Grounding/ Earthing - TN System, TT System, IT System, Protective Measures and Protective Devices in IT System - Main Characteristics of Earthing Systems - Selection Criteria for Earthing - Design Considerations of Earthing - Measurement of Earth Resistance - Earth Leakage Protection - Neutral

Earthing for Generators and Transformers.

UNIT IV

POWER QUALITY ISSUES AND RESONANCE PROBLEMS IN SYSTEMS DESIGN: Power Quality Issues - Harmonics, Sources of Harmonics - Disturbances Caused by Harmonics - Methods to reduce the Impact of Harmonics - Design the Detuned Capacitor Bank - IEEE Standard 519-1992 and Limits. Economics of Power Factor Improvement, Optimal Compensation, PF Correction of Induction Motors.

UNIT V

ENERGY ECONOMICS IN SYSTEM DESIGN: Introduction - Time Value of Money - Single Payment Compound Amount Model (SPCA) - Uniform Series Compound Amount Model (USCA) - Uniform Series Present Worth Model (USPW) - Depreciation, Tax Considerations - After Tax Analysis.

TEXT BOOKS:

1.Giridharan, M.K, Electrical Systems Design,I. K. International Publishing House Pvt.Ltd, 3rd Edition, 2015.

2.Raina, K.B and Bhattacharya, Electrical Design Estimating and Costing, New AgeInternational Publishers 2nd Edition, 2017.

REFERENCE BOOKS:

1.Turan Gonen, Electric Power Distribution Engineering, CRC Press, 3rd Edition, 2014.

2.Er. Jain ,V. K.and Er. Amitabh Bajaj, Design of Electrical Installations, UniversityScience Press, Reprint 2016.

3.Gupta,J.B., A Course in Electrical Installation Estimating & Costing, Katson Books,Reprint, 2013.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	--	-	2	--	--	--	--	--	3	3	3
CO2	3	3	3	3	--	--	2	--	--	--	--	--	3	3	3
CO3	3	3	3	3	--		2	--	--	2	2	2	2	3	3
CO4	3	2	2	3	--		2	--	--	2	2	2	2	3	3
CO5	3	2	3	2	--		--	--	--	2	3	2	3	3	3
Average	3.00	2.60	2.80	2.80	0.00	0.00	1.60	0.00	0.00	1.20	1.40	1.20	2.60	3.00	3.00
Level of Correlation of the Course	3	3	3	3			2			2	2	1	3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

IV B.Tech – I Semester

L	T	P	C
3	0	0	3

20AEE54 DISTRIBUTED GENERATION AND MICRO-GRID
(Professional Elective - IV)

COURSE OUTCOMES

After successful completion of the course student will be able to

CO1: Interpret the concepts of non conventional energy based power generation.

CO2: Analyze distributed generation systems and their standards in connection with distributed resources along with energy storage systems.

CO3: Analyze the power systems to integrate the distributed generation systems to the utility grid.

CO4: Analyze the concept of micro grid Renewable energy technologies and power electronics

CO5: Apply the different types of applications power system operation to analyze the control and power quality issues of Micro grid

UNIT: I

INTRODUCTION: Conventional power generation: advantages and disadvantages, Energy crises, non-conventional energy (NCE) resources: review of Solar PV, Wind Energy systems, Fuel Cells, micro-turbines, biomass, and tidal sources.

UNIT: II

DISTRIBUTED GENERATIONS (DG): Concept of distributed generations, topologies, selection of sources, regulatory standards/ framework, Standards for interconnecting Distributed resources to electric power systems: IEEE 1547. DG installation classes, security issues in DG implementations. Energy storage elements: Batteries, ultra-capacitors, flywheels. Captive power plants.

UNIT: III

IMPACT OF GRID INTEGRATION: Requirements for grid interconnection, limits on operational parameters, voltage, frequency, THD, response to grid abnormal operating conditions, islanding issues. Impact of grid integration with NCE sources on existing power system: reliability, stability and power quality issues.

UNIT: IV

BASICS OF A MICROGRID : Concept and definition of micro-grid, micro-grid drivers and benefits, review of sources of micro-grids, typical structure and configuration of a micro-grid, AC and DC micro-grids, Power Electronics interfaces in DC and AC micro-grids.

UNIT: V

CONTROL AND OPERATION OF MICROGRID : Modes of operation and control of micro-grid: grid connected and islanded mode, Active and reactive power control, protection issues, anti-islanding schemes: passive, active and communication-based techniques, micro-grid communication infrastructure, Power quality issues in micro-grids, regulatory standards, Micro-grid economics, Introduction to smart micro-grids.

TEXT BOOKS:

1. Amirnaser Yezdani, and Reza Iravani, “Voltage Source Converters in Power Systems: Modeling, Control and Applications”, IEEE John Wiley Publications, 2009.
2. DorinNeacsu, “Power Switching Converters: Medium and High Power”, CRC Press, Taylor & Francis, 2006.
3. Chetan Singh Solanki, “Solar Photo Voltaics”, , PHI learning Pvt. Ltd., New Delhi, 2009

REFERENCE BOOKS:

1. J.F. Manwell, J.G “Wind Energy Explained, Theory Design and Applications,”. McGowan Wiley publication, 2nd Edition, 2009.
2. D. D. Hall and R. P. Grover, “Biomass Regenerable Energy”, , John Wiley, New York, 1987.
3. John Twidell and Tony Weir, “Renewable Energy Resources”, Taylor and Francis Publications, Second Edition, 2006.

Mapping of CO’s- PO’s-PSO’s

Course Outcome	Program Outcomes												Program Specific 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	--	3	--	--	--	--	--	--	--	--	3	3	3
CO3	3	3	2	3	--	--	--	--	--	--	--	2	2	2	3
CO4	3	2	3	2	--	--	--	--	--	--	--	2	2	2	3
CO5	3	2	3	2	--	--	--	--	--	--	--	2	3	1	3
Average	3.00	2.60	1.6	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.20	2.60	2..00	3.00
Level of Correlation of the Course	3	3	2	2								1	3	2	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B.Tech – I Semester

L	T	P	C
3	0	0	3

20AEE55 POWER SYSTEM AUTOMATION

(Professional Elective - IV)

COURSE OUTCOMES:

After successful completion of this course students should be able to

CO1: Analyze the structure and operation of power system automation

CO2: Develop Energy Management System with the role of program logic controller in EMS.

CO3: Analyze fundamentals of SCADA and its various classification to various applications

CO4: Understand the substation automation structure and its applications functions.

CO5: Explore various control schemes of distribution automation and know its technical benefits.

UNIT I:

POWER SYSTEM AUTOMATION: Introduction –Evolution of automation system – Benefits of power system automation, Structure of power system automation, Electrical Protection, Control, Measurement, Monitoring- Architecture for power system automation – Classification of power system automation – Substation automation and Distribution automation – Problems with Data acquisition - implementation of power system automation and protection using SCADA.

UNIT II:

ENERGY MANAGEMENT SYSTEMS (EMS): Introduction, EMS in Power Systems, Objectives of EMS, Evolution of EMS, Functions and Benefits of EMS, EMS Architecture, Working of EMS, Evolution of EMS.

PROGRAMMABLE LOGIC CONTROLLERS: Introduction – Basic Operation – PLC architecture and components – Programming Languages – PLC's Applications to Power System Automation.

UNIT III:

SCADA FUNDAMENTALS: Introduction – Building Blocks of SCADA - SCADA in power systems – Its application functions in Generation, Transmission and Distribution – Advantages of SCADA – SCADA Communication systems - RTUs – Components of RTUs –Communication Protocols – Advanced RTU functionalities, IEDs, Data concentrators and merging units, Human

Machine Interface, Classification of SCADA systems Single master–single remote, Single master–multiple RTU, Multiple master–multiple RTUs, Single master, multiple sub master, multiple remote.

UNIT IV:

SUBSTATION AUTOMATION: Why Substation automation (SA)? Why now?, Role of IEDs in SA, Conventional substations: Islands of automation, Substation automation issues, SA architectures, application functions, Enterprise- level application functions, Benefits of data analysis to utilities.

UNIT V:

DISTRIBUTION AUTOMATION: Introduction to Distribution Automation (DA), control system interfaces, control and data requirements, centralized (Vs) decentralized control, DA System (DAS), DA Hardware, DAS software, Distribution Automation Functions-Information management, system reliability management, system efficiency management, voltage management, Load management, Communication systems used in DA - DA communication requirements, Communication reliability, Cost effectiveness, Data rate Requirements, Two way capability, Technical Benefits of DA.

TEXT BOOKS

1. Power system SCADA and smart grids, Mini S Thomas, John D Mcdonald, CRC Press, 2015.
2. Control and Automation of Electrical Distribution Systems, James. Northcote, Green Robert Wilson, CRC Press.

REFERENCE BOOKS:

1. Electric Power Distribution Automation, Dr. M. K. Khedkar, Dr. G.M.Dhole, University Science press.
2. PLCs and SCADA- Theory and Practice, Rajesh Mehra, Vikrant Vij, Laxmi Publications, First edition, 2016.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	--	3	--	-	2	--	--	--	--	--	3	3	3
CO2	3	3	--	3	--	--	3	--	--	--	--	--	3	3	3
CO3	3	3	3	3	--	--	2	--	--	--	--	--	2	2	3
CO4	3	2	2	3	--	--	2	--	--	--	--	--	2	2	3
CO5	2	2	3	2	--	--	--	--	--	--	--	--	3	3	3
Average	2.80	2.60	1.6	2.80	0.00	0.00	1.8	0.00	0.00	0.00	0.00	0.00	2.60	2.6	3.00
Level of Correlation of the Course	3	3	2	3			2				2	1	3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

IV B.Tech – I Semester

L	T	P	C
3	0	0	3

20AEE56 POWER SYSTEM DEREGULATION
(Professional Elective – IV)

COURSE OUTCOMES:

After successful completion of the course student will be able to

CO1: Understand the concepts of deregulated power utlities. .

CO2: Analyze the Solutions for issues in electricity market models and their functions in different scenarios.

CO3: Analyze Electricity pricing methods and ancillary service management in competitive market.

CO4: Develop skills to predict market models to provide power exchange among various entities of deregulated power system.

CO5: Analyze forecasting methods for minimizing the energy price, transmission losses and to regulate impediment in tie-lines of interconnected deregulated power system.

UNIT - I

DEREGULATION OF ELECTRIC UTILITIES: Introduction – Traditional central utility model, reform motivations, separation of ownership and operation, competition and direct access in the electricity market, independent system operator (ISO), retail electric providers, different experiences.

UNIT - II

COMPETITIVE WHOLESALE ELECTRICITY MARKETS & TRANSMISSION OPEN ACCESS: Introduction, ISO, wholesale electricity market characteristics, market model, challenges. Transmission open access: Trading arrangements - the pool and bilateral trade - multilateral trades, congestion management.

UNIT - III

TRANSMISSION COST ALLOCATION METHODS: Introduction, Postage Stamp Rate Method - Contract Path Method - MW-Mile Method – Unused Transmission Capacity Method - MVA-Mile method – Comparison of cost allocation methods.

UNIT - IV

MARKET POWER & ANCILLARY SERVICES MANAGEMENT: Market power Introduction - different types of market Power, mitigation of market power – Examples. Ancillary services - Introduction, reactive power as an Ancillary Service – a review, synchronous generators as ancillary service providers.

UNIT-V

TRANSFER CAPABILITY CALCULATIONS AND ELECTRICITY PRICING: Transfer Capability calculations: definitions, transfer capability calculations – ATC, TTC, TRM, CBM calculations. Calculation of ATC based on power flow.

Electricity Pricing: Introduction, electricity price volatility, electricity price indexes, challenges to electricity pricing, construction of forward price curves, short-time price forecasting.

TEXT BOOKS:

1. Loi Lei Lai, Power System Restructuring and Deregulation, John Wiley & Sons Ltd., England, 1st Edition, 2001.

2. Mohammad Shahidehpour and Muwaffaq Alomoush, Restructured Electrical Power Systems, Marcel Dekker, Inc., New York, 1st Edition, 2001.

REFERENCE BOOKS:

1. Kankar Bhattacharya, Math H.J. Boller and JaapE.Daalder, Operation of Restructured Power System, Kulwer Academic Publishers, 1st Edition, 2001.

2. P.Venkatesh, B.V.Manikandan, S.Charles Raja and A.Srinivasan, Electrical Power Systems Analysis, Security and Deregulation, PHI Publishers, 2nd Edition, 2012.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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	3
CO3	3	3	3	3	--	--	--	--	--	--	--	2	2	3	3
CO4	3	3	2	3	--	--	--	--	--	--	--	2	2	3	3
CO5	3	2	3	2	--	--	--	--	--	--	--	2	3	3	3
Average	3.00	2.80	1.6	2.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.20	2.60	3.00	3.00
Level of Correlation of the Course	3	3	2	3					1	0		1	3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

IV B.Tech – I Semester

L	T	P	C
3	0	0	3

20AEE57 HVDC and FACTS
(Professional Elective -V)

COURSE OUTCOMES:

After successful completion of the course student will be able to

CO1: Analyze the different types of HVDC levels and basic concepts and operation of converters.

CO2: Apply the knowledge of power electronics for the control of HVDC converter and the harmonic effects.

CO3: Analyze about power flow control in transmission line using FACTS controllers.

CO4: Analyze about the methods of compensation and operation of combined controllers.

CO5: Design different FACTS devices for the voltage stability of transmission system.

UNIT - I

BASIC CONCEPTS AND ANALYSIS OF HVDC SYSTEM: Terminal equipment of HVDC transmission systems-Types of HVDC Links- Comparison of AC & DC Transmission- Applications-Pulse number – Choice of converter configuration-Analysis of Graetz circuit with and without overlap -Analysis of a 12 pulse converter.

UNIT - II

HVDC CONVERTER CONTROL AND HARMONICS: Principles of DC link control – Converter control characteristics –Firing angle control – Current and extinction angle control – Generation of harmonics – Calculation of voltage and current harmonics-Types of filters.

UNIT - III

INTRODUCTION TO FACTS: Power flow in an AC System – Loading capability limits – Dynamic stability considerations – Importance of controllable parameters – Basic types of FACTS controllers – Benefits from FACTS controllers – Requirements and characteristics of high power devices – Voltage and current rating – Losses and speed of switching – Parameter trade–off devices.

UNIT - IV

SHUNT& SERIES COMPENSATORS: Objectives of shunt and series compensation – Mid– point voltage regulation for line segmentation – End of line voltage support to prevent voltage instability – Improvement of transient stability – Power oscillation damping-Basic operating principles of SSSC & STATCOM, Applications on transmission lines.

UNIT - V

COMBINED CONTROLLERS: Schematic and basic operating principles of Unified Power Flow Controller (UPFC) & IPFC– Application on transmission lines.

TEXT BOOKS:

1.Padiyar, K.R, HVDC Power Transmission Systems, New Age International *(*P*)* Limited, 3rd Edition, 2015.

2.Narain G. Hingorani, Understanding FACTS: Concepts and Technology of Flexible AC Transmission Systems, Laszlo Gyugyi the Institute of Electrical and Electronics ngineers, Inc. 2013.

REFERENCES BOOKS:

1. K R Padiyar, FACTS Controllers in Power Transmission and Distribution, New Age International Publishers, 2007.
2. E.W.Kimbark, High Voltage Direct Current Transmission, John Wiley & Sons, Inc., Vol.1, 1971.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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	3
CO3	3	3	3	3	--	--	--	--	--	--	--	2	2	3	3
CO4	3	3	2	2	--	--	--	--	--	--	--	2	2	3	3
CO5	2	2	3	2	--	--	--	--	--	--	--	2	3	3	3
Average	2.80	2.80	1.6	2.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.20	2.60	3.00	3.00
Level of Correlation of the Course	3	3	2	3								1	3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B.Tech – I Semester

L	T	P	C
3	0	0	3

20AEE58 POWER ELECTRONICS FOR RENEWABLE ENERGY SYSTEMS

(Professional Elective -V)

COURSE OUTCOMES:

After successful completion of the course student will be able to

CO1: Analyze the impacts of renewable energy generation on environment.

CO2: Interpret the qualitative analysis of different renewable energy sources.

CO3: Apply the principle of operation of electrical machines for renewable energy conversion and their Performance characteristics.

CO4: Design the solar photo voltaic systems and power converters for Inversion mode and boost mode in PV system.

CO5: Analyze different types of converters used in renewable energy systems.

UNIT I

INTRODUCTION AND QUALITATIVE STUDY OF DIFFERENT RENEWABLE ENERGY RESOURCES: Environmental aspects of electric energy conversion: impacts of renewable energy generation on environment (cost-GHG Emission) ,Qualitative study of different renewable energy resources: Solar, wind, ocean, Biomass, Fuel cell, Hydrogen energy systems and hybrid renewable energy systems.

UNIT II

ELECTRICAL MACHINES FOR RENEWABLE ENERGY CONVERSION: Review of reference theory fundamentals-principle of operation and analysis: IG, PMSG, SCIG and DFIG.

UNIT III

POWER CONVERTERS AND THREE PHASE AC VOLTAGE CONTROLLERS: Solar: Block diagram of solar photo voltaic system -Principle of operation: line commutated converters (inversion-mode) - Boost and buck-boost converters- selection of inverter, battery sizing, and array sizing Wind, AC-DC-AC converters: uncontrolled rectifiers, PWM Inverters, Grid Interactive Inverters-matrix converters.

UNIT IV

ANALYSIS OF WIND AND PV SYSTEMS AND GRID CONNECTION ISSUES: Stand alone operation of fixed and variable speed wind energy conversion systems and solar system, Grid integrated PMSG and SCIG Based WECS Grid Integrated solar system.

UNIT V

HYBRID RENEWABLE ENERGY SYSTEMS:

Need for Hybrid Systems- Range and type of Hybrid systems- Case studies of Wind-PV Maximum Power Point Tracking (MPPT).

TEXT BOOKS:

1.Rashid .M. H:"power electronics Hand book", Academic press, 2001.

2.Rai. G.D:"Non conventional energy sources", Khanna publishes, 1993.

3.Ewald F.Fuchs, Mohammad A.S.Masoum:power conversion of Renewable Energy Systems, Springer, 2011.

REFERENCE BOOKS:

1. Rai. G.D:"Solar energy utilization", Khanna publishes, 1993.
2. Gray, L. Johnson:"Wind energy system", prentice hall linc, 1995.
3. B.H.Khan: "Non-conventional Energy sources", Tata McGraw-hill PublishingCompany, New Delhi.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	-	--	--	--	--	--	--	--	--	3	2	2
CO2	2	3	2	-	--	--	--	--	--	--	--	--	3	3	2
CO3	3	2	1	1	--	--	--	--	--	--	--	--	2	2	1
CO4	3	2	2	2	1	--	--	--	--	--	--	--	2	1	3
CO5	3	2	2	1	1	-	--	--	--	--	--	--	3	2	1
Average	2.80	2.20	2.00	0.80	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.60	2.00	1.80
Level of Correlation of the Course	3	2	1	1									3	2	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B.Tech – I Semester

L	T	P	C
3	0	0	3

20AEE59 POWER SYSTEM STABILITY

(Professional Elective -V)

COURSE OUTCOMES:

After successful completion of the course student will be able to

CO1: Understand the concepts of stability parameters of power systems.

CO2: Apply the stability of power systems using different methods.

CO3: Analyze the power system model using small signal stability analysis.

CO4: Estimate the stability of voltage in a power system network using different parameters.

CO5: Apply different techniques for improvement of power system stability.

UNIT: I

INTRODUCTION TO POWER SYSTEM STABILITY: Power system stability considerations – definitions-classification of stability-rotor angle and voltage stability-synchronous machine representation –classical model-load modeling concepts-modeling of excitation systems-modeling of prime movers.

UNIT: II

STABILITY ANALYSIS OF POWER SYSTEM NETWORK: Transient stability-swing equation-equal area criterion-solution of swing equation-Numerical methods -Euler method-Runge-Kutte method-critical clearing time and angle-effect of excitation system and governors- multi-machine stability –extended equal area criterion-transient energy function approach.

UNIT: III

SMALL SIGNAL STABILITY: Small signal stability – state space representation – eigen values-modal matrices-small signal stability of single machine infinite bus system – synchronous machine classical model representation-effect of field circuit dynamics-effect of excitation system-small signal stability of multi machine system.

UNIT: IV

VOLTAGE STABILITY ANALYSIS: Voltage stability – generation aspects - transmission system aspects – load aspects – PV curve – QV curve – PQ curve – analysis with static loads – load ability limit - sensitivity analysis-continuation power flow analysis - instability mechanisms-examples.

UNIT: V

POWER SYSTEM STABILITY IMPROVEMENT: Methods of improving stability – transient stability enhancement – high speed fault clearing – steam turbine fast valving-high speed excitation systems- small signal stability enhancement-power system stabilizers – voltage stability enhancement – reactive power control.

TEXT BOOKS:

1. Kundur, P., 'Power system stability and control,' Mc Graw Hill international editions, 2004.
2. Anderson P.M. and fouad A.A., 'Power system stability', Galgotia publication New Delhi, 2003.
3. Van Cutsem, T. and Voumas, C., 'Voltage stability of Electrical Power Systems', Kluwer Academic Publishers, 1998.

REFERENCE BOOKS:

1. Peter W., Saucer, Pai M.A., "Power System Dynamics and Stability, Pearson Education (Singapore), 9th Edition, 2007.
2. EW. Kimbark., "Power System Stability", John Wiley & Sons Limited, New Jersey, 2013.
3. SB. Crary., "Power System Stability", John Wiley & Sons Limited, New Jersey, 1955.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	--	--	--	--	--	--	--	--	3	3	3
CO2	3	3	3	3	--	--	--	--	--	--	--	--	3	3	3
CO3	3	3	3	3	--	--	--	--	--	--	--	2	2	3	3
CO4	3	3	2	3	--	--	--	--	--	--	--	2	2	3	3
CO5	3	1	3	2	--	--	--	--	--	--	--	2	3	3	3
Average	3.00	2.60	2.80	2.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.20	2.60	3.00	3.00
Level of Correlation of the Course	3	3	3	3			2		1		2	1	3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B.Tech – I Semester

L	T	P	C
3	0	0	3

20AEE60 ANALYSIS OF ELECTRICAL MACHINES

(Professional Elective -V)

COURSE OUTCOMES:

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

CO1: Analyze magnetic circuits and force components of electrical machines

CO2: Demonstration of transformation theory and its need for machine modelling

CO3: Apply machine dynamics in Electrical engineering.

CO4: Analyze the dynamic performance of electrical machines using computational software.

CO5: Design power supplies and loads to analyse complete electrical machine performance.

UNIT I

PRINCIPLES OF ELECTROMAGNETIC ENERGY CONVERSION:

Magnetic circuits, permanent magnet, dynamic induced emf and dynamic torque - stored magnetic energy, co-energy - force and torque in singly and doubly excited systems – machine windings and air gap mmf– determination of winding resistances and inductances – determination of friction coefficient and moment of inertia of electrical machines.

UNIT II

DC MACHINES:

Elementary DC machine and analysis of steady state operation - Voltage and torque equations – dynamic characteristics of permanent magnet and shunt d.c. motors – electrical and mechanical time constants - Time domain block diagrams –transfer function of d.c. motor responses – digital computer simulation of permanent magnet and shunt d.c. machines.

UNIT III

REFERENCE FRAME THEORY:

Historical background of Clarke and Park transformations – power invariance and phase transformation and commutator transformation – transformation of variables from stationary to arbitrary reference frame - variables observed from several frames of reference.

UNIT IV

INDUCTION MACHINES: Three phase induction machine, equivalent circuit and analysis of steady state operation – free acceleration characteristics – voltage and torque equations in machine variables and arbitrary reference frame variables – analysis of dynamic performance for supply excitation and load torque variations - digital computer simulation of three phase induction machines.

UNIT V

SYNCHRNOUS MACHINES:

Three phase synchronous machine and analysis of steady state operation - voltage and torque equations in machine variables and rotor reference frame variables (Park's equations) – analysis of Dynamic performance for supply excitation and load torque variations - digital computer simulation of synchronous machines.

TEXT BOOKS:

1.PaulC.Krause, Oleg Wasyzczuk, Scott S, Sudhoff, "Analysis of Electric Machinery and Drive Systems", John Wiley, Second Edition, 2010.

REFERENCE BOOKS:

1. P S Bimbhra, "Generalized Theory of Electrical Machines", Khanna Publishers, 2008.
2. A.E, Fitzgerald, Charles Kingsley Jr, and Stephan D, Umans " Electric Machinery", Tata McGraw Hill,5th Edition, 1998
3. R.Krishnan, "Electric Motor Drives, Modeling, Analysis and Control, Prentice Hall of India, 2002.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	--	--	--	--	--	--	--	--	3	3	3
CO2	3	3	3	3	--	--	--	--	--	--	--	--	3	3	3
CO3	3	3	3	3	--	--	--	--	--	--	--	2	2	3	3
CO4	3	3	2	3	--	--	--	--	--	--	--	2	2	3	3
CO5	3	2	3	2	--	--	--	--	--	--	--	2	3	3	3
Average	3.00	2.80	2.80	2.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.20	2.60	3.00	3.00
Level of Correlation of the Course	3	3	3	3			2					1	3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B.Tech – I Semester

L	T	P	C
3	0	0	3

20AEE61 MEDICAL INSTRUMENTATION

(Professional Elective -V)

COURSE OUTCOMES:

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

CO1: Explain Biomedical Instrumentation and diagnostic procedures for clinical applications

CO2: Design and operate medical equipments and its necessities

CO3: Know measure the non electrical parameters and physiological information for bio medical Instrumentation

CO4: Interpret the knowledge of electrical and electronics to analyze instrumentation for medical imaging

CO5: Apply concepts of electronics to analyze therapeutic and diagnostic devices

UNIT: I

BASIC CONCEPTS OF MEDICAL INSTRUMENTATION

Terminology of medicine and medical devices-Generalized medical Instrumentation systems Medical measurement constraints-Classification of Biomedical instruments-Interfering and modifying inputs-Compensation Techniques-Bio-statics-Generalized static characteristics Generalized Dynamic Characteristics- Design criteria-Transducers Selection criteria. The origin of Biopotentials -Electrical activity of excitable cells-Volume conductor fields-Functional organization of peripheral Nervous system.

UNIT: II

ELECTRICAL PARAMETERS ACQUISITION AND ANALYSIS

Bio-potential Electrodes-The electrode-Electrolyte interface-Polarization –Polarizable and non polarizable electrodes-Electrode behavior and circuit models-Electrode arrays-Microelectrodes. Electrical parameters acquisition - ECG – EEG – EMG – ERG – Lead systems and recording methods – Typical waveforms - Electrical safety in medical environment, shock hazards – leakage current-Instruments for checking safety parameters of biomedical equipments.

UNIT: III

NON ELECTRICAL PARAMETERS MEASUREMENT AND DIAGNOSTIC PROCEDURES

Measurement of blood pressure - Cardiac output –blood flow- Heart rate - Heart sound - Pulmonary function measurements – spirometer – Photo Plethysmography, Body Plethysmography – Blood Gas analyzers, pH of blood –measurement of blood pCO2, pO2, finger-tip oxymeter - ESR, GSR measurements .

UNIT IV

MEDICAL IMAGING SYSTEMS

X-ray machine- computer radiography - computer tomography- magnetic resonic imaging – Neuclear medicine – single photo emission computer tomography – positron emission tomography – Ultra sonography – Endoscopy – Thermography.

UNIT V

LIFE ASSISTING, THERAPEUTIC AND ROBOTIC DEVICES

Pacemakers – Defibrillators – Ventilators – Nerve and muscle stimulators – Diathermy – Heart – Lung machine – Audio meters – Dialyzers – Lithotripsy - Therapeutic and Prosthetic Devices – Infant Incubators – Drug Delivery Devices – Surgical Instruments.

TEXT BOOKS:

1. John G. Webster, Medical Instrumentation Application and Design, John Wiley and sons,New York, 1998.
2. Leslie Cromwell, Biomedical Instrumentation and Measurement, Prentice hall of India,New Delhi, 2007.
3. Ed. Joseph D. Bronzino, The Biomedical Engineering HandBook, Second Edition, BocaRaton, CRC Press LLC, 2000.

REFERENCE BOOKS:

1. Joseph J.carr and John M. Brown, Introduction to Biomedical Equipment Technology, John Wiley and sons, New York, 1997.
2. Duane Knudson, Fundamentals of Biomechanics, Springer, 2003.
3. Suh, Sang, Gurupur, Varadraj P., Tanik, Murat M., Health Care Systems, Technology and Techniques, Springer, 1st Edition, 2011.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	--	-	2	--	--	--	--	--	3	3	3
CO2	3	3	3	3	--	--	2	--	--	--	--	--	3	3	3
CO3	3	2	3	3	--		2	--	--		2	2	2	3	3
CO4	3	3	2	3	--		2	--	--		2	2	2	3	3
CO5	2	2	3	2	--		--	--	--		2	2	3	3	3
Average	2.80	2.60	2.80	2.80	0.00	0.00	1.60	0.00	0.00	0.00	1.20	1.20	2.60	3.00	3.00
Level of Correlation of the Course	3	3	3	3			2				1	1	3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech – II ECE

IV B.Tech – I EEE

L	T	P	C
3	0	0	3

20AEC33 DIGITAL SIGNAL PROCESSING

(Open Elective –III)

COURSE OUTCOMES:

After successful completion of the course, 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 Computationof 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 firstorder 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,4th 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 McGrawHill, 3rd 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.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	-	-	-	-	-	-	-	-	1	-	1
CO2	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	-	3	-	3
CO4	3	3	3	3	-	-	-	-	-	-	-	-	2	-	2
Average	3	3	2.5	1.75	-	-	-	-	-	-	-	-	2.25	-	1.5
Level of Correlation of the Course	3	3	3	2	-	-	-	-	-	-	-	-	2	-	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

IV B.Tech I Semester

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

20AMB09 INTELLECTUAL PROPERTY RIGHTS

COURSE OUTCOMES:

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

1. Outline different types of intellectual properties.
2. Distinguish the crucial role of IP in organizations of different industrial sectors for the purposes of product and technology development.
3. Formulate designs, patent and copyright for their innovative research works.
4. Apply intellectual property law principles of Trademarks to real problems.
5. Examine ethical and professional issues which arise in the intellectual property law context.

UNIT - I: UNDERSTANDING AND OVERVIEW OF IPR: Introduction- meaning- nature- forms of intellectual property- types of intellectual property-industry property-International conventions.

UNIT-II: COPYRIGHT ACT, 1957: Meaning –Nature and object of copyright-origin and development of copyright law in India-salient features of copyright act,1957-Definitons- originality material-rights of reproduction.

UNIT-III: TRADEMARKS ACT, 1999: Salient features of Trademarks Act, 1999-Meaning-objectives and functions of trademark-Definition of Trademark- trademark protection- -acquisition of Trademark rights-protectable matter-trademark registration process.

UNIT-IV: PATENT ACT, 1970: Meaning –definition of patent-history and concept of patent law-salient features of the patent act- Definition-kinds of patents and advantages-rights and obligations of patentee- Process of obtaining a patent.

UNIT-V: DESIGNS ACT, 2000: Meaning –definition- Salient features of Designs-Registration of Designs-Rights granted to design holders -Infringement of Design.

TEXT BOOKS:

1. Narayanan, P.(Revised 2017, Reprint 2018).Patent Law. Eastern Law House.
2. Acharya, N.K. (2021). Intellectual Property Rights: Scandinavian Languages Edition.
3. Chowdhary, R., S.K. & Other. Law of Trademark, Copyrights, Patents and Designs.

4. Reddy, G.B., Intellectual Property Rights and the Law, Gogia Law Agency.
5. Holyoak, J. &Torremans, P. Intellectual Property Law.

References:

1. Bouchoux, E.B. Intellectual Property Rights, Cengage Learning.
2. Ganguli, P. Intellectual Property Rights– Unleash my Knowledge Economy. Tata McGraw Hill Publishing Company Ltd.
3. Wadhera, B.L. Intellectual Property Law, Universal Publishers.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific 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	3
CO3	-	-	3	-	-	-	-	-	-	-	3	-	2	3	3
CO4	-	-	3	-	-	-	-	-	-	-	3	-	2	3	3
CO5	-	-	3	-	-	-	-	-	-	-	3	-	3	3	3
Average	-	-	3	-	-	-	-	-	-	-	3	-	2.60	3.00	3.00
Level of Correlation of the Course	-	-	3	-	-	-	-	-	-	-	3	-	3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

IV B.Tech I Semester

L	T	P	C
3	0	0	3

20AEC68 COMMUNICATION SYSTEM

(Open Elective –III)

COURSE OUTCOMES:

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

CO1: Explain Functional blocks of communication system and apply various modulation and demodulation techniques.

CO2: Illustrate sampling theorem and explain the importance of various multiplexing techniques.

CO3: Analyze the aspects of noise in receivers.

CO4: Analyze various digital modulation techniques.

UNIT-1

AMPLITUDE MODULATION AND DEMODULATION:

Need for modulation– Model of communication system and classification, Representation of AM – Modulation index and power calculation –Types of AM, DSB-FC, square law modulator- DSB-SC: Balanced modulator circuit using FET – SSB: Filter method and phase shift method – VSB, Comparison of various AM schemes-AM transmitter: Low level and high-level Modulation. Demodulation –Envelope detector, Significance of RC time constant- Square law detector

UNIT-II

ANGLE MODULATION AND DEMODULATION:

Single tone FM: Mathematical representation, frequency spectrum and bandwidth- Multi-tone FM - NBFM and WBFM - Phase modulation (PM): Mathematical representation - Conversion: FM to PM and PM to FM – Comparison of AM, FM and PM- FM Generation: Direct method using Varactor diode and indirect method (Armstrong modulator) - Pre-emphasis – FM transmitter. FM Detector: Balanced slope detector, Foster seeley frequency discriminator and Ratio detector - De- emphasis.

UNIT-III

ANALOG PULSE MODULATION AND MULTIPLEXING:

Sampling theorem – Types of sampling-Concepts of PAM, PWM, PPM and PCM- Modulators and demodulators. Types of Multiplexing- Frequency Division Multiplexing, Time Division Multiplexing and Quadrature Multiplexing - Comparison of multiplexing.

UNIT-IV

ANALOG RECEIVERS AND NOISE:

AM Receivers: TRF receivers -Super heterodyne receivers - FM Receivers: FM stereo broadcast receivers - AFC – Capture effect, FM threshold effect. Communication Receivers: Sensitivity,fidelity and selectivity - Squelch circuit - Beat frequency Oscillator-Types of Noise- Noise in AM and FM systems.

UNIT-V

DIGITAL COMMUNICATION 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 of the above systems.

TEXT BOOKS:

1. R.P Singh Sanjay Sharma, “Analog Communication Systems”, 2009.
2. B.P.Lathi, “Modern Digital and Analog Communication Systems”, 3rd Edition, Oxford University Press, 2007.

REFERENCE BOOKS:

1. Dennis Reddy and John Coolen, "Electronic Communications", 4th Edition, Prentice Hall Publishers,1995.
2. Kennedy, "Electronic Communications Systems", 4th Edition, McGraw-Hill Publishers,1992.
3. Louis. E. Frenzel, “Communication Electronics Principles and applications”, 3rd Edition, Tata Mc.Graw Hill, 2002.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific 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	3	3
CO3	3	3	-	3	-	-	-	-	-	-	-	-	2	3	3
CO4	3	3	-	-	-	-	-	-	-	-	-	-	2	3	3
Average	3	3	-	3	-	-	-	-	-	-	-	-	2.60	3.00	3.00
Level of Correlation of the Course	3	3	-	3	-	-	-	-	-	-	-	-	3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B.Tech – I Semester

L	T	P	C
3	0	0	3

20AEE62 EV CHARGE STATION DESIGN

(Job Oriented Elective -III)

COURSE OUTCOMES:

After successful completion of the course students will be able to

CO1: Understand the history of EV and their electrification levels.

CO2: Analyze the different types of EV Chargers and its ratings.

CO3: Apply the knowledge of charging for the sizing of fast and slow chargers and their EVSE communication protocol.

CO4: Analyze the different types of connectors and their applications.

CO5: Analyze HT and LT cable and assessment of site selections considering societal and environmental aspects for public charging applications.

UNIT–I

Introduction: Electric Vehicle

History of EV--- Components of Electric Vehicle-- Comparison with Internal combustion Engine: Technology-- Comparison with Internal combustion Engine: Benefits and Challenges-- EV classification and their electrification levels-- EV Terminology

UNIT–II

Types of EV Chargers

Electric Vehicle Technology and Charging Equipment's-- Basic charging Block Diagram of Charger-- Difference between Slow charger and fast charger-- Slow charger design rating-- Fast charger design rating-- AC charging and DC charging-- Inboard and off board charger specification-- Type of Mode of charger Mode -2 , Mode-3 and Mode-4-- EVSE associated charge times calculation

UNIT–III

Selection and sizing of fast and slow charger (AC & DC)

AC Pile Charger-- DC Pile Charger-- EVSE Power Module selection and technical specification-- Selection of EVSE Communication Protocol (PLC / Ethernet / Modbus/ CAN Module) -

Communication gateway-- Specification of open charge point protocol (OCCP 1.6/2.0)- Bharat DC001 & AC001 Charger specification-- Communication Interface between charger and CMS (central management system)-- Payment apps

UNIT–IV

Selection and sizing of Common types of connectors and applications

Selection of AC charger type-1 , type -2 and type -3-- Communication between AC charger and EV-- Selection of DC charger connector GB/T, CHAdeMO , CCS-1 and CSS-2-- Communication methodology of DC fast chargers-- IS/ IEC/ARAI/ standard of Charging topology ,Communication and connectors (IEC 61851-1, IEC 61851-24,62196-2)-- Selection sizing of Charger connector cable

UNIT–V

Public Charging infrastructure / Electrical system design

Assessment of site Location for Public charging station-- Selection and Sizing of Distribution transformer-- Selection and sizing of HT Equipment (VCB , CT , PT , Metering)-- Selection and Sizing HT Cables and LT cables-- Selection and sizing of Distribution Board / feeders-- Sizing calculation of LT and HT cable-- Selection and of Compact Substation (CSS for EV CS)/ Power Substation)-- Selection of relay and calculation-- Preparation of EV Charger Single Line Diagram-- Preparation of EV Charger Electric-- Assessment of site Location for Public charging station-- Selection and Sizing of Distribution transformer.

TEXT BOOKS:

1. Electric Vehicle Charging Station (EVCS): Renewable Energy meets the Ultra-Low Emission Vehicle Kindle Edition
2. Electric Vehicles: And the End of ICE age Kindle Edition

REFERENCE BOOKS:

1. Electric Vehicles: A comprehensive guide (Chapter Book 1) [Print Replica] Kindle Edition

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	--	--	--	--	--	--	--	--	3	2	2
CO2	3	3	2	2	--	--	--	--	--	--	--	--	3	1	2
CO3	2	2	1	1	--	--	--	--	--	--	--	--	2	2	1
CO4	3	3	2	3	--	--	--	--	--	--	--	--	2	3	3
CO5	2	2	3	2	--	3	2	--	--	--	--	--	3	2	1
Average	2.60	2.6	2.00	1.80	0.00	0.60	0.40	0.00	0.00	0.00	0.00	0.00	2.60	2.00	1.80
Level of Correlation of the Course	3	3	2	2									3	2	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B.Tech – I Semester

L	T	P	C
3	0	0	3

20AEE63 ELECTRICAL POWER PLANT ENGINEERING

(Job Oriented Elective -III)

COURSEOUTCOMES:

After successful completion of this course students should be able to

CO1: Analyse the layout, construction and working of the components inside a thermal power plant.

CO2: Analyse the layout, construction and working of the components inside a Diesel, Gas and combined cycle power plants.

CO3: Analyse the layout, construction and working of the components inside nuclear power plant.

CO4: Analyse the layout, construction and working of the components inside Renewable energy power plants.

CO5: Explain the applications of power plants while extend their knowledge to power plant economic and environmental hazards.

UNIT I :

COAL BASED THERMAL POWER PLANTS : Layout of modern coal power plant, Boilers, Turbines, Condensers, Steam & Heat rate, Subsystems of thermal power plants – Fuel and ash handling, Draught system, Feed water treatment. Binary Cycles and Cogeneration-systems.

UNIT II:

DIESEL AND GAS TURBINE POWER PLANTS:

Otto and Diesel Cycle – Analysis & Optimisation. Components of Diesel and Gas Turbine power plants. Combined Cycle Power Plants. Integrated Gasifier based Combined Cycle systems.

UNIT III

NUCLEAR POWER PLANTS

Basics of Nuclear Engineering, Layout and subsystems of Nuclear Power Plants, Working of Nuclear Reactors : Boiling Water Reactor (BWR), Pressurized Water Reactor (PWR), CANada

Deuterium- Uranium reactor (CANDU), Breeder, Gas Cooled and Liquid Metal Cooled Reactors. Safety measures for Nuclear Power plants.

UNIT IV

POWER FROM RENEWABLE ENERGY

Hydro Electric Power Plants – Classification, Typical Layout and associated components including Turbines. Principle, Construction and working of Wind, Tidal, Solar Photo Voltaic (SPV), Solar Thermal, Geo Thermal, Biogas and Fuel Cell power systems.

UNIT V

ENERGY, ECONOMIC AND ENVIRONMENTAL ISSUES OF POWER PLANTS

Power tariff types, Load distribution parameters, load curve, Comparison of site selection criteria, relative merits & demerits, Capital & Operating Cost of different power plants. Pollution control technologies including Waste Disposal Options for Coal and Nuclear Power Plants.

TEXT BOOKS:

1. Nag. P.K., "Power Plant Engineering", Third Edition, Tata McGraw – Hill Publishing Company Ltd., 2008

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	--	-	2	--	--	--	--	--	3	3	3
CO2	3	3	3	3	--	--	2	--	--	--	--	--	3	3	3
CO3	3	2	3	3	--	--	2	--	--	--	--	2	2	3	3
CO4	3	3	2	3	--	--	2	--	--	--	--	2	2	3	3
CO5	2	2	3	2	--	--	--	--	--	--	--	2	3	3	3
Average	2.80	2.60	2.80	2.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.20	2.60	3.00	3.00
Level of Correlation of the Course	3	3	3	3								1	3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech – II ECE

IV B.Tech – I EEE

L	T	P	C
3	0	0	3

20AEC32 VLSI DESIGN

(Open Elective -III)

COURSE OUTCOMES:

After successful completion of this course students should 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 OF MOS AND BICMOS CIRCUITS: Ids–Vds relationships,

MOS transistor threshold Voltage, gm, gds, figure of merit ω0; Pass transistor, NMOS Inverter, Variouspullups, 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 ofMOS 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'salgorithm, Parity generators, Comparators, Counters, High Density Memory Elements **UNIT-V VHDLSYNTHESIS:** VHDL Synthesis, Circuit Design Flow, Circuit Synthesis, Simulation, Layout, Design capturetools, 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 circuitsand systems", PHI, 2013 Edition.
2. Weste and Eshraghian, "Principles of CMOS VLSI Design", Pearson Education, 2012.

REFERENCE BOOKS:

1. Wayne Wolf, "Modern VLSI Design", Pearson Education, 3rd Edition, 2004.
2. John P. Uyemura, "Introductionto VLSI Circuits and Systems", John Wiley, 2003.
3. M.J.Smith, "Application specific Integrated circuits", Addisson Wesley1997

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific 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 of the Course	3	1	2	1	-	-	-	-	-	-	-	-	3	2	-

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B.Tech – I Semester

	L	T	P	C
	3	0	0	3

20AEE64 IOT FOR ELECTRICAL ENGINEERING

(Open Elective-IV)

COURSEOUTCOMES:

After successful completion of this course students should be able to

CO1: Know the fundamentals, architecture and various technologies of Internet of Things.

CO2: Apply various communication technologies used in the Internet of Things.

CO3: Interpret the knowledge of communication for connectivity of devices using web and internet in the IOT environment.

CO4: Apply various data acquisition methods, data handling using cloud for IoT applications.

CO5: implement IOT by studying case studies like Smart Home, Smart city, Agricultural practice.

UNIT I

The Internet of Things

An Overview of Internet of Things (IoT) – IoT framework – Architecture – Technology behind IoT – Sources of the IoT – M2M Communication – Examples of IoT.

UNIT II

Design Principles For Connected Devices

IoT/M2M systems, Layers and Designs Standardization – Communication Technologies – Data Enrichment, Consolidation and Device Management at Gateway – Ease of designing and affordability.

UNIT III

Design Principles for the Web Connectivity

Introduction – Web Communication protocols for Connected Devices – Message Communication protocols for Connected Devices – Web Connectivity for connected devices network .Introduction to Internet Connectivity Principles, Internet connectivity, Internet based communication – IP addressing in the IoT – Application Layer Protocols: HTTP, HTTPS, FTP, Telnet, WAP (Wireless Application Protocol).

UNIT IV

Data Acquiring Organizing: Introduction

Data Acquiring and Storage – Organizing the Data – Analytics. Data Collection, Storage and Computing Using a Cloud Platform: Introduction – Cloud computing paradigm for data collection, storage and computing – IoT as a service and Cloud Service Models – IoT cloud based services using the Xively (Pachube/COSM), Nim bits and other platforms.

UNIT V

Sensor technology: Actuator, Sensor data communication protocols, Radio Frequency Identification technology, Wireless Sensor Network Technology. IoT application case studies: Smart Home, Smart Cities, Environment monitoring and Agriculture practices.

TEXT BOOKS:

1. "The Internet 'of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press)
2. Make sensors: Terokarvinen, kemo, karvinen and villey valtokari, 1st edition, maker media, 2014.
3. "Internet of Things: A Hands-on Approach", by Arshdeep Bahga and Vijay Madisetti

REFERENCE BOOKS:

1. Vijay Madisetti, Arshdeep Bahga, Internet of Things: A Hands-On Approach
2. Waltenegus Dargie,Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice"
3. Beginning Sensor networks with Arduino and Raspberry Pi – Charles Bell, Apress, 2013

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	--	--	2	--	--	--	--	--	3	3	3
CO2	3	3	3	3	--	--	2	--	--	--	--	--	3	3	3
CO3	3	2	3	3	--	--	2	--	--	--	--	2	2	3	3
CO4	3	3	2	3	--	--	2	--	--	--	--	2	2	3	3
CO5	3	2	3	2	--	--	--	--	--	--	--	2	3	3	3
Average	3.00	2.60	2.80	2.80	0.00	0.00	1.60	0.00	0.00	0.00	0.00	1.20	2.60	3.00	3.00
Level of Correlation of the Course	3	3	3	3			2					1	3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B.Tech – I Semester (CE,ME, EEE, CSE, IT, CSE (AI&ML), & CSE (DS)

L	T	P	C
3	0	0	3

20AME54 OPTIMIZATION TECHNIQUES

(Open Elective – IV)

COURSE OUTCOME:

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

CO1: Analyze the unconstrained optimization techniques in the engineering application.

CO2: Analyze the constrained optimization techniques for various applications.

CO3: Implement neural network technique and swarm optimization to real world design problems.

CO4: Apply genetic algorithms and multi objective optimization to the complex engineering Problems.

CO5: Evaluate solutions by various optimization approaches for structural and dynamic problem.

UNIT: I

Unconstrained Optimization Techniques

Introduction to optimum design - General principles of optimization – Problem formulation & their classifications - Single variable and multivariable optimization, Techniques of unconstrained minimization – Golden section, Random, pattern and gradient search methods – Interpolation methods.

UNIT: II

Constrained optimization techniques

Optimization with equality and inequality constraints - Direct methods – Indirect methods using penalty functions, Lagrange multipliers - Geometric programming.

UNIT: III

Artificial Neural Networks and Swarm intelligence

Introduction – Activation functions, types of activation functions, neural network architectures, Single layer feed forward network, multilayer feed forward network, Neural netwok applications. Swarm intelligence - Various animal behaviors, Ant Colony optimization, Particle Swarm optimization.

UNIT: IV

Advanced Optimization Techniques

Multi stage optimization – dynamic programming; stochastic programming; Multi objective optimization, Genetic algorithms and Simulated Annealing technique.

UNIT: V

Static and Dynamic Applications

Structural applications – Design of simple truss members – Design of simple axial, transverse loaded members for minimum cost, weight – Design of shafts and torsionally loaded members – Design of springs. Dynamic Applications – Optimum design of single, two degree of freedom systems, vibration absorbers. Application in Mechanisms – Optimum design of simple linkage mechanisms.

TEXT BOOK(S)

Kalyanmoy Deb, "Optimization for Engineering Design: Algorithms and Examples", PHI Learning Private Limited, 2nd Edition, 2012.

Rao Singiresu S., "Engineering Optimization – Theory and Practice", New Age International Limited, New Delhi, 3rd Edition, 2013.

Rajasekaran S and VijayalakshmiPai, G.A, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2011

REFERENCE BOOKS

1 Goldberg, David .E, "Genetic Algorithms in Search, Optimization and Machine Learning", Pearson, 2009.

2 Srinivasan G, "Operations Research Principles and Applications", PHI, 2017.

Mapping of CO's- PO's-PSO's

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

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

IV B.Tech – I Semester

L	T	P	C
3	0	0	3

20AEE65 RAILWAY TRACTION DESIGN

(Job Oriented Elective -IV)

COURSE OUTCOMES:

After successful ompletion of this Course, the student will be able to

CO1: Understand traction Systems and various Power supply in Electric Traction

CO2: Analyze the heating and cooling of electric motor

CO3: Analyze Various Different types of power supply.

CO4: Apply the knowledge of illumination for the indoor and outdoor system.

CO5: Analyze the Estimating and Costing of Electric Installation.

UNIT-I

INTRODUCTION

Electric Traction Introduction: System of D.C and A.C traction train movement and energy consumption, Electric Traction motor, their starting speed, control and braking, System of power supply in traction, Modern method of speed control and starting.

UNIT-II

ELECTRIC HEATING AND COOLING

Introduction, different methods of heating, Resistance, Dielectric, Induction and arc heating, Heating and cooling of electric motors. Cooling:- Method of cooling by air, hydrogen and water, forced and natural cooling.

UNIT-III

POWER SUPPLY FOR ELECTRIC TRACTION

Current collection system, current collectors for Over Head Systems, Overhead construction for Tramways and trolley buses and railways, Sag and Tension calculation for a trolley wire, Traction substations, location of substations, feeding and distributing system, substation equipment's. Block Diagram of AC Electric locomotive, Signaling interference in telecommunication circuits

UNIT-IV

ILLUMINATION

Introduction, Nature of radiation, Definition, polar curves, laws of illumination, luminous efficiency, Sources of light, incandescent, vapour, Florescent, lighting calculation, Factory lighting, Flood lighting, Street lighting essential.

UNIT-V

ESTIMATING AND COSTING OF ELECTRIC INSTALLATION

Introduction, Type of wiring, Design of light, fan, alarm circuit and drawing of panel board, Electric installation for building, hotels, offices, workshops, playground, street and road lighting, Estimation and costing of electrical installation, House wiring and workshop lighting.

TEXTBOOKS:

1. Utilization of Electric Power & Electric Traction by G.C Garg, Khanna Publishers Delhi
2. Electrical Installation Estimating & Costing by J. B. Gupta, S. K. Kataria & Sons

REFERENCE BOOKS

1. Book by V.K.Mehta, Rohit Mehta, S Chand & Company Limited, New Delhi.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	--	--	--	--	--	--	--	--	3	2	2
CO2	3	3	2	2	--	--	--	--	--	--	--	--	3	2	2
CO3	2	2	2	1	--	--	--	--	--	--	--	--	2	1	2
CO4	2	3	2	1	--	--	2	--	--	--	--	--	2	1	2
CO5	3	2	3	2	--	1	2	1	--	--	--	--	2	2	3
Average	2.60	2.40	2.20	1.40	0.00	0.20	0.80	0.20	0.00	0.00	0.00	0.00	2.40	1.60	2.20
Level of Correlation of the Course	3	3	2	1			1						3	2	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B.Tech – I Semester

L	T	P	C
3	0	0	3

20AEE66 INDUSTRIAL AUTOMATION

(Job Oriented Elective -IV)

COURSE OUTCOMES:

After successful completion of the course student will be able to

CO1: Understand about overall technology of Industrial Automation and Control.

CO2: Understand about architecture of automation systems, measurement systems.

CO3: Analyze the PLC, sensors and signal conditioning.

CO4: Interpret the programming knowledge for embedded computing

CO5: Analyze the Hydraulic control systems and CNC Machines for higher level automation.

UNIT –I

INTRODUCTION TO INDUSTRIAL AUTOMATION:

Introduction to Industrial Automation, Architecture of Industrial Automation Systems, Measurement Systems Characteristics, Data Acquisition Systems.

UNIT –II

AUTOMATIC CONTROL:

Introduction to Automatic Control, P-I-D Control, PID Control Tuning, Feedforward Control Ratio Control, Time Delay Systems and Inverse Response Systems, Special Control Structures, Process Control.

UNIT –III

SEQUENCE CONTROL:

Introduction to Sequence Control, PLC, RLL, Sequence Control. Scan Cycle, Simple RLL Programs and syntax, A Structured Design Approach to Sequence Control, PLC Hardware Environment, Flow Control Valves.

UNIT –IV

HYDRAULIC CONTROL SYSTEMS:

Introduction to Hydraulic Control Systems, Industrial Hydraulic Circuit, Pneumatic Control Systems, Energy Savings with Variable Speed Drives.

UNIT –V

CNC MACHINES:

Introduction to CNC Machines, The Field bus Network, Higher Level Automation Systems.

TEXT BOOKS:

1. Industrial Instrumentation, Control and Automation, S. Mukhopadhyay, S. Sen and A. K. Deb, Jaico Publishing House, 2013

2.Chemical Process Control, An Introduction to Theory and Practice, George Stephanopoulos, Prentice Hall India, 2012

REFERENCES:

1. Electric Motor Drives, Modelling, Analysis and Control, R. Krishnan, Prentice Hall India, 2002
2. Hydraulic Control Systems, Herbert E. Merritt, Wiley, 1991

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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	3
CO3	3	2	3	3	--	--	--	--	--	--	--	2	2	3	3
CO4	3	3	2	3	--	--	--	--	--	--	--	2	2	3	3
CO5	2	2	3	2	--	--	--	--	--	--	--	2	3	3	3
Average	2.80	2.60	1.6	2.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.60	3.00	3.00
Level of Correlation of the Course	3	3	2	3								1	3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B.Tech – I Semester

L	T	P	C
3	0	0	3

20AEE67 EMBEDDED SYSTEM DESIGN

(Skill Oriented Course)

COURSE OUTCOMES:

After successful completion of the course student will be able to

CO1: Interpret knowledge about principles, analysis and design of hybrid and electric vehicles,

CO2: Analyze hybrid and electric drive train

CO3: Analyze electric machines used for hybrid and electric vehicle.

CO4: Design electric machines used for hybrid and electric vehicle.

CO5: Analyze different types of Hybrid Electric Vehicles

List of Experiments:

1. Arithmetic operations
2. 8 bit arithmetic operation with stack pointer:
3. Direct and indirect addressing
4. Accessing scratchpad ram
5. Creating variable arrays
6. Interfacing of RS232
7. Interfacing of LCD display
8. Interfacing of Elevator
9. Interfacing of Keypad
10. Interfacing of SSR Buzzer DC Motor
11. Interfacing of Stepper motor

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific 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
CO3	3	2	3	2	--	--	--	--	3	--	--	--	2	2	2
CO4	3	3	2	3	3	--	--	--	2	--	--	1	2	3	3
CO5	3	2	3	2	2	--	--	--	2	--	--	2	3	3	2
Average	3.00	2.60	2.80	2.60	1	0.00	0.00	0.00	2.6	0.00	0.00	0.60	2.60	2.80	2.60
Level of Correlation of the Course	3	2	3	2	1				3				3	2	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B.Tech – I Semester

L	T	P	C
2	0	0	0

20AMB12 PROFESSIONAL ETHICS

(Common to CE, EEE, ME, ECE, CSE, IT, CSE (AI&ML) & CSE(DS))

COURSE OUTCOMES:

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

CO1: Identify and analyze an ethical issue in the relevant field.
CO2: Apply specific ethical theories to current social issues.
CO3: Identify significant problems in contemporary professional ethics.
CO4: Explain the ethical roles of engineers in industry and society.
CO5: 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.

Mapping of CO’s- PO’s-PSO’s

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	2	3	-	-	-	-	3	3	3
CO2	-	-	-	-	-	-	2	3	-	-	-	-	3	3	3
CO3	-	-	-	-	-	-	2	3	-	-	-	-	2	3	3
CO4	-	-	-	-	-	-	2	3	-	-	-	-	2	3	3
CO5	-	-	-	-	-	-	2	3	-	-	-	-	3	3	3
Average	-	-	-	-	-	-	2	3	-	-	-	-	2.60	3.00	3.00
Level of Correlation of the Course	-	-	-	-	-	-	2	3	-	-	-	-	3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

IV B.Tech – I Semester

L	T	P	C
0	0	0	3

20AEE68 SUMMER INTERNSHIP 2 MONTHS
(MANDATORY)
AFTER THIRD YEAR

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B.Tech – II Semester

L	T	P	C
0	0	24	12

20AEE71 MAJOR PROJECT

PROJECT WORK, SEMINAR AND INTERNSHIP IN INDUSTRY

HONOR DEGREE

POOL (I – V)

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

II B.Tech – II Semester (EEE)

L	T	P	C
3	1	0	4

20AEE72 SPECIAL ELECTRICAL MACHINES

(Honor Degree POOL – I)

COURSE OUTCOMES:

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

CO1: Apply the construction and Working principle of specialized electrical machines.

CO2: Apply the conceptual knowledge of special electrical machines in relevance to industry and society.

CO3: Analyze the operation and performance of special electrical machines for various operating conditions.

CO4: Analyze the various characteristics on special electrical machines.

CO5: Design suitable accessories for desired operation and control of special electrical machines.

UNIT-I STEPPER MOTORS:

Introduction, classification, single phase, Disc Magnet and Claw-tooth stepper motors, inference from Torque equation, (no derivation) static and dynamic characteristics, open loop and closed loop control, concepts of Microprocessor based control, comparison of conventional stepper motors with permanent magnet stepper motor.

UNIT-II SWITCHED RELUCTANCE MOTOR (SRM):

Construction, Principle of working, constraints on pole arc and tooth arc, Inference from torque equation and Characteristics, Control of SRM, features of Microprocessor based control of SRM, Introduction to Synchronous Reluctance Motor.

UNIT-III PMDC AND BLDC MOTOR:

PMDC Motor: Construction, Principle of working Minor hysteresis loops and recoil line, Equivalent circuit of PM, Inference from Torque equation, performance Characteristics, moving coil-motors Printed Circuit Motor BLDC Motor: Construction, principle of working, types, and control types and differences among various controls such as Microprocessor based sensor less control.

UNIT-IV LINEAR ELECTRIC MACHINES:

Construction, equivalent circuit, characteristics, design aspects and control, Types such as – linear synchronous motor, DC Linear motor, Linear Reluctance motor and Linear Levitation Machines(elementary treatment only)

UNIT-V PERMANENT MAGNET AXIAL FLUX (PMAF) MACHINES:

Construction, Armature windings – Toroidal stator, Trapezoidal stator, Rhomboidal Stator winding, salient features of torque equation, EMF equations and Output equation [No derivations], Phasor diagram, Applications; Introduction to Permanent Magnet Synchronous Motor.

TEXT BOOKS:

1. E.G. Janardhan, "Special Electrical Machines", Prentice Hall India, 2014.

2. K. Venkatarathnam, "Special Electrical Machines", Universities Press (India) Pvt. Ltd., 2013,

REFERENCE BOOKS:

1. T. Kenjo and S. Nugatory, Permanent-Magnet and Brushless DC Motors, clarenden press, Oxford, 1984.
2. T.J.E. Miller, Brushless Permanent Magnet and Reluctance Motor Drives, clarenden press, Oxford 1989.
3. Takashi Kenjo, Stepping Motors and their Microprocessor controls, clarenden press, Oxford, 2017.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	--	--	3	--	--	--	--	--	--	--	3	2	2
CO2	3	3	--	3	2	--	--	--	--	--	--	--	2	3	2
CO3	3	2	--	3	2	2	--	--	--	--	--	--	2	2	2
CO4	3	3	2	3	2	2	--	--	--	--	--	--	2	3	3
CO5	3	2	3	2	2	2	--	--	--	--	--	--	2	2	2
Average	3.00	2.60	1.00	2.20	2.20	1.2	0.00	0.00	0.00	0.00	0.00	0.00	2.20	2.40	2.20
Level of Correlation of the Course	3	3	1	2	2	1							2	3	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech – II Semester (EEE)

L	T	P	C
3	1	0	4

20AEE73 MICRO ELECTRONIC DEVICES AND SENSORS

(Honor Degree POOL – I)

COURSE OUTCOME:

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

CO1: Apply structure and underlying the microelectronics concepts.

CO2: Apply different types of sensors and actuators used in robotic systems

CO3: Analyze various electronics devices and vital parameters

CO4: Analyze and select suitable sensor for force, magnetic field, and position.

CO5: Analyze working principle, construction, application and characteristics of optical, pressure, temperature and other sensors.

UNIT -I PHYSICS OF MOS TRANSISTORS

Electronics versus Microelectronics- Examples of Electronic Systems - Structure of MOSFET- Operation of MOSFET - MOS Device Models - PMOS Transistor - CMOS Technology- Comparison of Bipolar and MOS Devices.

UNIT-II CMOS AMPLIFIERS

General Considerations - Common-Source Stage - Common-Gate Stage - Source Follower- Design Examples-Real time Clock/Calendar

UNIT-III DIFFERENTIAL AMPLIFIERS

General Considerations - Bipolar Differential Pair - MOS Differential Pair - Cascade Differential Amplifiers - Common-Mode Rejection - Differential Pair with Active Load

UNIT-IV SENSORS

Sensors types and classification – mechanical, acoustic, magnetic, thermal, chemical, radiation and biosensors - Micro sensors - Sensors based on surface-acoustic wave devices- Sensors and smart structures - Micro-opto-electro-mechanical sensors and system.

UNIT -V SENSORS FOR ROBOTICS

Proximity Sensors: Typical Sensor Characteristics - Technologies For Proximity Sensing - Electro-Optical Sensors - Capacitive Sensors - Magnetic Sensors- Position Encoders - Resonant Sensors -

SAW Sensors - Sensors Based On Semiconductor Junctions - Sensors Based On MOSFET Transistors - Charge-Coupled And CMOS Image Sensors - Fiber-Optic Sensors, Ultrasonic-Based Sensors, Biosensors.

TEXT BOOKS:

1. Behzad Razavi, Fundamentals of Microelectronics, 2nd Edition**,** 2013
2. Ristic L (ed), "Sensor Technology and Devices", Artech House, London, 1994.

REFERENCES BOOKS:

1. Sze S.M. (ed), "Semiconductor Sensors", John Wiley, New York, 1994
2. S.R Ruocco, Robot sensors and Transducers, Springer, 2013
3. Paul. W.Chapman, "Smart sensors" ISA Publications, 1996.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	--	2	1	--	--	--	--	--	--	3	2	2
CO2	3	3	3	3	--	2	--	--	--	--	--	--	2	3	2
CO3	3	2	2	1	2	2	--	--	--	--	--	--	2	2	1
CO4	3	3	2	3	--	2	--	--	--	--	--	--	2	3	3
CO5	3	2	3	2	2	1	--	--	--	--	--	--	1	2	2
Average	3.00	2.60	1.00	1.80	1.20	1.60	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.40	2.00
Level of Correlation of the Course	3	3	2	2	2	2							2	3	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech – II Semester (EEE)

L	T	P	C
3	1	0	4

20AEE74 INDUSTRIAL ELECTRICAL SYSTEMS

(Honor Degree POOL – I)

COURSE OUTCOMES:

After successful completion of this course, students will able to:

1. Apply various components of industrial electrical systems
2. Apply residential and commercial electrical wiring rules and guidelines for installation of electrical systems
3. Analyze various Illumination schemes and lighting systems
4. Analyze HT connection, Industrial loads and LT panel components
5. Analyze proper size of various electrical system components

UNIT-I ELECTRICAL SYSTEM COMPONENTS:

LT system wiring components, selection of cables, wires, switches, distribution box, metering system, Tariff structure, single line diagram (SLD) of a wiring system, Electric shock and Electrical safety practices (Elementary treatment only)

UNIT-II RESIDENTIAL AND COMMERCIAL ELECTRICAL SYSTEMS:

Types of residential and commercial wiring systems, general rules and guidelines for installation, load calculation and sizing of wire, rating of main switch, distribution board and protection devices, earthing system calculations, requirements of commercial installation, deciding lighting scheme and number of lamps, ear thing of commercial installation, selection and sizing of components. (Elementary treatment only)

UNIT-III ILLUMINATION SYSTEMS:

Understanding various terms regarding light, lumen, intensity, candle power, lamp efficiency, specific consumption, glare, space to height ratio, waste light factor, depreciation factor, various illumination schemes, Incandescent lamps and modern luminaries like CFL, LED and their operation, energy saving in illumination systems, design of a lighting scheme for a residential and commercial premises, flood lighting. (Elementary treatment only)

UNIT-IV INDUSTRIAL ELECTRICAL SYSTEMS-I:

HT connection, industrial substation, Transformer selection, Industrial loads, Earthing design, Introduction to PCC, MCC panels. Specifications of LT Breakers, MCB and other LT panel components. (Elementary treatment only)

UNIT-V INDUSTRIAL ELECTRICAL SYSTEMS II:

DG Systems, UPS System, Electrical Systems for the elevators, Battery banks, Sizing the DG, UPS and Battery Banks, Selection of UPS & Battery Banks. (Elementary treatment only).

Text Books:

1. S. L. Uppal and G. C. Garg, "Electrical Wiring, Estimating & Costing", Khanna publishers, 2008.
2. K. B. Raina, "Electrical Design, Estimating & Costing", New age International, 2007.

Reference Books:

1. S. Singh and R. D. Singh, "Electrical estimating and costing", Dhanpat Rai and Co., 1997.
2. H. Joshi, "Residential Commercial and Industrial Systems", McGraw Hill Education, 2008.
3. Hemant Joshi "Residential, Commercial and Industrial Electrical Systems: Equipment and selection Volume 1 of Residential, Commercial and Industrial Electrical Systems", Tata McGraw-Hill Education, 2008.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	--	2	2	1	--	--	--	--	--	--	3	2	2
CO2	3	3	--	3	--	2	--	--	--	--	--	--	1	3	2
CO3	3	2	2	1	3	2	--	--	--	--	--	--	2	2	3
CO4	3	3	2	3	--	2	--	--	--	--	--	--	2	3	3
CO5	3	2	3	2	3	1	--	--	--	--	--	--	1	2	3
Average	3.00	2.60	1.2	2.20	1.60	1.60	0.00	0.00	0.00	0.00	0.00	0.00	1.80	2.40	2.60
Level of Correlation of the Course	3	3	1	3	2	2							2	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech – II Semester (EEE)

L	T	P	C
3	1	0	4

20AEE75 ELECTRICAL DISTRIBUTION SYSTEMS

(Honor Degree POOL – I)

Course Outcomes:

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

1. Apply concept of load characteristics and different types of distribution networks.
2. Apply concept of sub-transmission lines, feeders and effects of series and shunt capacitors.
3. Apply the concepts of different types of Distribution feeders.
4. Analyze the voltage drop, Power loss and voltage control methods in distribution system.
5. Apply the concept of distribution system in Automation and SCADA.

UNIT-I LOAD CHARACTERISTICS:

Demand, demand curve, load duration curve, Diversified demand, Non-coincident Demand, Coincidence factor, Contribution factor problems, Relationship between load and loss factors of load growth, Rate structure, Customer billing, Classification of loads(residential, commercial, agricultural, and industrial) and their characteristics.

UNIT-II SUB-TRANSMISSION LINES AND SUBSTATIONS:

Types of sub-transmission lines, Distribution substations, Substation bus schemes, Rating of distribution substation, Service area with multiple feeders, Percent voltage drop calculations.

UNIT-III PRIMARY AND SECONDARY FEEDERS:

Types of primary systems, Radial type, Loop type and Primary network, Primary feeder loading, radial feeder with uniformly distributed load, Secondary voltage levels, Secondary banking, Secondary networks.

UNIT-IV VOLTAGE DROP AND POWER LOSS CALCULATIONS:

Voltage drop and power loss calculations, 3- phase, Non 3-phase primary lines, Single phase two-wire laterals with ungrounded neutral, Single phase two wire ungrounded laterals, two phase plus neutral, Method to analyze voltage costs, Voltage control methods, Feeder voltage regulators.

UNIT-V APPLICATION OF CAPACITORS TO DISTRIBUTION SYSTEMS:

Effects of series and shunt capacitors, Power factor correction, Economic justification for capacitors, Location and sizing of capacitors in distribution system. Distribution System Automation: Definitions, control functions, Level of penetration of DA, Types of communication systems, Supervisory Control and Data Acquisition (SCADA).

TEXT BOOKS:

1. Turan Gonen, Electric Power Distribution Engineering, TMH, 3rd Edition, 2016.
2. A. S. Pabla, Electrical Power Distribution, TMH, 6th Edition, 2012.

REFERENCE BOOKS:

1. M.K. Khed Kar, G.M.Dhole, Electrical Power Distribution automation, Laxmi Publications, 2010.
2. William Kersting, Distribution System Modelling and Analysis, 3rd Edition CRC Press, 2015.
3. S.Sivanagaraju, and V.Sankar , Electric Power Distribution and Automation , Dhanpat Rai & Co,2012.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	--	2	2	1	--	--	--	--	--	--	3	2	2
CO2	3	3	3	3	2	2	--	--	--	--	--	--	2	3	2
CO3	3	2	2	1	2	2	--	--	--	--	--	--	2	2	2
CO4	3	3	2	3	2	2	--	--	--	--	--	--	2	3	3
CO5	3	2	3	2	2	1	--	--	--	--	--	--	1	2	2
Average	3.00	2.60	1.6	2.20	2.00	1.60	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.40	2.20
Level of Correlation of the Course	3	3	2	3	2	2							2	3	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech – I Semester

L	T	P	C
3	1	-	4

20AEE76 ELECTRICAL MACHINE MODELING & ANALYSIS

(HONOR POOL -II)

COURSE OUTCOMES:

After successful completion of the course student will be able to

CO1: Emphasis the basic concepts of machine modeling

CO2: Develop mathematical model of dc motor

CO3: Analyze on the abc to dq and dq to abc transformations to develop

CO4: Analyze the Mathematical model of single-phase induction machine

CO5: Design control strategies based on dynamic modeling of 3-ph Induction machines and 3- phase synchronous machine.

UNIT I

PRINCIPLES OF MACHINE MODELLING

Basic concepts of modeling Basic Two-pole Machine representation of Commutator machines, 3-phase synchronous machine with and without damper bars and 3-phase induction machine, Kron's primitive Machine-voltage, current and Torque equations.

UNIT II

MODELLING OF DC MACHINES

DC machine modeling Mathematical model of separately excited D.C Motor – Steady State analysis-Transient State analysis-Sudden application of Inertia Load-Transfer function of Separately excited D.C Motor- Mathematical model of D.C Series motor, Shunt motor-Linearization Techniques for small perturbations.

UNIT III

MODELLING OF SINGLE PHASE INDUCTION MACHINE

Reference frame theory & Modeling of single phase Induction Machines Linear transformation-Phase transformation - three phase to two phase transformation (abc to dq0) and two phase to three phase transformation dq0 to abc -Power equivalence- Mathematical modeling of single phase induction machines.

UNIT IV

MODELLING OF THREE PHASE INDUCTION MACHINE

Modeling of three phase Induction Machine Generalized model in arbitrary reference frame-Electromagnetic torque-Derivation of commonly used Induction machine models- Stator reference frame model-Rotor reference frame model-Synchronously rotating reference frame model-state space model with flux linkages as variables.

UNIT V

MODELLING OF SYNCHRONOUS AND SPECIAL MACHINES

Modeling of Synchronous Machine Synchronous machine inductances–voltage equations in the rotor's dq0 reference frame-electromagnetic torque-current in terms of flux linkages-three phase synchronous machine model. Modeling of Special Machines - Modeling of PM Synchronous motor, modeling of BLDC motor and modeling of Switched Reluctance motor.

TEXT BOOKS:

1. Generalized theory of Electrical Machinery –P.S.Bimbra- Khanna Publishers.
2. Electric Motor Drives - Modeling, Analysis& control -R.Krishnan- Pearson Publications1st edition -2002.

REFERENCE BOOKS:

1. Analysis of Electrical Machinery and Drive systems – P.C.Krause, OlegWasynczuk, Scott D.Sudhoff – Second Edition-IEEE Press.
2. Dynamic simulation of Electric machinery using Matlab / Simulink –CheeMunOng-PHl.
3. Modern Power Electronics and AC Drives-B.K. Bose - PHI

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	--	--	--	--	--	--	--	--	--	3	2	2
CO2	3	3	3	3	--	--	--	--	--	--	--	--	3	3	2
CO3	3	2	3	1	--	--	--	--	--	--	--	--	2	2	1
CO4	3	3	2	3	--	--	--	--	--	--	--	--	2	3	3
CO5	3	2	3	2	--	--	--	3	--	--	--	--	3	2	1
Average	3.00	2.60	2.80	1.80	0.00	2.20	0.00	0.60	0.00	0.00	0.00	0.00	2.60	2.40	1.80
Level of Correlation of the Course	3	3	3	2		2							3	3	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech – I Semester

L	T	P	C
3	1	-	4

20AEE77 POWER SYSTEMS DYNAMICS AND CONTROL (HONOR POOL -II)

COURSE OUTCOMES:

After successful completion of the course student will be able to

CO1: Analyze fundamental dynamic behavior and controls of power systems to perform basic stability analysis.

CO2: Comprehend concepts in modeling and simulating the dynamic phenomena of power Systems

CO3: Interpret the system dynamics for system stability studies.

CO4: Analyze theory and practice of modeling main power system components.

CO5: Analyze the concepts synchronous machines, excitation systems and governors.

UNIT I

INTRODUCTION TO POWER SYSTEM DYNAMICS AND STABILITY:

Basic Concepts of Dynamic Systems and Stability Definition, Small Signal Stability (Low Frequency Oscillations) of Unregulated and Regulated System, Effect of Damper, Detailed study of technique to improve stability

UNIT II .

STABILITY ANALYSIS IN POWER SYSTEM

Asynchronous operation and resynchronization, Multi-Machine stability, Dynamic analysis of Voltage stability, frequency stability. Transients: Per unit system, Sub-transient, steady state, transient inductance and Time constants.

UNIT III

DYNAMICS OF SYNCHRONOUS MACHINES

Simplified models of synchronous machines.Mathematical description of synchronous machine, fundamental of magnetic circuit, basic equation of synchronous machine, Park's transformation. Steady state analysis with phasor diagram, equation of motion. Synchronous machine representation in stability studies. Rotor angle stability, Power V/s angle relationship and transient stability.

UNIT IV

GOVERNING MECHANISM

Effect of governor action and excite on power system stability effect of saturation, saliency & automatic voltage regulators on stability.

UNIT V

EXCITATION SYSTEMS:

Rotating Self-excited Exciter with direct acting Rheostatic type voltage regulator – Rotating main and Pilot Exciters with Indirect Acting Rheostatic Type Voltage Regulator – Rotating Main Exciter, Rotating Amplifier and Static Voltage Regulator – Static excitation scheme – Brushless excitation system.

TEXT BOOKS:

1**.** Power System Stability by Kimbark Vol. I&II, III, Willey.

2. Power System control and stability by Anderson and Fund, IEEE Press.

3. M.A.Pai and W.Sauer, 'Power System Dynamics and Stability', Pearson Education Asia, India, 2002.

REFERENCE BOOKS:

1. James A.Momoh, Mohamed. E. EI-Hawary. "Electric Systems, Dynamics and Stability with Artificial Intelligence applications", Marcel Dekker, USA First Edition, 2000.

2. C.A.Gross, "Power System Analysis," Wiley India, 2011.

3. M.Weedy, B.J.Lory, N.Jenkins, J.B.Ekanayake and G.Strbac," Electric Power Systems", Wiley India, 2013.

4. K.Umarao, "Computer Techniques and Models in Power System," I.K. International, 2007.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	--		--	--	--	--	--	--	3	2	2
CO2	3	3	3	3	--	3	--	--	--	--	--	--	3	3	2
CO3	3	2	3	3	--	--	--	--	--	--	--	--	3	3	3
CO4	3	3	2	3	--	3	--	--	--	--	--	--	3	3	3
CO5	3	2	3	2	--	3	--	3	--	--	--	--	3	3	3
Average	3.00	2.60	2.80	2.80	0.00	1.80	0.00	0.60	0.00	0.00	0.00	0.00	3.00	2.80	2.60
Level of Correlation of the Course	3	3	3	2		2							3	3	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech – I Semester

L	T	P	C
3	1	-	4

20AEE78 MODERN CONTROL THEORY

(HONOR POOL -II)

COURSE OUTCOMES:

After successful completion of the course student will be able to

CO1: Analyze the basic and modern control system for the real time analysis and design of control systems.

CO2: Analyze the state variables analysis for any real time system.

CO3: Apply the concept of optimal control to any system.

CO4: Implement basic principles and techniques in designing linear control systems.

CO5: Apply knowledge of control theory for practical implementations in engineering and network

UNIT - I

MATHEMATICAL PRELIMINARIES AND STATE VARIABLE ANALYSIS:

Fields, Vectors and Vector Spaces – Linear combinations and Bases – Linear Transformations and Matrices – Scalar Product and Norms – Eigen values, Eigen Vectors and a Canonical form representation of Linear systems – The concept of state – State space model of Dynamic systems – Time invariance and Linearity – Non uniqueness of state model – State diagrams for Continuous-Time State models - Existence and Uniqueness of Solutions to Continuous-Time State Equations – Solutions of Linear Time Invariant Continuous-Time State Equations – State transition matrix and it's properties. Complete solution of state space model due to zero input and due to zero state.

UNIT - II

CONTROLLABILITY AND OBSERVABILITY:

General concept of controllability – Controllability tests, different state transformations such as diagnolization, Jordon canonical forms and Controllability canonical forms for Continuous-Time Invariant Systems – General concept of Observability – Observability tests for Continuous-Time Invariant Systems – Observability of different State transformation forms.

UNIT - III

STATE FEEDBACK CONTROLLERS AND OBSERVERS:

State feedback controller design through Pole Assignment, using Ackkermans formula– State observers: Full order and Reduced order observers.

UNIT - IV

NON-LINEAR SYSTEMS:

Introduction – Non Linear Systems - Types of Non-Linearities – Saturation – Dead-Zone - Backlash – Jump Phenomenon etc; Linearization of nonlinear systems, Singular Points and its types– Describing function–describing function of different types of nonlinear elements, – Stability analysis of Non-Linear systems through describing functions. Introduction to phase-plane analysis, Method of Isoclines for Constructing Trajectories, Stability analysis of nonlinear systems based on phase-plane method.

UNIT – V

STABILITY ANALYSIS:

Stability in the sense of Lyapunov, Lyapunov's stability, and Lypanov's instability theorems - Stability Analysis of the Linear continuous time invariant systems by Lyapunov second method – Generation of Lyapunov functions – Variable gradient method – Krasooviski's method.

TEXT BOOKS:

1. M. Gopal, Modern Control System Theory by – New Age International - 1984
2. Ogata. K, Modern Control Engineering by– Prentice Hall - 1997
3. N K Sinha, Control Systems– New Age International – 3rd edition.

REFERENCES:

1. Donald E. Kirk, Optimal Control Theory an Introduction, Prentice - Hall Network series - First edition.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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	--	--	--	--	--	--	--	--	3	3	3
CO3	3	3	3	3	--	--	--	--	--	--	--	--	3	3	3
CO4	3	3	3	3	3	--	--	--	--	--	--	--	3	3	3
CO5	3	3	3	3	--	2	--	3	--	--	--	--	3	3	3
Average	3.00	3.00	3.00	2.40	0.60	0.4	0.00	0.60	0.00	0.00	0.00	0.00	3.00	3.00	2.80
Level of Correlation of the Course	3	3	3	2									3	3	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech – I Semester

L	T	P	C
3	1	-	4

20AEE79 REACTIVE POWER COMPENSATION & MANAGEMENT

(HONOR POOL -II)

COURSE OUTCOMES:

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

CO1: Understand the load compensation in symmetrical and unsymmetrical loads

CO2: Apply various compensation methods in transmission lines

CO3: Analyze the model for reactive power coordination

CO4: Analyze the demand side reactive power management.

CO5: Analyze the user side management of reactive power in transmission lines.

UNIT-I

LOAD COMPENSATION: Objectives and specifications – reactive power characteristics – inductive and capacitive approximate biasing – Load compensator as a voltage regulator – phase balancing and power factor correction of unsymmetrical loads- examples.

UNIT-II

STEADY – STATE REACTIVE POWER COMPENSATION IN TRANSMISSION SYSTEM: Uncompensated line – types of compensation – Passive shunt and series and dynamic shunt compensation –examples Transient state reactive power compensation in transmission systems: Characteristic time periods – passive shunt compensation – static compensations- series capacitor compensation – compensation using synchronous condensers – examples

UNIT-III

REACTIVE POWER COORDINATION: Objective – Mathematical modeling – Operation planning – transmission benefits – Basic concepts of quality of power supply – disturbances- steady –state variations – effects of under voltages – frequency –Harmonics, radio frequency and electromagnetic interferences

UNIT-IV

DEMAND SIDE MANAGEMENT:

Load patterns – basic methods load shaping – power tariffs- KVAR based tariffs penalties for voltage flickers and Harmonic voltage levels Distribution side Reactive power Management:: System losses –loss reduction methods – examples – Reactive power planning – objectives – Economics Planning capacitor placement – retrofitting of capacitor banks

UNIT-V

USER SIDE REACTIVE POWER MANAGEMENT:

KVAR requirements for domestic appliances – Purpose of using capacitors – selection of capacitors – deciding factors – types of available capacitor, characteristics and Limitations Reactive power management in electric traction systems and are furnaces: Typical layout of traction systems – reactive power control requirements – distribution transformers- Electric arc furnaces – basic operations- furnaces transformer –filter requirements – remedial measures –power factor of an arc furnace

TEXT BOOKS:

1. Reactive power control in Electric power systems by T.J.E. Miller, John Wiley and sons, 1982.
2. Reactive power Management by D. M. Tagare, Tata McGraw Hill, 2004.

REFERENCE BOOKS:

1. Wolfgang Hofmann, Jurgen Schlabbach, Wolfgang Just "Reactive Power Compensation: A Practical Guide, April, 2012, Wiely publication.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	--	--	--	--	--	--	--	--	3	3	3
CO2	3	3	3	3	--	--	--	--	--	--	--	--	3	3	2
CO3	3	3	3	3	--	2	--	--	--	--	--	--	3	2	3
CO4	3	3	3	3	--	2	--	--	--	--	--	--	3	3	3
CO5	3	2	3	2	--	3	--	--	--	--	--	--	3	2	3
Average	3.00	2.80	3.00	2.80	0.00	1.60	0.00	0.60	0.00	0.00	0.00	0.00	3.00	2.60	2.80
Level of Correlation of the Course	3	3	3	3		2							3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech – II Semester	**L**	**T**	**P**	**C**
	3	**1**	**-**	**4**

20AEE80 POWER ELECTRONIC CONVERTERS APPLICATION FOR DC AND AC DRIVES

(HONOR POOL -III)

COURSE OUTCOMES:

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

CO1: Apply the knowledge of power electronics and motor dynamics to understand the Electrical drive

CO2: Apply the discriminate different power converter control to be applied for different Electrical machines

CO3: Analyze the phase rectifier and chopper circuits for the speed control of DC Machines

CO4: Analyze the classic and modern control method in induction and synchronous motor drives

CO5: Analyze the Digital control of power electronic based drives using modern devices for different industrial and domestic applications.

UNIT I

ELECTRIC DRIVE – FUNDAMENTALS

Electric Drives- Components of drive, Dynamics of motor-load system, multi quadrant operation, Selection of motor power rating, Thermal model of motor for heating and cooling, Classes of duty cycle- Determination of motor rating, Drive classifications, Modes of operation - Speed control, compatibility of motor & drives- Effects of drives on motor - dV/dt, THD, Common Mode Voltage, Shaft Voltage and Bearing Current, Closed loop control of electric drives. Energy consumption and energy saving in electric drive.

UNIT II

DC DRIVES : Dynamic model of machine with armature voltage control only and converters with continuous conduction only DC motors and their performance, Braking, Transient analysis. Controlled rectifier fed DC drives (Separately excited, DC series), Chopper controlled DC drives –

Single, two and Four quadrant operations. Applications

UNIT III

INDUCTION MOTOR DRIVE : Induction motor drives –, Principle of Scalar and vector control- V/f control, Stator control , Stator voltage and frequency control, AC chopper fed induction motor drives, Voltage source inverter- current source inverter - Z – source inverter fed induction motor drive Cyclo-converter fed induction motor drives. Rotor control- Static rotor resistance control and slip power recovery schemes(static Kramers drive & sherbius drive) matrix from element stiffness.Vector control of wound rotor induction machine using self-commutated converter cascade and improvement in power factor, Variable speed constant frequency (VSCF) generation.

UNIT IV

SYNCHRONOUS MOTOR DRIVE : Speed control of Synchronous motor drive - Principle of Scalar and vector control- V/f control of synchronous motor, Voltage source inverter and current source inverter fed synchronous motor drive, Z – source inverter fed drive, cycloconverter fed drive, Power Electronics Control of Permanent magnet synchronous machine, Applications

UNIT V

DIGITAL CONTROL OF DRIVES – INDUSTRIAL APPLICATIONS: Digital technique in speed control-Advantages and Limitations, Microprocessor based control of drives, Solar powered pump, Selection of drive and control engineering for Fan, Pump, Compressor, Lift-Elevator, Kiln, Winder-Un-Winder, Traction application.

TEXT BOOKS:

1. Gopal K. Dubey, " Power Semiconductor Controlled Drives", Prentice Hall, 1989.
2. Gopal K. Dubey, "Fundamentals of Electrical Drives", Alpha Science International Ltd, 2001.

REFERENCES:

1. Vedam Subramanyam, "Thyristor control of Electric Drives", Tata Mc Graw Hill, New Delhi 1991.
2. S.K.Pillai, " A First Course on Electrical Drives", New age international Publishers Pvt Ltd,1989,Reprint 2004.
3. P.C.Sen, "Thyristor DC Drives", John Wiley & Sons New York 1981. 4. B.K.Bose, "Power Electronic & AC drives", Prentice Hall, 2006

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific 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	2
CO3	3	2	3	3	--	3	--	--	--	--	--	--	3	3	2
CO4	3	3	3	3	--	3	--	--	--	--	--	--	3	3	3
CO5	3	3	3	2	--	3	--	--	--	--	--	--	3	2	2
Average	3.00	2.80	3.00	2.80	0.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00	3.00	2.80	2.40
Level of Correlation of the Course	3	3	3	3		3							3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech – II Semester

L	T	P	C
3	1	-	4

20AEE81 DISCRETE CONTROL SYSTEMS

(HONOR POOL -III)

COURSE OUTCOMES:

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

CO1: Apply the concepts of discrete control systems.

CO2: Analyze and design of discrete systems in state variable analysis.

CO3: Understand the concepts of stability analysis.

CO4: Analyze the discrete time systems.

CO5: Analyze the state space variables

UNIT I

CONCEPT & REPRESENTATION OF DISCRETE TIME SYSTEMS

Block Diagram of typical control system advantages of sampling in control systems – examples of discrete data and digital systems – data conversion and quantization – sample and hold devices – D/A and A/D conversion – sampling theorem – reconstruction of sampled signals. Z-transform: Definition of Z-transforms – mapping between s-plane and z-plane – inverse z- transform – properties of z-transforms - ROC of z-transforms –pulse transfer function –relation between G(s) and G(z) – signal flow graph method applied to digital control systems.

UNIT II

STATE SPACE ANALYSIS

State space modeling of discrete time systems – state transition equation of discrete time invariant systems – solution of time invariant discrete state equations: recursive method and the Z-Transformation method – conversion of pulse transfer function to the state model & vice versa – Eigen values – Eigen vectors of discrete time system-matrix (A) – Realization of pulse transformation in state space form, discretization of continuous time systems, Computation of state transition matrix and its properties. Response of sample data system between sampling instants.

UNIT III

CONTROLLABILITY, OBSERVABILITY & STABILITY TESTS

Concept of controllability, stabilizability, observability and reach ability - Controllability and observability tests, Transformation of discrete time systems into controllable and observable forms. Stability: Definition of stability – stability tests – The second method of Liapunov.

UNIT IV

DESIGN OF DISCRETE TIME CONTROLLERS AND OBSERVERS

Design of discrete time controller with bilinear transformation – Realization of digital PID controller-Design of deadbeat controller; Pole placement through state feedback.

UNIT V

STATE OBSERVERS

Design of - Full order and reduced order observers. Study of observer-based control design

TEXT BOOKS:

1. K. Ogata, Discrete-Time Control systems, Pearson Education/PHI, 2nd Edition.
2. V. I. George, C. P. Kurian, Digital Control Systems, Cengage Learning.
3. M. Gopal, Digital Control Engineering, New Age Int. Pvt. Ltd., 2014

REFERENCES:

1. Kuo, Digital Control Systems, Oxford University Press, 2nd Edition, 2003.
2. M. Gopal, Digital Control and State Variable Methods, TMH.
3. M. Sami Fadali Antonio Visioli, Digital Control Engineering Analysis and Design, Academic Press

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	--	3	--	--	--	--	--	--	3	2	3
CO2	3	3	3	3	3	--	--	--	--	--	--	--	3	3	3
CO3	3	2	3	1	3	2	--	--	--	--	--	--	2	2	3
CO4	3	3	3	3	--	2	--	--	--	--	--	--	2	3	3
CO5	3	2	3	2	--	3	--	--	--	--	--	--	3	2	3
Average	3.00	2.60	3.00	2.40	1.20	2.00	0.00	0.00	0.00	0.00	0.00	0.00	2.60	2.40	3.00
Level of Correlation of the Course	3	3	3	3	1	2							3	3	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B.Tech – II Semester

L	T	P	C
3	1	-	4

20AEE82 RELIABILITY ENGINEERING AND APPLICATIONS
(HONOR POOL -III)

COURSE OUTCOMES:

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

CO1: Understand the concept of elements of probability theory and probability distributions

CO2: Analyze types of failures, reliability block diagram reductions and network reduction techniques and markov modeling

CO3: Analyze the generation and load modeling, frequency and duration techniques and distribution system reliability indices

CO4: Analyze the failure rate distributions and network reduction techniques

CO5: Evaluate the power system networks using reliability concepts for adequacy and security

UNIT I

PROBABILITY THEORY

Introduction - rules for combining probabilities of events – bernoulli's trials, probability density and distribution functions - examples. Probability Distributions - discrete distributions - binomial distribution, poison distribution. Continuous distributions - exponential distribution, weibull distribution and normal distribution - mean, standard deviation, variance - examples.

UNIT II

NETWORK MODELLING AND RELIABILITY FUNCTIONS

Reliability block diagrams – series, parallel systems and combined series-parallel systems - examples. Reliability evaluation of non-series-parallel systems - decomposition method, cut-set method - deduction of the minimal cut-sets from the minimal paths, tie-set method – examples. Concept of redundancy - standby redundant systems, perfect switching, imperfect switching. Reliability analysis of series parallel networks using exponential distribution .Reliability functions f(t), F(T), R(T), H(T) and their relationships, bath tub curve, reliability measures - MTTF, MTTR, MTBF.

UNIT–III

MARKOV MODELLING AND FREQUENCY AND DURATION TECHNIQUES

Markov chain – concept of stochastic transitional probability matrix (STPM), evaluation of limiting state probabilities. Markov processes - time dependent probability evaluation – evaluation of limiting state probabilities using STPM – one, two component repairable models. Frequency and duration concept – evaluation of frequency of encountering state for one, two component repairable models – evaluation of cumulative probability and cumulative frequency of encountering of merged states.

UNIT–IV

GENERATION SYSTEM RELIABILITY ANALYSIS: Generation system reliability analysis - reliability model of a generation system – recursive relation for unit addition and removal. Load modeling - merging of generation load model – evaluation of transition rates for merged state model – cumulative probability, cumulative frequency of failure evaluation – LOLP, LOLE, LOEE - numerical problems.

UNIT–V

COMPOSITE SYSTEM AND DISTRIBUTION SYSTEM RELIABILITY ANALYSIS: Transmission system reliability analysis - system and load point reliability indices weather effects on transmission lines, weighted average rate and Markov model, Distribution system reliability analysis - radial networks – evaluation of basic reliability indices, performance indices – load point and system reliability indices – customer oriented, loss and energy oriented indices - numerical problems.

TEXT BOOKS:

1. Roy Billinton and Ronald N Allen, Reliability Evaluation of Engineering Systems,Springer, 2nd Edition, 2007.
2. Roy Billinton and Ronald N Allen, Reliability Evaluation of Power Systems, Springer,2nd Edition, 2007.

REFERENCE BOOKS:

1. V. Sankar, System Reliability Concepts, Himalaya Publishing House, 2015.
2. Charles E. Ebeling, An Introduction to Reliability and Maintainability Engineering, Tata McGraw-Hill, 2000.
3. E. Balagurusamy, Reliability Engineering, Tata McGraw Hill, 2003.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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	3	3
CO3	3	3	--	3	3	--	--	--	--	--	--	--	2	2	3
CO4	3	3	2	3	2	--	--	--	--	--	--	--	2	3	3
CO5	3	3	3	2	3	--	--	--	--	--	--	--	3	2	3
Average	3.00	3.00	1.00	2.80	1.6	0.00	0.00	0.60	0.00	0.60	0.00	0.00	2.60	2.60	2.80
Level of Correlation of the Course	3	3	1	3	2								3	3	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B.Tech – II Semester

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3	**1**	**-**	**4**

20AEE83 EHV AC TRANSMISSION SYSTEM
(HONOR POOL -III)

COURSE OUTCOMES:

After successful completion of the course student will be able to

CO1: Analyze the necessity of EHV AC transmission.

CO2: Analyze the key advantages and applications of EHVAC system.

CO3: Evaluate the line parameters in EHVAC Transmission line

CO4: Apply the concept of Corona and its effect on transmission line and travelling wave theory phenomenon.

CO5: Estimate statistical procedures for line designs.

UNIT-I

INTRODUCTION: Necessity of EHV AC transmission – Advantages and problems – Standard transmission voltages-Average values of line parameters- power handling capacity and line losses – Cost of transmission lines and equipment - Mechanical considerations.

UNIT-II

CALCULATION OF LINE PARAMETRS: Resistance of conductors-Properties of bundled conductors-Inductance and Capacitance of EHV line configuration-Sequence inductances and capacitances-Line parameters for modes of propagation.

UNIT-III

VOLTAGE GRADIENTS OF CONDUCTORS: Field of line charges and properties – Charge Potential relations for multi-conductors – Surface voltage gradient on conductors – Distributionof voltage gradient on sub-conductors of bundle.

UNIT-IV

CORONA EFFECTS: Power loss and corona loss - Corona loss formulae –Attenuation of travelling waves due to corona loss – Audible noise: Generation, characteristics and limits-AN measurement and meters – Measurement of RI, RIV and excitation functions.

UNIT-V

ELECTRO STATIC FIELD OF EHV LINES: Calculation of electrostatic field of AC lines –

Effect of high electrostatic field on humans, animals and plants – Electrostatic induction in unenergised circuit of double circuit line. **DESIGN OF EHV LINES:** Based on steady state limits with design examples.

TEXT BOOKS:

1. Rokosh Das Begamudre, Extra High Voltage AC Transmission Engineering, New ageinternational (P)Ltd., publishers, 3rd Edition, 2009.
2. Shobhit Gupta, Deepak Gupta, EHV AC/DC Transmission, Published by Genius Publications, 2014.

REFERENCE BOOKS:

1.Sunil S.Rao, EHV-AC HVDC Transmission & Distribution Engineering, KhannaPublishers, 3rd Edition, 2008.

2.A. Chakrabarti , D. P. Kothari and A. K. Mukhopadhyay, Performance, Operation andControl of EHV Power Transmission System, A H Wheeler Publishing Co Ltd, 1999.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	--	3	2	--	--	--	--	--	--	--	3	2	3
CO2	3	3	--	3	2	--	--	--	--	--	--	--	3	3	3
CO3	3	2	2	3	--	2	--	--	--	--	--	--	3	2	3
CO4	3	3	2	3	--	2	--	--	--	--	--	--	3	2	3
CO5	3	3	2	3	--	3	--	--	--	--	--	--	3	2	2
Average	3.00	2.80	1.2	3.00	0.80	1.40	0.00	0.00	0.00	0.00	0.00	0.00	3.00	2.20	2.80
Level of Correlation of the Course	3	3	1	3	1	1							3	2	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech – II Semester

L	T	P	C
4	-	-	4

20AEE84 POWER SEMICONDUCTOR DEVICES AND PROTECTION

(HONOR POOL -IV)

COURSE OUTCOMES:

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

CO1: Analyze the characteristics and operation of power semi conductor devices.

CO2: Design the cross section and switching characteristics of semi conductor devices.

CO3: Identify the occurrence of noise and measurement of noise.

CO4: Design the protection of power device

CO5: Analyze the transient in the power electronic circuits.

UNIT I BJT ANDGATE TURN-OFF THYRISTOR (GTO)

BJT Introduction- vertical power transistor structures-I-V characteristics-physics of BJT operation - switching characteristics-break down voltages-second break down-on-state losses-safe operation areas - design of drive circuits for BJTs-snubber circuits for BJT and Darlington's–GTO Introduction-basic structures-I-V characteristics-physics of device operation-GTO switching characteristics-snubber circuits - over protection of GTO

UNIT II POWER MOSFET

Power MOSFET Introduction-basic structures-I-V characteristics-physics of device operation-switching characteristics-operation limitations and safe operating areas-design of gate drive circuits-snubber circuits.

UNIT III INSULATED GATE BIPOLAR TRANSISTOR (IGBT)

IGBT Introduction-basic structures-I-V characteristics-physics of device operation-Latch in IGBTs-switching characteristics-Device limits and safe operating areas-drive and snubber circuits.

UNIT IV EMERGING DEVICES

Introduction-Power junction field effect transistors-field controlled Thyristor-JFET based devices versus other power devices-MOS controlled Thyristors – Switching Characteristics.

UNIT V PROTECTION OF POWER DEVICES & CIRCUITS

Cooling & Heat sinks – Thermal modeling of power switching devices- snubber circuits – Reverse recovery transients – Supply and load side transients – voltage protections – current protections.

TEXT BOOKS:

1. Mohan and Undeland:Power Electronics –Converters, Applications and Design,John Wiley&Sons
2. M.H.Rashid:Power Electronics Circuits, Devices and Applications,PHI-Publication
3. B.W Williams:Power Electronics Circuit Devices and Applications, New York, Halsted Press, 1987.

REFERENCE BOOKS:

1. Joseph Vithayathil: Power Electronics Circuits, 2^{nd} Edition, Tata MC Graw Hill.
2. W.C. Lander Power Electronics Circuits, 3^{rd} Edition, Tata MC Graw Hill.
3. Loganathan Umanand: Power Electronics: Essentials and Applications, Wiley India Pvt. Ltd, 2009.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	--	2	--	--	--	--	--	--	3	3	3
CO2	3	3	3	3	--	2	--	--	--	--	--	--	3	3	3
CO3	3	3	3	1	2	--	--	--	--	--	--	--	2	2	3
CO4	3	3	2	3	2	--	--	--	--	--	--	--	2	3	3
CO5	3	3	3	2	3	--	--	3	--	--	--	--	3	3	3
Average	3.00	3.00	2.80	2.40	1.40	0.80	0.00	0.60	0.00	0.00	0.00	0.00	2.60	2.80	3.00
Level of Correlation of the Course	3	3	3	3	1	1							3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech – II Semester

L	T	P	C
3	1	-	4

20AEE85 MICRO-GRID TECHNOLOGIES

(HONOR POOL -IV)

COURSE OUTCOMES:

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

CO1: Apply the knowledge of power electronics in Micro-grid and multifunction grid connected converters

CO2: Analyse the various types of control in micro grid in islanded and grid connected operation

CO3: Analyze energy management concept in grid connected a and islanded Micro-grid

CO4: Categorize the issues in Micro-grid technologies and study the impact of DG's and an optimized Micro-grid considering the role of power market

CO5: Analyze the necessity of protection and detecting the islanding operation in Micro-grid

UNIT I INTRODUCTION TO MICRO-GRID

Micro-grid Configurations – CERTS Micro-grid Test Bed – DC Micro-grid- HFAC Micro-grid – LFAC Micro-grid – Hybrid DC- and AC- Coupled Micro-grid.

UNIT II POWER ELECTRONICS IN MICRO-GRID GRID

Connected Mode – Islanded mode – Battery Charging mode – design of power converters– Brick Busses Software Frame work- Multi Function grid Connected inverters Impact of load characteristics – Local control – Centralized Control- Decentralized Control islanded operation – PQ Control - Droop control methods – Frequency/Voltage Control.

UNIT III CONTROL IN MICRO-GRID

Inverter Output Impedance Micro-grid Energy Management Systems Load Sharing and Power Management Strategy - Stand-alone – Grid connected – energy storage - Voltage Control and Active Power Management Power Quality Enhancement Compensators and controllers for power quality issues.

UNIT IV POWER QUALITY IMPROVEMENT TECHNOLOGIES

Impact of DG integration on Power Quality. Optimization in Micro-grid Stochastic Optimization for Operating Cost- Unit Commitment- Congestion Management.

UNIT V ROLE OF MICRO-GRID

Power Market Protection in Micro-grid Device Discrimination-Islanding detection, Effect on Feeder Reclosure, Protection for an Islanded Micro-grid having IIDG Units- Adaptive relaying scheme.

TEXT BOOKS :

1. Suleiman M,Sharkh, Mohammad A.Abu-Sara Georgios I. Orfanoudakis, Babar Hussain, "Power Electronic Converters for Microgrid", Wiley-IEEE Press, 2014
2. A.Mahmoud, A.L- Sunni and Faud,M, "Control and Optimization of Distributed Generation Systems"ISBN: 978331916910, Springer Publishers,2015

REFERENCE BOOKS :

1. Nikos Hatziargyiou, "Microgrids: Architectures and Control" ISBN: 978-1-118-72068-4,Wiley-IEEE Press, December 2013.
2. S.Chowhury, S.P.Chowdury and Peter Crossley, "Microgrids and Active Distribution Networks" ISBN978-1-84919-014-5, IET renewable Energy series, 2011.
3. Ritwi K Majumder, "Microgrid: Stability Analysis and Control" VDM Publishing 2010
4. Shin'ya Obara, "Optimum Design of Renewable Energy Systems: Microgrid and Nature Grid Methods", AEEGT Book Series, 2014

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	--	2	--	--	--	--	--	--	3	3	3
CO2	3	3	3	3	--	2	--	--	--	--	--	--	3	3	3
CO3	3	3	3	3	2	--	--	--	--	--	--	--	2	3	3
CO4	3	3	2	3	2	--	--	--	--	--	--	--	2	3	3
CO5	3	3	3	2	--	3	--	3	--	--	--	--	3	2	3
Average	3.00	3.00	2.80	2.80	0.80	1.40	0.00	0.60	0.00	0.00	0.00	0.00	2.60	2.80	3.00
Level of Correlation of the Course	3	3	3	3	1	1							3	3	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B.Tech – II Semester

L	T	P	C
3	1	-	4

20AEE86 POWER SYSTEM OPTIMIZATION
(HONOR POOL -IV)

COURSE OUTCOMES:

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

CO1: Analyze the optimization techniques in the power system

CO2: Analyze linear and non linear problems in the power system

CO3: Apply the different techniques for dynamic programming model in the power systems

CO4: Analyze the Genetic algorithms for power optimization in the systems

CO5: Apply the reactive power compensation techniques for power system optimization.

UNIT -I INTRODUCTION TO OPTIMIZATION

Classical optimization techniques Linear programming: standard form, geometry of LPP, Simplex method of solving LPP, Revised simplex method, duality, decomposition principle, and transportation problem**.**

UNIT-II NON LINEAR PROBLEM (NLP)

One dimensional methods, Elimination methods, Interpolation methods, Unconstrained optimization techniques-Direct search and Descent methods, constrained optimization techniques, direct and indirect methods.

UNIT-III DYNAMIC PROGRAMMING

Multi stage decision process, concept of sub optimization and principle of optimality, conversion of final value problem in to an initial value problem CPM and PERT

UNIT- IV INTRODUCTION TO GENETIC ALGORITHM

Introduction to genetic algorithm , working principle , coding of variables, fitness function, GA operators, similarities and differences between Gas and traditional methods, Unconstrained and constrained optimization using genetic algorithm , real coded Gas , advanced Gas, global optimization using GA

UNIT-V APPLICATIONS TO POWER SYSTEM

Economic load dispatch in thermal and hydro-thermal system using GA and classical optimization techniques, unit commitment problem. Reactive power optimization, optimal power flow,LPP,and NLP techniques to optimal power flow problems

TEXT BOOKS :

1. Optimization theory and applications, S.S Rao, Wiley –Eastern Limited
2. Introduction to linear and non linear programming, David G. Luenberger, Wesley publishing company
3. Genetic algorithm in search optimization and machine learning, D.E.Gold berg, Addision-Wesley Publication, 1989

REFERENCE BOOKS:

1. Computational methods in optimization, Polak ,Academic Press
2. Optimization engineering design: Algorithms and examples, Kalyanmoy deb,PHI publications
3. Advanced power system analysis and dynamics , L.P.Singh, Wiley Eastern limited.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	--	3	--	2	--	--	--	--	--	--	3	2	3
CO2	3	3	--	3	--	2	--	--	--	--	--	--	3	3	3
CO3	3	3	3	3	2	--	--	--	--	--	--	--	3	3	1
CO4	3	3	2	3	2	--	--	--	--	--	--	--	3	3	3
CO5	3	2	3	2	3	--	--	--	--	--	--	--	3	2	2
Average	3.00	2.80	1.6	2.80	1.40	0.80	0.00	0.00	0.00	0.00	0.00	0.00	3.00	2.60	2.40
Level of Correlation of the Course	3	3	2	3	1	1							3	3	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B.Tech – II Semester

L	T	P	C
3	1	-	4

20AEE87 REAL TIME CONTROL OF POWER SYSTEMS
(HONOR POOL -IV)

COURSE OUTCOMES:

After completion of the course, student will be able to

CO1: Apply the concepts of state estimation and bad data detection in power system.

CO2: Analyze the security and contingency analysis.

CO3: Design of real time control of power systems and SCADA implementation.

CO4: Apply different types of intelligence techniques in power systems.

CO5: Analyze the concepts of application AI and ANN in power systems

UNIT-I STATE ESTIMATION & BAD DATA OBSERVABILITY

Different types of State Estimations, Theory of WLS state estimation, sequential and non-sequential methods to process measurements - Bad data detection, identification and elimination.

UNIT-II SECURITY AND CONTINGENCY EVALUATION

Security concept, Security Analysis and monitoring, Contingency Analysis for Generator and line outages by iterative linear power flow method, Fast Decoupled model, and network sensitivity methods.

UNIT-III COMPUTER CONTROL OF POWER SYSTEMS

Need for real time and computer control of power systems - operating states of a power system.

UNIT-IV SCADA

Supervisory Control And Data Acquisition (SCADA) systems – SCADA systems implementation considerations - energy control centers - software requirements for implementing the above functions.

UNIT-V APPLICATION OF AI AND ANN IN POWER SYSTEM

Basic concepts and definitions - algorithms for load flow - short term load forecasting - fault diagnosis and state estimation.

TEXT BOOKS:

1. John J.Grainger and William D.Stevenson, Jr.: Power System Analysis, McGraw-Hill, 1994, International Edition

2. Allen J.Wood and Bruce F.Wollenberg: Power Generation operation and control, John Wiley & Sons, 1984
3. 3. R.N.Dhar: Computer Aided Power Systems Operation and Analysis, Tata McGraw Hill, 1982.

REFERENCE BOOKS:

1. L.P.Singh: Advanced Power System Analysis and Dynamics, Wiley Eastern Ltd.
2. Prabha Kundur: Power System Stability and Control, McGraw Hill, 1994
3. P.D.Wasserman: Neural Computing: Theory and Practice, Van Nostrand Feinhold, New York.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	--	--	--	--	--	--	--	3	3	3
CO2	3	3	3	3	2	--	--	--	--	--	--	--	3	3	3
CO3	3	2	3	3	--	3	--	--	--	--	--	--	2	3	1
CO4	3	3	3	3	--	3	--	--	--	--	--	--	2	3	2
CO5	3	2	3	2	--	3	--	--	--	--	--	--	3	2	3
Average	3.00	2.60	3.00	2.80	0.80	1.80	0.00	0.00	0.00	0.00	0.00	0.00	2.60	2.80	2.2
Level of Correlation of the Course	3	3	3	3	1	2							3	3	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B.Tech – I Semester

L	T	P	C
3	1	-	4

20AEE88 ADVANCED MACHINES CONTROL

(HONOR POOL V)

COURSE OUTCOMES:

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

CO1: Interpret the knowledge of electrical machines and circuit theory to analyze the operation of synchronous motors and its performance.

CO2: Apply the concept of electrical transients to analyze the stability of synchronous machines.

CO3: Analyze the starting and running characteristics of synchronous and induction machines to design the special machines.

CO4: Apply the knowledge of circuit theory to analyze the power quality and integration of induction generators to wind energy system.

CO5: Analyze AC commutated and special machines with the appropriate control scheme.

UNIT I SYNCHRONOUS MOTOR

Synchronous motor analysis taking armature resistance into account, vector diagrams, power circle and excitation circle—diagrams. Performance calculations under various operating conditions.

UNIT II STABILITY ANALYSIS

The equation of motion or 'swing' equation for synchronous motors and generators. Solutions of linearized swing equation, small oscillations of synchronous machines. Hunting of synchronous motors, elements of large oscillation of synchronous machines, concept oftransient stability.

UNIT III STARTING METHODS OF SYNCHRONOUS MACHINES

Starting of synchronous motors with the help of damper windings, George's phenomenon. Brushless excitation of synchronous generators and motors. Synchronous-induction motor: Slip-ring induction motor run as synchronous motor.-Different types of motor excitation. Starting and running characteristics-combined synchronous motor and induction motor circle diagrams, performance calculation, design features.

UNIT IV HARMONICS IN AC MACHINES

Concept of negative sequence and zero sequence reactance of synchronous machines. Inverter operation of induction motors, space and time harmonics and their effects on the performance of induction motors. Induction generators; Operation from bus-bars, self-excitation equivalent circuits and performance—it's utility in wind power generation.

UNIT V A.C. COMMUTATOR MACHINES

General construction. Derivation of generalized expressions: (a) Transformer e.m.f. and rotational e.m.f's in phase windings; (b) Transformer and rotational e.m.f's in commutator windings, uncompensated and compensated series motor: vector diagrams, circle diagram, operational characteristics and design features. Variable reluctance and fractional and sub-fractional h.p. motors: Different types of reluctance and stepper motors, permanent magnet motors, derivation of performance equations. Control schemes and performance.

TEXT BOOKS:

1. PaulC.Krause, Oleg Wasyzczuk, Scott S, Sudhoff, "Analysis of Electric Machinery and Drive Systems", John Wiley, Second Edition, 2010.

REFERENCE BOOKS:

1. P S Bimbhra, "Generalized Theory of Electrical Machines", Khanna Publishers, 2008.
2. A.E, Fitzgerald, Charles Kingsley Jr, and Stephan D, Umans " Electric Machinery", Tata McGraw Hill, 5th Edition, 1998
3. R.Krishnan, "Electric Motor Drives, Modeling, Analysis and Control, Prentice Hall of India, 2002

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	--	2	--	-	--	--	--	--	--	--	3	3	3
CO2	3	2	--	2	--	--	--	--	--	--	--	--	3	3	3
CO3	3	2	3	2	--	--	--	--	--	--	--	2	2	2	2
CO4	2	3	2	2	--	--	--	--	--	--	--	1	2	3	3
CO5	2	2	3	2	2	--	--	--	--	--	--	2	3	3	2
Average	2.60	2.20	1.6	2.00	0.40	0.00	0.40	0.00	0.00	0.00	0.00	1.00	2.60	2.80	2.60
Level of Correlation of the Course	3	2	2	2								1	3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B.Tech – I Semester

L	T	P	C
3	1	-	4

20AEE89 DIGITAL VLSI TESTING

(HONOR POOL V)

COURSE OUTCOMES:

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

CO1: Analyze the fault models and testability of a VLSI circuit.

CO2: Determine the testability of a circuit and design simulation models

CO3: Realize the issues in testing based on algorithms.

CO4: Analyze the architectural, test and response patterns as part of testing.

CO5: Apply methods to test RAM, memory, thermal and power aspects.

UNIT I INTRODUCTION

Importance, Challenges, Levels of abstraction, Fault Models, Advanced issues Design for Testability: Introduction, Testability Analysis, DFT Basics, Scan cell design, Scan Architecture.

UNIT II DESIGN **FOR TESTABILITY**: Scan design rules, Scan design flow. Fault Simulation: Introduction, Simulation models. Fault Simulation: Logic simulation, Fault simulation-Test Generation: Introduction, Exhaustive testing.

UNIT III BOOLEAN DIFFERENCE & BASIC ATPG ALGORITHMS

Test Generation: ATPG for non-stuck-at faults, Other issues in test generation Built-In-Self-Test: Introduction, BIST design rules

UNIT IV BUILT-IN-SELF-TEST

Test pattern generation, Output response analysis, Logic BIST architectures- Test Compression: Introduction, Stimulus compression- Test Compression: Stimulus compression, Response compression-Memory Testing:

UNIT V RAM TEST MODELS

RAM fault models, RAM test generation- Memory Testing: Memory BIST Power and Thermal Aware Test: Importance, Power models, Low power ATPG- Power and Thermal Aware Test: Low power BIST, Thermal aware techniques

TEXT BOOKS:

1. Neil Weste and Kamran Eshraghian, “Principles of CMOS VLSI Design ", Addison Wesley, 1998.
2. Charles H Roth, Jr., "Digital Systems Design using VHDL", Thomson Learning, 2001

REFERENCE BOOKS:

1. John P. Uyemura, “VLSI Design Principles”, John Wiley, 2002
2. E. Fabricious, “Introduction to VLSI design”, McGraw-Hill, 1990
3. Wayne Wolf, “Modern VLSI Design”, Pearson Education, 2003

Mapping of CO’s- PO’s-PSO’s

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	--	3	--	--	--	--	--	--	--	--	3	2	3
CO2	3	3	--	3	2	--	--	--	--	--	--	--	3	2	3
CO3	3	2	3	2	2	--	--	--	--	--	--	--	2	2	2
CO4	2	3	2	3	2	--	--	--	--	--	--	--	2	2	3
CO5	2	2	3	2	2	--	--	--	--	--	--	--	3	1	2
Average	2.60	2.60	1.6	2.60	1.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.60	1.8	2.60
Level of Correlation of the Course	3	3	2	3	2								3	2	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

IV B.Tech – I Semester

L	T	P	C
3	1	-	4

20AEE90 FABRICATION TECHNIQUES FOR MEMS BASED SENSORS: CLINICAL PERSPECTIVE

(HONOR POOL V)

COURSE OUTCOMES:

After completion of the course, student will be able to

CO1: Apply the concept of fabrication and process of fabricating the sensors.

CO2: Comprehend the electronic aspects of sensors and biomedical applications.

CO3: Exploring the significance of the necessary flow for micro heaters in gas sensors.

CO4: Analyze the principles of attached to the fabrication of micro fluidic platforms.

CO5: Analyze the principles of micro-cantilevers, flexible force sensors, inter-digitized electrodes, polymer-glass bonding, etc. for clinical research.

UNIT I INTRODUCTION

Micro engineering devices and its applications Clean room, contaminants, wafer cleaning processes (DI water, RCA, metallic impurities, etc.). Introduction to the micro heater, force sensors, micro fluidic devices, its specifications, and applications.

Unit II MASKS

Types of masks, Types of Photo resists, Spin Coaters Lithography process: optical litho graphy, x-ray, and e-beam lithography, lift-off techniques, soft lithography, Use of resists (spin coating, positive and negative photo resists), photo resist pre-baking, exposure, and development.

UNIT III ETCHING

Isotropic/anisotropic, selectivity, wet and plasma assisted etching. Types of wafers and orientations. Techniques of metallization: PVD [(Sputtering – DC, RF, and Magnetron), thermal evaporation, e-beam evaporation.

UNIT IV CHEMICAL VAPOUR DEPOSITION

Dielectric films (Plasma Enhance Chemical Vapor Deposition (PECVD)), Atomic Layer Deposition Understanding and designing the process flow for fabricating microengineering devices. Process flow for microheater, force sensors, and microfluidic devices. Wafer dicing and bonding techniques.

UNIT V MICRO ENGINEERING DEVICES FOR CLINICAL RESEARCH

Microfluidic Chips Process Flow for Fabricating Flexible Force Sensors and Force Sensors on Silicon, Process Flow for Fabricating VOC sensors, Biochips Clinical Research: Problems and Solutions using Microengineering Device. Visit to non-conventional Class 10000 Clean Room and discussing few equipment within.

TEXT BOOKS:

1.J.D. Plummer, M.D. Deal, P.G. Griffin, Silicon VLSI Technology, Pearson Education, 2001. S.A. Campbell,

2.The Science and Engineering of Microelectronic Fabrication, Oxford University Press, 2001. S.M. Sze (Ed), VLSI Technology, 2nd Edition, McGraw Hill, 1988 Senturia

REFERENCE BOOKS:

1. S. D., Microsystem Design, Kluwer Academic Publisher, 2001 Madou, M Fundamentals of Microfabrication, CRC Press, 1997. Gad-el-Hak, M., Ed.;

2.The MEMS Handbook; CRC Press: New York, NY, 2002.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	2	1	-	--	--	--	--	--	--	3	3	3
CO2	2	1	2	3	2	--	--	--	--	--	--	--	3	3	3
CO3	2	2	3	2	2	--	--	--	--	--		2	2	2	2
CO4	2	3	2	3	2	1	--	--	--	--	--	--	2	3	3
CO5	1	2	3	2	2	2	1	--	--	--	--	--	3	3	2
Average	2.00	1.80	2.20	2.40	1.80	0.60	0.20	0.00	0.00	0.00	0.00	0.40	2.60	2.80	2.60
Level of Correlation of the Course	2	2	2	2	2								3	3	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

IV B.Tech – I Semester

L	T	P	C
3	1	-	4

20AEE91 ADVANCES IN UHV TRANSMISSION AND DISTRIBUTION
(HONOR POOL V)

COURSE OUTCOMES:

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

CO1: Apply the concepts of basic power transmission systems to understand Ultra high voltage transmission systems.

CO2: Analyze the components and configuration of UHV transmission lines.

CO3: Interpret the knowledge of electrical systems to calculate the switching and lighting surges.

CO4: Analyze the design considerations in UHV substation and transmission systems.

CO5: Analyze the corona, RI and audible noise in UHV.

UNIT I INTRODUCTION

Development of Power Transmission. Recent advances in UHV power transmission systems; present status and future growth.

UNIT II GENERAL DESIGN CRITERIA FOR OVERHEAD TRANSMISSION LINES

Methodologies, reliability, wind/ice loading etc Major Components of HV transmission systems, types of conductor configurations conductor accessories/clamps etc.

UNIT III UHV TRANSMISSION

Towers for UHV transmission, calculations of clearances for power frequency, switching and lightning surges, right of way (ROW)etc. Selection of insulators for light, medium and heavy polluted areas

UNIT IV DESIGN CONSIDERATIONS

Up-gradation of existing transmission lines Design consideration of UHV substations, Comparison of AIS, Hybrid-AIS and GIS electric and magnetic fields.

UNIT V CORONA IN UHV LINES

Corona - corona loss formulae – attenuation of traveling waves due to corona – Audio noise due to corona, its generation, characteristics and limits, measurement of audio noise. Insulation coordination for UHV systems Earthling and safety measures for UHV substation - IEC standards.

TEXT BOOKS:

1. Rakosh Das Begamudre, “Extra High Voltage AC Transmission Engineering”, Second Edition, New Age International Pvt. Ltd., 2006.
2. Pritindra Chowdhari, “Electromagnetic transients in Power System”, John Wiley and Sons Inc., 2009.
3. Sunil S.Rao, “EHV-AC, HVDC Transmission & Distribution Engineering”, Third Edition, Khanna Publishers, 2008.

REFERENCE BOOKS:

1. William H. Bailey, Deborah E. Weil and James R. Stewart, “A Review on HVDC Power Transmission Environmental Issues”, Oak Ridge National Laboratory.
2. J.C Molburg, J.A. Kavicky, and K.C. Picel ,”A report on The design, Construction and operation of Long-distance High-Voltage Electricity Transmission Technologies” Argonne (National Laboratory) 2007.
3. “Power Engineer’s Handbook”, Revised and Enlarged 6th Edition, TNEB Engineers’ Association, October 2002

Mapping of CO’s- PO’s-PSO’s

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	--	--	-	--	--	--	--	--	--	3	2	3
CO2	3	3	2	2	--	--	--	--	--	--	--	--	3	1	2
CO3	2	2	2	2	--	--	--	--	--	--	--	--	2	2	2
CO4	3	3	2	1	1	--	--	--	--	--	--	--	2	3	3
CO5	3	2	3	2	2	1	2	--	--	--	--	1	3	1	2
Average	2.80	2.60	2.00	1.40	0.60	0.20	0.40	0.00	0.00	0.00	0.00	0.20	2.60	1.80	2.40
Level of Correlation of the Course	3	3	2	1									3	2	2

MINOR GENERAL DEGREE

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

II B.Tech – II Semester (EEE)

L	T	P	C
3	0	2	4

20AEE92 BASICS OF ELECTRICAL POWER SYSTEMS

(Minor General)

COURSE OUTCOMES:

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

CO1: Apply the concepts of conventional and non-conventional power plants.

CO2: Apply the economic power calculations and its tariff.

CO3: Analyze the concepts and performance of Transmission and Distribution Line Parameters.

CO4: Analyze fault locations and laying of UG Cables.

UNIT-I ELECTRIC POWER GENERATION

Importance of Electricity - Sources of Energy - Types - Comparison-Advantages and disadvantages. Conventional Power Plants - Thermal –Hydro - Nuclear – Nonconventional Power Plant - Solar and Wind

UNIT-II LOADS AND ECONOMICS OF POWER GENERATION

Load on power station-different types of Loads-Definitions: Load factor, Demand Factor, Diversity Factor, Plant capacity factor-Load curve and Load duration curve-Cost of generation-Numerical problems -Tariff-Characteristics-Types of Tariffs-Numerical problems

UNIT-III TRANSMISSIONLINEPARAMETERS AND ITS PERFORMANCE

Types of Conductors- Calculation of Resistance-Skin and Proximity effect Concept of GMR and GMD – Calculation of Inductance and capacitance for single phase and Three phase circuits – Single and double circuits – Performance of Short, Medium and Long Transmission line – Calculation of voltage regulation and efficiency-Numerical Problems-Ferranti effect-Surge impedance and Surge Impedance Loading

UNIT-IV EFFECTS AND INSULATION COORDINATION OF TRANSMISSIONLINE

Corona phenomena-factors affecting corona-Critical voltages and Power loss-Methods of reducing corona-Calculation of sag and Tension with equal and unequal heights of towers- Numerical Problems-Types of insulators-Potential distribution over suspension Insulator String-String efficiency-Methods of improving String efficiency-Numerical Problems.

CABLES

Construction of cables-Types of cables and its ratings-Insulation resistance of single core cable-Capacitance of single and three core cable-Dielectric stress in a single core cable-Grading of cables-Numerical Problems-Fault location of cables

UNIT-V DISTRIBUTIONSYSTEMS

DC Distribution-Classification-Methods of 3wireDCsystem-Radial and Ring Distribution systems-DC Distribution with concentration loads and uniform loading-Numerical Problems-AC Distribution-Classification –Layout and Selection of site-Power Factor Improvement method-Selection of Capacitor Bank

Relevant Experiments

TEXT BOOKS:

1. Soni.M.L,Gupta.P.V.Bhatnagar.U.S and Chakraborti.A,A Text Bookon Power Systems Engineering, Dhanpat Rai & Co.Pvt.Ltd.,2nd Edition,2009.
2. Mehta.V.K and Rohit Mehta, Principles of power systems, S. Chand &Company Ltd,NewDelhi,RevisedEdition,2005.

REFERENCE BOOKS:

1. Singh. S.N, Electrical power Generation Transmission and Distribution, PHI, 2nd Edition,2004.
2. Rai.G.D, Non Conventional energy sources, KhannaPublishers,5th Edition,2010.
3. Rajput. R.K, Power systems Engineering, Laxmi Publishers,1st Edition, 2006.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	--	--	--	--	--	--	--	--	3	3	2
CO2	3	3	3	3	--	--	--	--	--	--	--	--	1	3	2
CO3	3	2	3	1	--	--	--	--	--	--	--	--	3	2	2
CO4	3	3	2	3	--	--	--	--	--	--	--	--	2	3	3
Average	3.00	2.75	2.2	1.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.25	2.75	2.25
Level of Correlation of the Course	3	3	2	2		2							2	3	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech – I Semester

L	T	P	C
3	-	2	4

20AEE93 SOLAR AND WIND ENERGY

(Minor General)

COURSE OUTCOMES:

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

CO1: Apply the energy scenario and the consequent growths of the power generate renewable energy sources.

CO2: Analyze the physics of wind and solar power generation.

CO3: Analyze the power electronic interfaces for wind and solar generation

CO4: Analyze the issues related to the grid-integration of solar energy systems

CO5: Analyze the issues related to the grid-integration wind energy systems

UNIT I SOLAR RESOURCE

Introduction, solar radiation spectra, solar geometry, Earth Sun angles, observer Sun angles, solar day length, Estimation of solar energy availability.

UNIT II SOLAR ENERGY

Solar Radiation, its computation and measurement. Solar Energy Collectors, Solar Thermal Energy Applications. Storage of Solar Energy, Solar Photovoltaic Technology, Solar cell configurations, and voltage developed by solar cell, photo current and load current, solar cell performance, test specifications for photo voltaic systems.

UNIT III PHOTOVOLTAIC TECHNOLOGIES

Amorphous, mono-crystalline, polycrystalline; V-I characteristics of a PV cell, PV module, array, Power Electronic Converters for Solar Systems, Maximum Power point Tracking (MPPT) algorithms. Converter Control.

UNIT IV WIND ENERGY

Basic Principles of Wind Energy Conversion. Wind energy estimation, site selection, components and classification of wind energy conversion systems, their advantages and disadvantages. Wind Machines Generating Systems, Energy Storage, Applications of Wind Energy. Inter connected systems.

UNIT V WIND GENERATOR TOPOLOGIES

Review of modern wind turbine technologies, Fixed and Variable speed wind turbine, Induction Generators, Doubly-Fed Induction Generators and their characteristics, Permanent Magnet Synchronous Generators, Power electronics converters. Generator configurations, Converter Control.

TEXT BOOKS:

1. T. Ackermann, Wind Power in Power Systems, John Wiley and Sons Ltd., 2005.
2. G. M. Masters, Renewable and Efficient Electric Power Systems, John Wiley and Sons, 2004.

REFERENCE BOOKS:

1. For the complete Syllabus, results, class timetable, and many other features kindly download the I Study App

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	--	2	--	--	--	--	--	--	3	3	2
CO2	3	3	3	3	--	2	--	--	--	--	--	--	3	3	3
CO3	3	3	3	1	2	--	--	--	--	--	--	--	3	3	3
CO4	3	3	3	3	2	--	--	--	--	--	--	--	2	3	3
CO5	3	2	3	2	3	--	--	3	--	--	--	--	3	3	3
Average	3.00	2.80	3.00	2.40	1.40	0.80	0.00	0.60	0.00	0.00	0.00	0.00	2.80	3.00	2.80
Level of Correlation of the Course	3	3	2	2	1	1							3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B.Tech – II Semester

L	T	P	C
3	-	2	4

20AEE94 FUNDAMENTALS OF POWER ELECTRONICS

(Minor General)

COURSE OUTCOMES:

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

CO1: Apply basic semiconductor physics to properties of power devices, and combine circuit theory to understand the characteristics of different power devices

CO2: Understand basic operation and compare performance of various power semiconductor devices, passive components and switching circuits

CO3: Design and Analyze power converter circuits and learn to select suitable power electronic devices by assessing the requirements of application field.

CO4: Analyze a power electronic design at the system level and assess the performance for practical applications

CO5: Apply the role power electronics in the improvement of energy usage efficiency and the applications of power electronics in emerging areas.

UNIT I POWER SEMICONDUCTOR DEVICES

Construction, Principle of operation -Power diodes, power transistors, SCR, TRIAC, GTO, MOSFET, and IGBT – driver circuit, SCR – Two transistor model of SCR, gate characteristics, turn on & off method – commutation Natural and Forced Commutation – Class A and Class B types, Gate Trigger Circuit: Resistance Firing Circuit, Resistance capacitance firing circuit, UJT Firing Circuit, series and parallel connections; rating and protection of SCR

UNIT II PHASE CONTROLLED CONVERTERS

Principle of phase control, Single phase and three phase controlled rectifiers (half wave, half controlled and full wave, fully controlled converters) with R, RL and RLE. Firing circuit, Effect of source inductance, freewheeling diode on performance of converter, External performance parameters of converters, techniques of power factor improvement, Dual converters – single phase & three phase dual converters, design aspects – Numerical problems.

UNIT III DC TO DC CHOPPER

Principle of chopper, Voltage, current load commutated chopper – step-up & step down chopper, chopper and firing circuits, Application of chopper as mode regulators – Boost , Buck , Buck –Boost regulator, design aspects of choppers – Numerical problems.

UNIT IV DC TO AC CONVERTERS

Series inverter – parallel inverter – current source inverter – voltage source inverter - Z-source inverters, PWM inverters – Variable DC-link inverter, Boost inverter, Inverter circuit design, Design of inverters for UPS applications.

UNIT V AC CHOPPER, CYCLOCONVERTER & VOLTAGE CONTROLER

Single phase AC chopper, multistage sequence control – step up and step down cyclo-converter – three phase to single phase and single phase to three phase cycloconverter – triggering circuit based on micro controller – single phase AC voltage controller with R, RL, RLE., Industrial Applications

TEXT BOOKS:

1. P S Bimbhra, Power Electronics, Khanna Publishers, New Delhi, 4^{th} Edition, 2010.

2. Rashid, M.H, Power Electronics – circuits, devices and applications, Pearson Education India, 1^{st} Edition, 2011.

REFERENCES:

1. M D Singh and K.B.Khanchandani, Power Electronics, Tata McGraw Hill, New Delhi, 2^{nd} Edition, 2006.

2. Andrzej M. Trzynadlowski, Introduction to Modern Power Electronics, John wiley & sons, 2^{nd} Edition, 2011.

3. Ned Mohan, Tore M Undeland, William P Robbins, Power Electronics – Converters, Applications and Design, John Wiley & sons India Pvt Ltd, 3^{rd} Edition, 2007.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	--	3	2	--	--	--	--	--	--	--	3	3	2
CO2	3	3	--	3	2	--	--	--	--	--	--	--	3	3	2
CO3	3	3	3	2	--	--	--	--	--	--	--	--	2	2	1
CO4	3	3	2	3	--	--	--	--	--	--	--	--	2	3	3
CO5	3	2	3	3	--	3	--	3	--	--	--	--	3	2	1
Average	3.00	2.80	1.6	2.80	0.80	0.60	0.00	0.60	0.00	0.00	0.00	0.00	2.60	2.60	1.80
Level of Correlation of the Course	3	3	2	3	1								3	3	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B.Tech – II Semester

L	T	P	C
3	-	2	4

20AEE95 ELECTRICAL MEASUREMENTS

(Minor General)

COURSE OUTCOMES:

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

CO1: Demonstrate knowledge on Calibration of various measuring instruments

CO2: Analyze instrument transformers for transmission lines.

CO3: Analyze single phase and three phase wattmeter and energy meters

CO4: Apply the absolute instruments to reduce different types of errors.

CO5: Apply various AC and DC bridges for measurement applications.

UNIT-I MEASURING INSTRUMENTS

Classification – deflecting, controlling and damping systems , Ammeters and Voltmeters – PMMC, Dynamometer, moving iron type instruments – Expression for the deflecting torque and control torque – Errors and compensation.

UNIT-II INSTRUMENT TRANSFORMERS AND POWER FACTOR METERS

Current Transformers and Potential Transformers – Ratio and phase angle errors – Design considerations - Types of Power Factor Meters – Dynamometer and moving iron type – 1-Φ and 3-Φ meters, Rotating field and alternating field types.

UNIT-III MEASUREMENT OF POWER & ENERGY

Single phase and three phase dynamometer wattmeter - LPF and UPF - Double elementand three element Dynamometer wattmeter - Expression for Deflecting and control torques – Single phase and three phase Induction type Energy Meter –Errors and compensation.

UNIT-IV POTENTIOMETERS and MAGNETIC MEASUREMENTS

Principle and operation of D.C. Crompton’s potentiometer – standardization – Measurement of unknown resistance, current,voltage and power - A.C. Potentiometers: Polar and coordinate types - Standardization-Ballistic galvanometer – Equation of motion – Flux meter – Constructional details-Comparison with Ballistic Galvanometer - Determination of B-H Curve - Method of reversals – step by step method - A.C. testing, CRT and CRO-DSO.

UNIT-V   D.C & A.C BRIDGES

Measurement of low, medium and high resistances – Kelvin's double bridge - Whetstone's bridge, Sensitivity – Loss of charge method - measurement of inductance - Maxwell's bridge, Anderson's bridge - Measurement of capacitance - Desauty bridge, Schering Bridge– Wien's Bridge.

TEXT BOOKS:

1. Sawhney.A.K, Electrical & Electronic Measurement & Instruments, Dhanpat Rai & Co.Publications, 2015.

2. Golding.E.W and Widdis.F.C, Electrical Measurements and Instrumentation, Reem Publications, 5th Edition, 1993.

REFERENCE BOOKS:

1. R. K. Rajput, Electrical & Electronic Measurement & Instrumentation, S. Chand & Co, 2nd Edition, 2008.

2. Reissland, M.U, Electrical Measurements: Fundamentals, Concepts, Applications, New Age International (P) Limited, Publishers, 2006.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	--	--	--	--	--	--	--	--	--	3	2	2
CO2	3	3	2	3	--	2	--	--	--	--	--	--	3	3	2
CO3	3	2	2	1	--	3	--	--	--	--	--	--	2	2	1
CO4	3	3	2	3	--	3	--	--	--	--	--	--	2	3	3
CO5	3	2	3	2	--	--	--	--	--	--	--	--	3	2	1
Average	3.00	2.60	2.20	1.80	0.00	1.6	0.00	0.00	0.00	0.00	0.00	0.00	2.60	2.40	1.80
Level of Correlation of the Course	3	3	2	2		2							3	3	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

IV B.Tech – I Semester

L	T	P	C
3	-	2	4

20AEE96 EMBEDDED SYSTEMS AUTOMATION
(Minor General)

COURSE OUTCOMES:

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

CO1: Analyze concepts of embedded system design and analysis

CO2: Analyze architecture and programming of ARM processor

CO3: Apply basic concepts of embedded programming and C language

CO4: Design real time operating systems for the application of embedded system

CO5: Analyze the concept of Processes and operating systems of embedded systems.

UNIT I INTRODUCTION TO EMBEDDED SYSTEM DESIGN:

Complex systems and micro processors– Embedded system design process –Design example: Model train controller- Design methodologies- Design flows – Requirement Analysis – Specifications-System analysis and architecture design – Quality Assurance techniques -Designing with computing platforms – consumer electronics architecture –platform-level performance analysis.

UNIT II ARM PROCESSOR AND PERIPHERALS

ARM Architecture Versions – ARM Architecture – Instruction Set – Stacks and Subroutines – Features of the LPC 214X Family – Peripherals – The Timer Unit – Pulse Width Modulation Unit – UART – Block Diagram of ARM9 and ARM Cortex M3 MCU.

UNIT III EMBEDDED PROGRAMMING

Components for embedded programs- Models of programs- Assembly, linking and loading – compilation techniques- Program level performance analysis – Software performance optimization – Program level energy and power analysis and optimization – Analysis and optimization of program size- Program validation and testing.

UNIT IV REAL TIME SYSTEMS

Structure of a Real Time System — Estimating program run times – Task Assignment and Scheduling – Fault Tolerance Techniques – Reliability, Evaluation – Clock Synchronization.

UNIT V PROCESSES AND OPERATING SYSTEMS

Introduction – Multiple tasks and multiple processes – Multirate systems- Preemptive realtime operating systems- Priority based scheduling- Interprocess communication mechanisms – Evaluating operating system performance- power optimization strategies for processes –Example Real time operating systems-POSIX-Windows CE. – Distributed embedded systems – MPSoCs and shared memory multiprocessors. – Design Example – Audio player, Engine control unit – Video accelerator.

TEXT BOOKS:

1. AnisKoubaa, "Robot Operating System (ROS) The Complete Reference", First Volume, Springer, 2016
2. Thomas Bräunl, "Embedded Robotics: Mobile Robot Design and Applications with Embedded Systems", Third Edition, Springer-Verlag Berlin Heidelberg, 2008.

REFERENCE BOOKS:

1. R.K.Mittal and I.J.Nagrath, "Robotics and Control", Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2003
2. K.S. Fu, R.C. Gonzalez and C.S.G. Lee, "Robotics: Control, Sensing, Vision, and Intelligence", McGraw-Hill, New York, 1987.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	--	-	--	--	--	--	--	--	3	3	3
CO2	3	3	3	3	--	--	--	--	--	--	--	--	3	3	3
CO3	3	2	3	2	--	--	--	--	--	--		2	2	2	2
CO4	3	3	2	3	2	--	--	--	--	--	--	1	2	3	3
CO5	3	2	3	2	2	--	--	--	--	--	--	2	3	3	2
Average	3.00	2.60	2.80	2.60	0.80	0.00	0.00	0.00	0.00	0.00	0.00	1.00	2.60	2.80	2.60
Level of Correlation of the Course	3	3	3	3	1							1	3	2	2

MINOR DEGREE (INDUSTRIAL RELEVANT TRACK)

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech – II Semester (EEE)

L	T	P	C
3	1	0	4

20AEE97 RENEWABLE ENERGY SOURCES

Minor Degree (Industry relevant Track- I)

COURSE OUTCOMES:

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

CO1: Apply principle of solar energy collection, wind energy conversion, biogas generation and Ocean Thermal Electric Conversion.

CO2: Apply the Principle of electric energy conversion in Power Plant Applications.

CO3: Apply various tracks in Bio Mass energy production.

CO4: Analyze Solar Thermal collectors and Betz coefficient of wind mills

CO5: Design Solar Photovoltaic collectors and Vertical & Horizontal axis wind systems.

UNIT – I INTRODUCTION OF NON-CONVENTIONAL ENERGY SOURCES

Statistics on conventional energy sources and supply in developing countries, Definition and Concepts of NCES, Limitations of RES- Classification of NCES :Solar, Wind, Geothermal, Bio-mass, Ocean Energy Sources, comparison of these energy sources.

UNIT – II SOLAR ENERGY SYSTEMS

Energy available from Sun, Solar radiation data, Solar energy conversion into heat, Flat plate and Concentrating collectors- Photovoltaic, p-n junction, solar cells, PV systems, Stand-alone, Grid connected solar PV System.

UNIT – III WIND ENERGY SYSTEMS

Basis of wind energy conversion – Effect of density, frequency variances, angle of attack, and wind speed- Windmill rotors Horizontal axis and vertical axis rotors- Determination of torque coefficient, - working principle of Induction generator-Types of Induction generators and its applications.

UNIT –IV BIOGAS ENERGY SYSTEMS

Principle of bio gas generation, constructional details of various biogas plants, factors affecting generation of biogas and methods of maintaining biogas, Bio Mass: Introduction, methods of obtaining energy from biomass, thermal gasification.

UNIT – V   OCEAN ENERGY AND TIDAL POWER PLANT

Ocean energy: ocean thermal electric conversion, open and closed cycle of OTEC, basic principles of tidal power & components of tidal power plants, single & double basin arrangements, Energy from ocean waves, wave energy conversion devices.

TEXT BOOKS:

1. G.D. Rai, ‘Non Conventional Energy Sources’, Khanna Publishers, New Delhi.
2. G. N. Tiwari and M. K. Ghoshal, Renewable Energy Sources Basic Principles and Applications, Narosa Publishing House, New Delhi.

REFERENCE BOOKS:

1. John Twidell , Tony Weir , ‘Renewable Energy Resources’, Taylor & Francis; 2nd edition, 2005
2. Duffie, J. A. & W. A. Beckman, ‘Solar Engineering of Thermal Processes’, 3rd ed. John Wiley & Sons, Inc., 2006
3. C. S. Solanki, ‘Solar Photovoltaics: Fundamental Applications and Technologies, Prentice Hall of India, 2009.
4. S.P. Sukhatme, Solar Energy: Principles of Thermal Collection And Storage, Tata Mcgraw-Hill

Mapping of CO’s- PO’s-PSO’s

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	--	2	1	--	--	--	--	--	--	3	2	2
CO2	3	3	--	3	--	2	--	--	--	--	--	--	1	3	2
CO3	3	2	2	1	--	2	--	--	--	--	--	--	2	2	1
CO4	3	3	2	3	2	2	--	--	--	--	--	--	2	3	3
CO5	3	2	3	2	--	1	--	--	--	--	--	--	1	2	1
Average	3.00	2.60	1.8	1.80	0.80	1.60	0.00	0.00	0.00	0.00	0.00	0.00	1.80	2.40	1.80
Level of Correlation of the Course	3	3	2	2	1	2							2	3	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

	L	T	P	C
III B.Tech – I Semester (EEE)	**3**	**1**	**-**	**4**

20AEE98 INTEGRATION OF RENEWABLE ENERGY INTO POWER SYSTEMS

Minor Degree (Industry relevant Track- I)

COURSE OUTCOMES:

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

CO1: Analyze electrical power system operations and control for renewable energy systems

CO2: Analyze distributed renewable generation in both large interconnected grid and Micro-grid

CO3: Assess renewable energy applications and projects in the context of integration into both the physical and economic electricity markets.

CO4: Apply the principles and requirements of the next generation future power network, incorporating distributed generation and storage and demand management.

CO5: Understand the principles, power and limitations of complex power networks incorporating distributed generation and storage.

UNIT I INTRODUCTION

Various techniques of utilizing power from renewable energy sources, concept of nano/micro/mini grid. Need of integrating large renewable energy sources, issues related to integration of large renewable energy sources, rooftop plants. Concept of VPP.

UNIT II POWER SYSTEM EQUIPMENTS FOR GRID INTEGRATION

Synchronous generator: synchronization/integration to existing grid, load sharing during parallel operation, stability (swing equation and solution) Induction Generator: working principle, classification, stability due to variable speed and counter measures Power Electronics: need of power electronic equipments in grid integration, converter, inverter, chopper, ac regulator and cycloconverters for AC/DC conversion.

UNIT III POWER QUALITY AND MANAGEMENT

THD, voltage sag, voltage swell, frequency change and its effects, network voltage management, frequency management, system protection, grid codes

UNIT IV GRID STABILIZATION SCHEDULING AND DISPATCH

Forecasting, reactive power and voltage control, frequency control, operating reserve, storage systems, electric vehicles Ancillary services in Indian Electricity Market (regulatory aspect), CERC and CEA orders (technical and safety standards)

UNIT V INTEGRATION OF ALTERNATE SOURCES OF ENERGY

Introduction, principles of power injection: converting technologies, power flow; instantaneous active and reactive power control approach; integrating multiple renewable energy sources; DC link integration; AC link integration; HFAC link integration; islanding and interconnection

TEXT BOOKS:

1. Integration of Alternative sources of Energy, Felix A. Farret and M. Godoy Simoes, IEEE Press – Wiley-Interscience publication, 2006.

2. Grid integration of solar photovoltaic systems, Majid Jamil, M. Rizwan, D.P.Kothari, CRC Press (Taylor & Francis group), 2017

3. Renewable Energy Grid Integration, Marco H. Balderas, Nova Science Publishers, New York, 2009. Wind Power Integration connection and system operational aspects, B. Fox, D.

REFERENCE BOOKS:

1. Flynn L. Bryans, N. Jenkins, M. O' Malley, R. Watson and D. Milborrow, IET Power and Energy Series 50 (IET digital library), 2007

2. Power Generation, Operation, and Control, Allen J. Wood, Bruce F. Wollenberg, Gerald B. Sheblé, John Wiley & Sons, New York, 2013 (3rd edition)

3. Power Electronics: Circuits, Devices, and Applications. M.H.Rashid, Pearson Education India, 2013

4. Advanced power system analysis and dynamics, L.P.Singh, New age international publishers, 2017

Mapping of CO’s- PO’s-PSO’s

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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	2
CO3	3	3	3	1		--	--	--	--	--	--	--	2	3	2
CO4	3	3	2	3	2	-	2	--	--	--	--	--	2	2	3
CO5	3	2	3	2	2	-	3	-	--	--	--	--	3	3	2
Average	3.00	2.80	1.6	2.40	0.8	0.00	1.00	0.00	0.00	0.00	0.00	0.00	2.60	2.80	2.40
Level of Correlation of the Course	3	3	2	3	1		1						3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B.Tech – II Semester (EEE)

L	T	P	C
3	1	-	4

20AEE99 ENERGY MANAGEMENT SYSTEMS FOR SUSTAINABILITY

Minor Degree (Industry relevant Track- I)

COURSE OUTCOMES:

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

CO1: Analyze the Conventional and Non-Conventional energy Sources.

CO2: Analyze Impact of Energy on Environment.

CO3: Design for PV systems for conventional systems.

CO4: Analyze Mechanical storage, Chemical storage and Electrical storage.

CO5: Apply the Energy conservation Opportunities for sustainability.

UNIT I INTRODUCTION TO ENERGY SOURCES

Energy and Development, Units and Measurements, Conventional and Non-Conventional Sources of Energy, Fossil and Mineral Energy Resources, Details of Coal, Peat, Oil, Natural Gas and Nuclear Resources, Recovery of Fossil Fuels, Classification and Characterization of Fossil fuels, Basic of Solar, Wind, Bio, Hydro, Tidal, Ocean Thermal and other Renewable Energy Sources,

UNIT II ENERGY AND ENVIRONMENT

Impact of Energy on Environment, Flow of Energy in Ecological System, Environmental Degradation due to energy, Control of Pollution from Energy Energy, Conversion routes, Direct and indirect way of Energy Conversion, Principles of heat and mass transfer, Thermodynamics, Fluid static and dynamics, Electricity generation, distribution and use, Basic of Solar Thermal Conversion, Technology of Selective Coating,

UNIT III SOLAR, WIND AND FUEL CELL TECHNOLOGY

Fundamentals of Flat Plate Collector and Evacuated Collector, Basic of Wind Energy Conversion, Wind machine, Wind electric generator, Wind pump.

Basics of Photovoltaic Conversion technology and PV systems, PV system design methodologies, Basics of Bio-energy conversion, biomethanation technology, Thermochemical Conversion through Pyrolysis, Gasification and Esterification, Bio Oil, Application of Ocean Thermal Gradient and Geothermal gradient for power generation, Basics of hydropower, Tidal and Wave power, Basics of Hydrogen fuel, Fundamentals of Fuel Cells,

UNIT IV ENERGY STORAGE TECHNOLOGIES

Basics of Fusion power, Energy Storage Technologies, Mechanical storage, Chemical storage and Electrical storage, Details of Pb-acid battery, Ni-Cd-alkaline battery, Ni-iron and Na-S batteries, battery maintenance and safety precautions. Fundamental of Energy conservation, Energy Management and Audit, Basics of Energy Demand and Supply, Principles of Economic analysis in the Energy Management and Audit Programme, Supply side and demand side energy management, Boilers and Firing System, Steam, Condensation Systems, Energy Conservation and Management in power plant, Energy conservation in Buildings, Heating,

UNIT V CONSERVATION OF ENERGY AND CO ENERGY GENERATION

Ventilation and Air Conditioning System, Degree day in energy use monitoring, Energy Conservation Opportunities, in chemical industries, Waste heat recovery, Co-generation, Energy Conservation in Agricultural Sector, Energy conservation into illumination engineering, Combustion stoichiometry, air-fuel ratio, optimum loading in boilers, etc.

TEXT BOOKS:

1. Energy and the Challenge of Sustainability, World Energy assessment, UNDP, N York,2000.
2. Thamas B Johanssson et al, “Renewable Energy Sources for fuel and electricity”,Earthscan Publishers, London, 1993.
3. J W Twidell and A D Weir, “Renewable Energy Resources”, ELBS, 1998.

REFERENCE BOOKS:

1. G N Tiwari, M K Ghosal, “Fundamentals of Renewable Energy Sources”, Narosa Publishing House.

2. Kastha D, Banerji S and Bhdra S N, " Wind Electrical Systems", Oxford University Press, New Delhi, 1998.

3. Tony Burton, David Sharpe, Nick Jemkins and Ervin Bossanyi., "Wind Energy HandBook", John Wiley & Sons, 2004.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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	2
CO3	3	3	3	2		--	--	--	--	--	--	--	2	3	3
CO4	3	3	2	3	3	3	2	--	--	--	--	--	2	3	3
CO5	3	2	3	2	3	3	3	-	--	--	--	--	3	3	3
Average	3.00	2.80	1.6	2.60	1.2	1.20	1	0.00	0.00	0.00	0.00	0.00	2.60	3.00	2.80
Level of Correlation of the Course	3	3	2	2	1	1	1						3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B.Tech – II Semester (EEE)

L	T	P	C
3	1	-	4

20AEEA0 SUSTAINABLE AND RENEWABLE ENERGY TECHNOLOGY

Minor Degree (Industry relevant Track- I)

COURSE OUTCOMES:

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

CO1: Analyze energy and sustainable energy technology.

CO2: Analyze PV and Wind models.

CO3: Understand the WT-IG, WT-DWIG, WTDOIG, WT-PMG and WTVSIG. Small WEGs techniques.

CO4: Design the model for energy storage systems**.**

CO5: Analyze the MPPT tracking and control algorithm.

UNIT I INTRODUCTION TO ENERGY SUSTAINABILITY

Challenges of Energy Sustainability. Future Energy Systems: Clean/Green Energy Technologies. International agreements/conventions on Energy and Sustainability: United Nations Framework Convention on Climate Change (UNFCC) sustainable development.

UNIT II SOLAR ENERGY TECHNOLOGIES

Renewable energy utilization in ancient times, Solar energy: Solar radiation measurements, Effects of changes in tilt angle, Sun Tracking, PV cell : Principle, types , PV Module and Array , Modeling of PV cell, Effects of shaded and faulty cell, Maximum power tracking, Charge Controllers, MPPT Algorithms, Stand Alone PV System, Grid Connected PV System, Hybrid Systems.

UNIT III WIND ENERGY SYSTEM

Atmospheric circulations, Wind monitoring and resource assessment, Modeling, Types and characteristics of wind turbines, thrust and torque, power coefficient, thrust coefficient, axial interference factor, Pitch and stall regulation, power curve, energy calculation,

UNIT IV RENEWABLE ENERGY TECHNOLOGIES

Principle of operation, types, configurations: WT-IG, WT-DWIG, WTDOIG, WT-PMG and WTVSIG. Small WEGs - standalone/grid connected applications. Other Renewable Energy Technologies: Biomass-Gasifiers, Small hydro, wave, tidal, ocean thermal, geothermal.

UNIT V ENERGY STORAGE SYSTEMS

Principles of Battery, Super capacitor, Fuel cells, its operation, types, applications. State of the Art in Power & Energy industry and R&D, Various Hardware and software experiments on solar PV cell and Module, standalone system design and development, MPPT tracking and control algorithm, Wind energy systems.

TEXT BOOKS:

1. Energy and the Challenge of Sustainability, World Energy assessment, UNDP, N York,2000.
2. Thamas B Johanssson et al, “Renewable Energy Sources for fuel and electricity”,Earthscan Publishers, London, 1993.
3. J W Twidell and A D Weir, “Renewable Energy Resources”, ELBS, 1998.
4. N K Bansal, M Kleemann and M Mellis, "Renewable Energy Resources and conversion Technology", Tata McGraw Hill, 1990.

REFERENCE BOOKS:

1. G N Tiwari, M K Ghosal, “Fundamentals of Renewable Energy Sources”, Narosa Publishing House.
2. Kastha D, Banerji S and Bhdra S N, “ Wind Electrical Systems”, Oxford University Press, New Delhi, 1998.
3. Tony Burton, David Sharpe, Nick Jemkins and Ervin Bossanyi., “Wind Energy HandBook”, John Wiley & Sons, 2004.

Mapping of CO’s- PO’s-PSO’s

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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	2
CO3	3	3	2	3		--	--	--	--	--	--	--	3	3	2
CO4	3	3	2	3	2	-	--	--	--	--	--	--	2	3	3
CO5	3	2	3	2	3	-	--	-	--	--	--	--	3	3	2
Average	3.00	2.80	1.4	2.80	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.80	3.00	2.40
Level of Correlation of the Course	3	3	2	2	1								3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

	L	T	P	C
IV B.Tech – I Semester (EEE)	**3**	**1**	**-**	**4**

20AEEA1 MODELING AND OPTIMIZATION OF ENERGY SYSTEMS

Minor Degree (Industry relevant Track- I)

COURSE OUTCOMES:

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

CO1: Analyze modelling and simulation methods for energy systems.

CO2: Design Optimization techniques for dynamic programming.

CO3: Design measuring instruments for second order systems.

CO4: Analyze statistical and dynamical characteristics.

CO5: Analyze demand forecasting techniques control in the Scenario based approach.

UNIT I MODELING AND SIMULATION OF ENERGY SYSTEMS

Modeling and simulation principles - Modelling overview-levels of analysis, steps in model development, examples of models. Hardy-Cross method - Multivariable Newton-Raphson simulation method - Simulation of renewable energy systems/Case studies - Simulation using differential equations - Mathematical modeling of thermodynamic properties - Steady state simulation of large systems - Simulation of dynamic systems.

UNIT II OPTIMIZATION TECHNIOQUES

Objectives/constraints, problem formulation. Unconstrained problems-Necessary & Sufficient conditions. Constrained Optimization-Lagrange multipliers, constrained variations, Kuhn-Tucker conditions. Case studies of optimization in Energy systems problems. Dealing with uncertainty probabilistic techniques. Linear programming - Dynamic programming - Nontraditional optimization techniques Introduction system design - Curve fitting - Search methods - Univariate / Multivariate

UNIT III RESPONSE ANALYSIS

Characteristics of measurement systems, time response of measurement systems, System response-first and second order systems and analysis, error estimates and uncertainty analysis, propagation of uncertainty

UNIT IV STATISTICAL AND DYNAMIC ANALYSIS

Statistical analysis of experimental data- normal error distributions (confidence interval and level of significance, Chauvenet's criterion), Chi-square test of goodness of fit, method of least squares (regression analysis, correlation coefficient), multivariable regression, error estimates using Gaussian distribution, Static and dynamic characteristics; dimensional analysis and similitude, Design of experiments

UNIT V ENERGY DEMAND FORECASTING

Simple and advanced Techniques, Econometric Approach to Energy Demand Forecasting, End-Use Method of Forecasting, Input– Output Model, Scenario based approach, ANN, Hybrid Approach.

TEXT BOOKS:

1. J. Randolph and G. M. Masters, Energy for Sustainability: Technology, Planning, Policy, Island Press, 2018, ISBN-13: 978-1597261036.
2. M. Munasinghe and P. Meier, Energy Policy Analysis and Modeling, Cambridge University Press, 1993, ISBN: 9780511983573.
3. Bhattacharyya, Subhes C. Energy economics: concepts, issues, markets and governance. Springer Science & Business Media, 2011, ISBN 978-0-85729-268-1.

REFERENCE BOOKS:

1. Adrian Bejan, George Tsatsaronis, Michael Moran, Thermal Design and Optimization, John Wiley, 1995, ISBN: 978-0-471-58467-4.
2. Y. Jaluria, Design and Optimization of Thermal Systems, 2e, CRC Press, 2008, ISBN 9781498778237.
3. W.F. Stoeker, Design of Thermal Systems, 3e, McGraw Hill, 2011, ISBN 10: 125900239X / ISBN 13: 9781259002397.

Mapping of CO’s- PO’s-PSO’s

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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	2
CO3	3	3	3	1	2	--	--	--	--	--	--	--	3	2	2
CO4	3	3	2	3	3	-	--	--	--	--	--	--	3	3	3
CO5	3	2	3	2	3	3	--	-	--	--	--	--	3	3	2
Average	3.00	2.80	1.6	2.40	1.6	0.60	0.00	0.00	0.00	0.00	0.00	0.00	3.00	2.8	2.40
Level of Correlation of the Course	3	3	2	3	2								3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech – II Semester (EEE)

L	T	P	C
3	1	0	4

20AEEA2 ELECTRIC AND HYBRID VEHICLES

Minor Degree (Industry relevant Track-II)

COURSE OUTCOMES:

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

CO1: Apply history, economical & environmental impact, benefits and challenges of Electric and Hybrid Vehicles.

CO2: Apply vehicle fundamentals and its performance.

CO3: Analyze Electric Drive train Configurations and Characteristics.

CO4: Analyze the Electric Propulsion drive schemes in electric and hybrid vehicles.

UNIT–I ELECTRIC VEHICLES

History - Economical and Environmental impact -Components –Block diagram-Classification-Comparison with Internal Combustion Engine -Benefits and Challenges

UNIT–II HYBRID ELECTRIC VEHICLES

History - Economical and Environmental impact -Components –Block diagram-Classification-Comparison with Electric Vehicles -Benefits and Challenges

UNIT–III VEHICLE FUNDAMENTALS AND PERFORMANCE

General Description of Vehicle Movement- Vehicle Resistance: Rolling Resistance- Aerodynamic Drag- Grading Resistance- Dynamic Equation-Vehicle Performance: Maximum Speed- Grade ability- Acceleration-Transmission: Differential, Clutch & Gearbox, Braking performance

UNIT–IV ELECTRIC DRIVE TRAINS

Electric Drive train Configuration-Characteristics- Drive train tractive effort and vehicle speed- EV Configurations-HEV Configurations-Power flow control of HEV-Series-Parallel-Series and Parallel configurations

UNIT–V Electric Propulsion unit

Different types of Electric Motors- Configuration and control of DC Motor drives-Induction Motor drives, -Permanent Magnet Motor Drives-Switched Reluctance Motor Drives

TEXT BOOKS:

1. Electric and Hybrid Vehicles: Design Fundamentals by Husain Iqbal
2. Advanced Hybrid and Electric Vehicles: System Optimization and Vehicle Integration

REFERENCE BOOKS:

1. Hybrid Electric Vehicles: Energy Management Strategies Book by Giorgio Rizzoni and Lorenzo Serrao.
2. Optimal Control of Hybrid Vehicles Novel by Bramde Jagerand John Kessels.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3		2	2	1	--	--	--	--	--	--	3	2	2
CO2	3	3		3	2	2	--	--	--	--	--	--	2	3	2
CO3	3	2	2	1	2	2	--	--	--	--	--	--	2	2	2
CO4	3	3	2	3	2	2	--	--	--	--	--	--	2	3	3
Average	3.00	2.75	1	2.25	2.00	1.75	0.00	0.00	0.00	0.00	0.00	0.00	2.25	2.50	2.25
Level of Correlation of the Course	3	3	1	3	2	2							2	3	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

	L	T	P	C
III B.Tech – I Semester (EEE)				
	3	**1**	**-**	**4**

20AEEA3 TESTING AND CERTIFICATION OF ELECTRIC HYBRID VEHICLES

Minor Degree (Industry relevant Track-II)

COURSE OUTCOMES:

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

CO1: Understand the E-vehicle certification.

CO2: Apply the concept of static testing of E-vehicle.

CO3: Apply the concept of dynamic testing of E-vehicle.

CO4: Analyze various E-vehicle component testing.

CO5: Gain the insight of charging station & hybrid electric vehicle testing.

UNIT I :

INTRODUCTION: Specification & Classification of Vehicles (including M, N and O layout), Homologation & its types, Regulations overview (EEC, ECE, FMVSS, AIS, CMVR), Type approval Scheme, Homologation for export, Conformity of Production, various Parameters, Instruments and Types of test tracks, Hardware in The Loop (HIL) concepts for EV/HEVs

UNIT II :

STATIC TESTING OF VEHICLE: Photographs, CMVR physical verification, Tyre Tread Depth Test, Vehicle Weightment, Horn installation, Rear view mirror installation, Tell Tales, External Projection, Wheel Guard, Arrangement of Foot Controls for M1 Vehicle, Angle & Dimensions Measurement of Vehicle, The requirement of temporary cabin for drive– away – Chassis, electric vehicle – Safety norms, Energy consumption and power test.

UNIT III

DYNAMICS TESTING OF VEHICLE: Hood Latch, Gradeability, Pass-by Noise, Interior Noise, Turning Circle Diameter & Turning Clearance Circle Diameter, Steering Effort, Constant Speed Fuel Consumption, Cooling Performance, Speedo-meter Calibration, Range Test, Maximum Speed, Acceleration Test, Coast-down test, Brakes Performance ABS Test, Broad band / Narrow band EMI Test, Electric vehicle – Range Test.

UNIT IV

VEHICLE COMPONENT TESTING: Horn Testing, Safety Glasses Test: Windscreen laminated and toughened safety glass, Rear View Mirror Test, Hydraulic Brakes Hoses Fuel Tank Test: Metallic & Plastic, Hinges and Latches Test, Tyre & Wheel Rim Test, Bumper Impact Test, Side Door Intrusion, Crash test with dummies, Demist test, Defrost Test, Interior Fittings, Steering Impact test (GVW

UNIT V :

TESTS FOR HYBRID ELECTRIC VEHICLES, RETRO-FITMENT AND CHARGING STATION: Hybrid Electric Vehicles Tests (M and N category), Tests for Hybrid Electric System Intended for Retro-fitment on Vehicles of M and N Category (GVW < 3500 kg), Test for Electric Propulsion kit intended for Conversion, Test for Electric Vehicle Conductive AC Charging System, and Test for Electric vehicle conductive DC charging system

TEXT BOOKS:

1. "Vehicle Inspection Handbook", American Association of Motor Vehicle Administrators 2. Michael Plint & Anthony Martyr, "Engine Testing & Practice", Butterworth Heinmenn,
   3rd ed, 2007

REFERENCE BOOKS:

1. Proceedings- Automotive Testing & Certification held on 20th to 24th July 2010 at ARAI,
   PUNE 2. Bosch Automotive Handbook, Robert Bosch, 7th Edition, 2007.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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	2
CO3	3	3	3	1		--	--	--	--	--	--	--	3	2	3
CO4	3	3	2	3	2	-	--	--	--	--	--	--	2	2	3
CO5	3	2	3	2	3	-	--	-	--	--	--	--	3	2	2
Average	3.00	2.80	1.6	2.40	1	0.00	0.00	0.00	0.00	0.00	0.60	0.00	2.80	1.2	2.60
Level of Correlation of the Course	3	3	2	2	1								3	2	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

	L	T	P	C
III B.Tech – II Semester (EEE)	**3**	**1**	**-**	**4**

20AEEA4 EV BATTERIES & CHARGING SYSTEM

Minor Degree (Industry relevant Track-II)

COURSE OUTCOMES:

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

CO1: Analyze various technical parameters of batteries.

CO2: Apply various technologies for EV charging systems and power management.

CO3: Analyze the voltage control for batteries.

CO4: Distinguish between various types of batteries used for EV applications.

CO5: Develop battery charger for an EV.

UNIT I

BATTERY –FUNDAMENTALS Cell and battery voltages, Charge (or Amphour) capacity, Energy stored, Energy density, Specific power, Amphour (or charge) efficiency, Energy efficiency, Self-discharge rates, Battery geometry, Battery temperature, heating and cooling needs, Battery life and number of deep cycles.

UNIT II

LEAD ACID AND NICKEL BASED BATTERIES Lead Acid Batteries Lead acid battery basics, Special characteristics of lead acid batteries, Battery life and maintenance, Battery charging, Summary Nickel-based Batteries Introduction, Nickel cadmium, Nickel metal hydride batteries.

UNIT III

POLYMER AND AIR BATTERIES Sodium-based Batteries Introduction, Sodium sulphur batteries, Sodium metal chloride (Zebra) batteries Lithium Batteries Introduction, The lithium polymer battery, The lithium ion battery Metal Air Batteries Introduction, The aluminium air battery.

UNIT IV:

CHARGING AND ITS INFRASTRUCTURE

The zinc air battery Domestic Charging Infrastructure, Public Charging Infrastructure, Normal Charging Station, Occasional Charging Station, Fast Charging Station, Battery Swapping Station, Move-and-charge zone.

UNIT V

BATTERY CHARGING METHODS : Charge equalization, Conductive (Basic charger circuits, Microprocessor based charger circuit. Arrangement of an off-board conductive charger, Standard power levels of conductive chargers, Inductive (Principle of inductive charging, Soft-switching power converter for inductive charging), Battery indication methods.

TEXT BOOKS:

1.James Larminie Oxford Brookes University, Oxford, UK John Lowry Acenti Designs Ltd., UK, Electric Vehicle Technology Explained.

2 C.C Chan, K.T Chau: Modern Electric Vehicle Technology, Oxford University Press Inc., New York 2001.

REFERENCE BOOKS:

1. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003.
2. Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi, Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, CRC Press, 2004.
3. James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley, 2003.

Mapping of CO's- PO's-PSO's

Course Outcome	**Program Outcomes**												**Program Specific Outcomes**		
	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	2
CO3	3	3		1	2	--	--	--	--	--	--	--	2	3	2
CO4	3	3	2	3	2	-	--	--	--	--	--	--	2	3	3
CO5	3	2	3	2	3	3	--	-	--	--	--	--	3	3	3
Average	3.00	2.80	2.80	2.40	1.4	0.60	0.00	0.00	0.00	0.00	0.00	0.00	2.60	3.00	2.60
Level of Correlation of the Course	3	3	3	2	2								3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B.Tech – II Semester (EEE)

L	T	P	C
3	1	-	4

20AEEA5 ELECTRIC VEHICLES IN SMART GRID

Minor Degree (Industry relevant Track-II)

COURSE OUTCOMES:

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

CO1: Analyze mathematical models, performance and characteristics of hybrid and electric vehicles.

CO2: Analyze the concepts, topologies and power flow control of electric traction systems.

CO3: Appraise the configuration and control of various hybrid electric motor drives

CO4: Design appropriate vehicle management system.

CO5: Apply different applications in Electric Vehicles in smart grid

UNIT I

INTRODUCTION HYBRID AND ELECTRIC VEHICLES (9L): History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies. Basics of vehicle performance, vehicle power source characterization, transmission characteristics, mathematical models to describe vehicle performance.

UNIT II

ELECTRIC TRACTION SYSTEMS(9L): Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis. Basic concepts of electric traction, introduction to various electric drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis

UNIT III

HYBRID ELECTRIC MOTOR DRIVES(9L): Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Introduction Motor drives, configuration and control of Permanent Magnet Motor drives, Configuration and control of Switch Reluctance Motor drives, drive system efficiency.

UNIT IV

ELECTRICAL MACHINES AND INTERNAL COMBUSTION ENGINE(9L) Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, sizing the power electronics, selecting the energy storage technology, Communications, supporting subsystems.

UNIT V

VEHICLE MANAGEMENT SYSTEM(9L) Introduction to energy management strategies used in hybrid and electric vehicle, classification of different energy management strategies, comparison of different energy management strategies, implementation issues of energy strategies

TEXT BOOKS:

1. Sira -Ramirez, R. Silva Ortigoza, 'Control Design Techniques in Power Electronics Devices', Springer, 2006

2 .Siew-Chong Tan, Yuk-Ming Lai, Chi Kong Tse, 'Sliding mode control of switching Power Converters', CRC Press, 2011

REFERENCE BOOKS:

1. Bimal Bose, 'Power electronics and motor drives', Elsevier, 2006

2. Ion Boldea and S.A Nasar, 'Electric drives', CRC Press, 2005

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	--	--	--	--	--	--	--	3	3	3
CO2	3	3	3	3	2	--	--	--	--	--	--	--	3	3	3
CO3	3	3	3	1	2	--	--	--	--	--	--	--	2	3	2
CO4	3	3	2	3	2	3	--	--	--	--	--	--	2	3	3
CO5	3	2	3	2	3	3	--	-	--	--	--	--	3	3	3
Average	3.00	2.80	2.80	2.40	2.20	1.20	0.00	0.00	0.00	0.00	0.00	0.00	2.60	3.00	2.80
Level of Correlation of the Course	3	3	3	2	2	1							3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

	L	T	P	C
IV B.Tech – I Semester (EEE)				
	3	**1**	**-**	**4**

20AEEA6 MODELLING AND SIMULATION OF EHV

Minor Degree (Industry relevant Track-II)

COURSE OUTCOMES:

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

CO1: Understand the modeling of vehicle performance parameters.

CO2: Analyze the battery electric vehicles.

CO3: Analyze the drive train characteristics.

CO4: Apply the concepts of energy management system.

CO5: Illustrate the vehicle dynamic control systems.

UNIT I MODELLING IN PERFORMANCE PARAMETER

Modelling Vehicle Acceleration - Acceleration performance parameters, modelling the acceleration of an electric scooter, modelling the acceleration of a small car.

UNIT II MODELLING OF BATTERY ELECTRIC VEHICLES

Electric Vehicle Modelling - Tractive Effort, Rolling resistance force, Aerodynamic drag, Hill climbing force, Acceleration force, Total tractive effort, Modelling Electric Vehicle Range - Driving cycles, Range modelling of battery electric vehicles, Constant velocity range modelling, Range modelling of fuel cell vehicles, Range modelling of hybrid electric vehicles.

UNIT III DRIVE TRAIN CHARACTERISTICS

Modelling and Characteristics of EV/HEV Powertrains Components- ICE Performance Characteristics, Electric Motor Performance Characteristics - Battery Performance Characteristics-Transmission and Drivetrain Characteristics-Regenerative Braking Characteristics-Driving Cycles Modelling and Analysis of Electric and Hybrid Electric Vehicles Propulsion and Braking - Longitudinal Dynamics Equation of Motion - Vehicle Propulsion Modelling and Analysis - Vehicle Braking Modelling and Analysis.

UNIT IV ENERGY MANAGEMENT

Handling Analysis of Electric and Hybrid Electric Vehicles - Simplified Handling Models Energy/Power Allocation and Management - Power/Energy Management Controllers - Rule-Based Control Strategies - Optimization-Based Control Strategies.

UNIT V VEHICLE DYNAMIC CONTROL

Control of Electric and Hybrid Electric Vehicle Dynamics - Fundamentals of Vehicle Dynamic Control (VDC) Systems, VDC Implementation on Electric and Hybrid Vehicles – Case Studies, Rechargeable Battery vehicles, Hybrid Vehicles, Fuel Cell Powered Bus. Simulation Tools: Matlab/Simulink, ADVISOR and AVL Cruise.

TEXT BOOKS:

1. James Larminie, John Lowry, "Electric Vehicle Technology Explained", John Wiley & Sons Ltd, 2003.
2. Amir Khajepour, Saber Fallah and AvestaGoodarzi, "Electric and Hybrid Vehicles Technologies, Modelling and Control: A Mechatronic Approach", John Wiley & Sons Ltd, 2014.

REFERENCE BOOKS:

1. Antoni Szumanowski, "Hybrid Electric Power Train Engineering and Technology: Modelling, Control, and Simulation", IGI Global, 2013.
2. Mehrdad Ehsani, Yimin Gao, Ali Emadi, "Modern Electric, Hybrid Electric, and Fuel Cell Vehicles_ Fundamentals, Theory, and Design, Second Edition", CRC Press, 2010.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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	3	2
CO3	3	3	3	1	--	2	--	--	--	--	--	--	2	3	2
CO4	3	3	2	3	3	-	--	--	--	--	--	--	2	3	3
CO5	3	2	3	2	3	-	--	--	--	--	--	--	3	3	3
Average	3.00	2.80	1.6	2.40	1.2	1.00	0.00	0.60	0.00	0.00	0.00	0.00	2.60	3.00	2.60
Level of Correlation of the Course	3	3	2	3	1	1							3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

II B.Tech – II Semester (EEE)

L	T	P	C
3	1	0	4

20AEEA7 SMART ELECTRIC GRID TECHNOLOGY

Minor Degree (Industry relevant Track-III)

COURSE OUTCOMES:

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

CO1: Apply the functioning of various devices used in Smart Grids

CO2: Analyze about the communication channels in Smart Grid.

CO3: Apply the concept of information security for the smart grid

CO4: Apply knowledge in smart metering and control techniques used in smart grid.

UNIT- I SMART GRID

Introduction – Necessity of smart grid – Definition – Early smart grid initiatives – overview of the technologies required for the smart grid-Information and communication technologies, Sensing measurement, control and automation technologies, Power electronics and energy storage.

UNIT-II DATA COMMUNICATION

Introduction – dedicated and shared communication channels – switching techniques – communication channels- layered architecture and protocols; Communication technologies for the smart grid: Introduction –communication technologies – standards for information exchange.

UNIT-III INFORMATION SECURITY FOR THE SMART GRID:

Introduction – Encryption and Decryption: Symmetric Key encryption, Public key encryption - Authentication – Digital signature: Secret key signature, Public key signature, Message digest – cyber security standards.

UNIT-IV SMART METERING AND DEMAND SIDE INTEGRATION:

Introduction – smart metering – smart meters – Communication infra structure and protocols for smart metering - Demand side integration.

UNIT-V: SMART GRID APPLICATIONS:

Introduction – voltage and VAR control and optimization – fault detection, isolation and restoration (FDIR) – Demand response (DR) – Distributed energy resources (DERs) – wide area monitoring, control and protection (WAMCP).

TEXT BOOKS:

1. Janaka Ekanayake, Kithsiri Liyanage, Jianzhong Wu , Nick Jenkins "Smart Grid: Technology and Applications" first Edition, John Wiley & sons Limited ; 2012.
2. Lars T. Berger and Krzysztof Iniewski "Smart Grid: Applications, communication and security" first Edition ,John Wiley & sons Limited; 2012.

REFERENCE BOOKS:

1. James Momoh "Smart grid: Fundamental of Design and analysis" ,John Wiley & sons Limited IEEE Press, 2012.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2		1	--	--	--	--	--	--	3	2	2
CO2	3	3	2	3	3	2	--	--	--	--	--	--	1	3	2
CO3	3	2	2	1	2	2	--	--	--	--	--	--	2	2	2
CO4	3	3	2	3	3	2	--	--	--	--	--	--	2	3	3
Average	3.00	2.75	2	2.25	2	1.75	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.50	2.25
Level of Correlation of the Course	3	3	2	3	3	2							2	3	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

III B.Tech – I Semester (EEE)

L	T	P	C
3	1	-	4

20AEEA8 MICRO-GRID OPERTION AND CONTROL

Minor Degree (Industry relevant Track-III)

COURSE OUTCOMES:

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

CO1: Analyze of AC and DC micro-grids

CO2: Analyze Dynamic modeling and analysis of micro-grids

CO3: Analysis of different hierarchical control schemes for micro-grid system

CO4: Analysis of Communication implementation of hierarchical control

CO5: Investigate the stability in micro-grids and alternate options for stability improvement in micro-grids

UNIT I CONCEPT OF MICRO-GRIDS

Introduction to the concept of micro-grid, the overview of the structure and architecture of micro-grid with brief control, operational aspects. Till date pilot micro-grid projects and their outcomes. Decentralized local controllers: AC-micro-grids: Control Mechanism of the DGs connected in micro-grid.

UNIT II POWER SHARING IN MICROGRID

Virtual synchronous generator (VSG) and Droop control. Transient frequency response, active power Response, reactive power sharing and voltage regulation DC-micro-grids: DC micro-grid control mechanism, droop control, issues in achieving active power sharing with impedance droop, remedies to achieve active power sharing.

UNIT III POWER SYSTEM STABILITY

Power system stability classification, Basic definitions of transient, dynamic, and small signal stability, basic synchronous machine dynamic modeling, k1-k6 model and analysis of SMIB systems. Modeling and stability analysis of micro-grids: Dynamic modeling of individual components in AC and DC micro-grids, state space modal analysis and influence of system parameters on the micro-grid dynamics, brief concept on the design of micro-grid stabilizers to improve stability.

UNIT IV HIERARCHICAL CONTROL SCHEME FOR MICRO-GRIDS

Control Objectives in AC Micro-grids, bottleneck with only local control, need of secondary and tertiary control, implementation of hierarchical control with centralized and distributed control schemes for AC and DC micro-grids. Advantages and disadvantages of centralized and distributed control schemes.

UNIT V MULTI-MICRO-GRID COORDINATION AND CONTROL

AC-AC, AC-DC and DC-DC micro-grid clustering, coordinated control schemes in multi-micro-grids, frequency, voltage regulations and volt-VAR support. Control of Smart Power Grid System: Load Frequency Control (LFC) in Micro Grid System – Voltage Control in Micro Grid System – Reactive Power Control in Smart Grid. Case Studies and Test beds for the Smart Grids.

TEXT BOOKS:

1. Micro-grids Architecture and control, N. D. Hatziargyriou, IEEE Press Series, John Wiley & Sons Inc, 2013, 1st Edition.
2. Micro-grid Dynamics and Control, H. Bevrani, B. François, and T. Ise, John Wiley & Sons, 2017, 1st Edition.

REFERENCE BOOKS:

1. Cooperative Synchronization in Distributed Microgrid Control, Bidram, V. Nasirian, A. Davoudi, F. L. Lewis, Springer, 2017, 1st Edition.
2. Power System Stability and Control, P. Kundur, McGraw-Hill, Inc., 1994, 2nd Edition.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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	3
CO3	3	3	--	1	--	--	--	--	--	--	--	--	2	3	3
CO4	3	3	2	3	2	3	--	--	--	--	--	--	2	3	3
CO5	3	2	3	2	3	3	--	-	--	--	--	--	3	3	2
Average	3.00	2.80	1	2.40	1	1.20	0.00	0.00	0.00	0.00	0.00	0.00	2.60	3.00	2.80
Level of Correlation of the Course	3	3	1	2	1	1							3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech – II Semester (EEE)

L	T	P	C
3	1	-	4

20AEEA9 SMART GRID PLANNING & OPERATION

Minor Degree (Industry relevant Track-III)

COURSE OUTCOMES:

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

CO1: Analysis and planning of Smart Grids.

CO2: Evaluate the tools for modeling and analysis of smart grid dynamics.

CO3: Analyze and synthesize different control schemes of smart grid operation.

CO4: Assess the influence of smart grid on power system.

CO5: Interpret knowledge different control schemes of smart grid planning.

UNIT I   INTRODUCTION TO SMART GRID SYSTEM

Analysis of Smart Grid System Smart grid concepts, smart grid components and control elements, Distributed generation resources and Energy Storage, Plug-in-Hybrid Electric Vehicles (PHEV), Micro-grids, Load Flow study for AC/DC power system.

UNIT II SMART GRID MONITORING

Smart grid Monitoring, smart grid standards and policies. Smart Grid Planning Aspects of smart grid, Optimal power flow, Demand side management of smart grid, Demand response analysis of smart grid, Planning and Design of smart grid systems.

UNIT III   CONTROL OF SMART GRID

Voltage and frequency control of Smart Grid (Angle/Voltage instability Phenomena, stability constraints), frequency & voltage regulations, Automatic generation Control, Tie-line power sharing and Voltage Stability assessment.

UNIT IV REACTIVE POWER AND COMPENSATION IN SMART GRID

Voltage and reactive power control, Shunt compensation, SVC, Voltage stability Indexing, and volt VAR support Operation and Control of Smart Grids Operational aspects of smart grid system, Economic Dispatch, Load Dispatch Centre Function.

UNIT V SMART DISTRIBUTION SYSTEM

Contingency Analysis, preventive, Emergency and Restorative, control objectives of smart distribution system, architecture and different schemes of smart grid control, bottleneck in smart grid control, Ancillary Services.

TEXT BOOKS:

1. Smart Grid: Fundamentals of Design and Analysis, J. Momoh, Wiley-IEEE Press, 2012, 1st Edition.
2. Introduction to the Smart Grid: Concepts, Technologies and Evolution, S. K. Salman, IET Energy Engineering Series, 2017, 1st Edition.
3. Power System Stability and Control, Prabha Kundur, McGraw Hill Education, 2006, 1st Edition.

REFERENCE BOOKS:

1. Power System SCADA and Smart Grid, Mini S Thomas and J. D MacDonald, CRC Press, 2015, 1st Edition.
2. Micro-grids Architecture and control, N. Hatziargyriou, Wiley-IEEE Press Series, 2013, 1st Edition.
3. Smart Grid Applications and Developments, D. Mah, P. Hills, Victor O.K. Li, R. Balme, Springer-Verlag London, 2014, 1st Edition.
4. Smart Grid: Technology and Applications, J. Ekanayake, N. Jenkins, K. Liyanage, J. Wu, A. Yokoyama, John Wiley & Sons, 2015, 1st Edition.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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	3
CO3	3	3	--	1	--	--	--	--	--	--	--	--	2	3	3
CO4	3	3	2	3	2	-	--	--	--	--	--	--	2	3	3
CO5	3	2	3	2	2	-	--	2	--	--	--	--	3	3	2
Average	3.00	2.80	1	2.40	0.8	0.00	0.00	0.40	0.00	0.00	0.00	0.00	2.60	3.00	2.80
Level of Correlation of the Course	3	3	1	2	1								3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B.Tech – II Semester (EEE)

L	T	P	C
3	1	-	4

20AEEB0 SMART GRID TECHNOLOGIES & IOT

Minor Degree (Industry relevant Track-III)

COURSE OUTCOMES:

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

CO1: Apply different smart devices and smart meters for domestic and industrial applications

CO2: Analyze modern power distribution system functions.

CO3: Identify suitable communication networks for Smart Grid applications.

CO4: Design smart meters for various management systems**.**

CO5: Evaluate the Smart Grid integration in the grid levels.

UNIT I : INTRODUCTION TO SMART GRID

Introduction - Evolution of Electric Grid, Smart Grid Concept - Definitions and Need for Smart Grid – Functions – Opportunities – Benefits and challenges, Difference between conventional & Smart Grid, Technology Drivers.

UNIT II : ENERGY MANAGEMENT SYSTEM

Energy Management System (EMS) - Smart substations - Substation Automation - Feeder Automation, SCADA – Remote Terminal Unit – Intelligent Electronic Devices – Protocols, Phasor Measurement Unit – Wide area monitoring protection and control, Smart integration of energy resources – Renewable, intermittent power sources – Energy Storage.

UNIT III : DISTRIBUTION MANAGEMENT SYSTEM

Distribution Management System (DMS) – Volt / VAR control – Fault Detection, Isolation and Service Restoration, Network Reconfiguration, Outage management System, Customer Information System, Geographical Information System, Effect of Plug in Hybrid Electric Vehicles MODULE 4 – SMART METERS (9L)

UNIT IV: SMART METERS

Introduction to Smart Meters – Advanced Metering infrastructure (AMI), AMI protocols – Standards and initiatives, Demand side management and demand response programs, Demand pricing and Time of Use, Real Time Pricing, Peak Time Pricing.

UNIT V : COMMUNICATION NETWORKS & IOT

Elements of communication and networking – architectures, standards, PLC, Zigbee, GSM, BPL, Local Area Network (LAN) - House Area Network (HAN) - Wide Area Network (WAN) - Broadband over Power line (BPL) - IP based Protocols - Basics of Web Service and CLOUD Computing, Cyber Security for Smart Grid

TEXT BOOKS:

1. Stuart Borlase 'Smart Grid: Infrastructure, Technology and Solutions', CRC Press 2012.
2. JanakaEkanayake, Nick Jenkins, KithsiriLiyanage, Jianzhong Wu, Akihiko Yokoyama, 'Smart Grid: Technology and Applications', Wiley, 2012

REFERENCE BOOKS:

1. Mini S. Thomas, John D McDonald, 'Power System SCADA and Smart Grids', CRC Press, 2015
2. Kenneth C.Budka, Jayant G. Deshpande, Marina Thottan, 'Communication Networks for Smart Grids', Springer, 2014.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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	3
CO3	3	3	--	1			--	--	--	--	--	--	2	3	3
CO4	3	3	2	3	3	-	--	--	--	--	--	--	2	3	3
CO5	3	2	3	2	3	-	--	-	--	--	--	--	3	3	2
Average	3.00	2.80	1	2.40	1.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.60	3.00	2.80
Level of Correlation of the Course	3	3	1	3	1								3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B.Tech – I Semester (EEE)

L	T	P	C
3	1	-	4

20AEEB1 SMART GRID COMMUNICATIONS AND PROTOCOLS

Minor Degree (Industry relevant Track-III)

COURSE OUTCOMES:

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

CO1: Understand the role of communication networks in Smart Grid systems.

CO2: Analyze the architectures of the network communications.

CO3: Evaluate advanced communication protocols for power system automation.

CO4: Analyze system network security and data management.

CO5: Analyze the grid potential and power management.

UNIT I

POWER SYSTEM AUTOMATION: Evolution of power system Automation, SCADA System, Elements of Communication Networking; Control in Traditional Power Networks; Distributed Generation and Active Control; Communications Challenges in Active Control Elements of Communication Networking for Power System Practitioners: Elements of Data Communication Networks.

UNIT II

SMART GRID NETWORK AND PROTOCOLS: Protocols and Protocol Layers; OSI Reference Model; TCP Reference model; Practical Protocol Layering in Network; Data Networking Technologies; Different network topologies and Classification of communication network. Communication Network Architecture Framework; Core-Edge Architecture; Smart Grid Network Protocols.

UNIT III

SMART GRID DOMAINS AND COMMUNICATION NETWORK; WAN Architecture; WAN over Network Service Provider; Local Traffic Aggregation; Putting It All Together; Field Area Networks; FAN Protocol Options; Summary of FAN Networking Technologies; Logical End-to-End

Connectivity (A Few Examples); Automated Demand Response; Volt, VAR, Watt Control in Distribution System; Wide Area Situational Awareness and Control.

UNIT IV

NETWORK SECURITY: Importance of Smart Grid Security; Regulations, Standards, and Best Practices; Smart Grid Security Architecture; Security Zones; Transmission Zone; Distribution SCADA Zone; Distribution Non-SCADA Zone; Interconnect Zone; Additional Security-Related Operations. Smart Grid Data Management Characterization of Smart Grid Data. Technology Challenges; Secure Information and Data Management Architecture; Design Requirements; Secure Data Management; Secure End-toEnd Protocols; Data Management Platform; Applications of Smart Grid Data; Utility-Centric Applications; Consumer-Centric Analytics; Market-Centric Analytics; Power Line Communication; Smart Grid Protocols Modbus.

UNIT V

SMART GRID PROTOCOLS : Modbus message frame; Protocol architecture, IEC 60870-5-101/103/104; Distributed network protocol 3; Inter-control center protocol; Ethernet; IEC 61850, Synchrophasor standard; Wireless technologies for home automation; Protocols in the power system communication: Deployed and evolving such as LPWAN, 5G etc. for network; Parallel Redundancy Protocol (PRP) and High-availability Seamless Redundancy (HSR) may be included/added.

TEXT BOOKS:

1. Communication Networks for Smart Grids, Kenneth C. Budka, Jayant G. Deshpandeand Marina Thottan, Springer London Heidelberg New York Dordrecht, 2014, 1st Edition.
2. Power system SCADA and smart grid, Mini. S. Thomas and John D. McDonald, CRC Press Taylor & Francis Group, 2015, 1st Edition.

REFERENCE BOOKS:

1. Communication Challenges and Solutions in the Smart Grid, F. Bouhafs, M. Mackay and M. Merabti, Springer New York Heidelberg Dordrecht London, 2014, 1st Edition.
2. Simulation-Based Validation for Smart Grid Environments: Framework and Experimental Results, Wonkyu Han, Mike Mabey, Gail-Joon Ahn and Tae Sung Kim, Springer International Publishing Switzerland, 2014, 1st Edition.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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	2
CO3	3	3	3	3	1	--	--	--	--	--	--	--	2	3	3
CO4	3	3	2	3	2	2	--	--	--	--	--	--	2	3	3
CO5	3	2	3	2	2	-	--	-	--	--	--	--	3	3	2
Average	3.00	2.80	1.6	2.80	1	0.40	0.00	0.00	0.00	0.00	0.00	0.00	2.60	3.00	2.60
Level of Correlation of the Course	3	3	2	2	1								3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

II B.Tech – II Semester (EEE)

L	T	P	C
3	**1**	**0**	**4**

20AEEB2 INDUSTRIAL DRIVES

Minor Degree (Industry relevant Track-IV)

COURSE OUTCOMES:

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

CO1: Apply the functioning of various devices in Smart Grids

CO2: Apply the communication channels in Smart Grid.

CO3: Analyze the concept of information security for the smart grid

CO4: Analyze the smart metering in Smart Grids

UNIT- I INTRODUCTION TO ELECTRIC DRIVES

Fundamentals of Electric Drive dynamics- -Power and Torque-Efficiency-Typical Operating Conditions-Speed Control of Electrical Motors-Reversing-Torque Control-Dynamic Braking-Sizing and Selection of Converters. Converter rating from Motor Specification-Overload Capacity-Control Range-Derating Factor-Regenerative Energy.

UNIT - II DC DRIVES

Conventional methods of DC motor speed control, single phase and three phase-controlled DC drives-four quadrant operation-Chopper fed DC drives-Braking and speed reversal-Closed-loop control of DC Drives-Design of controllers- Applications

UNIT – III AC DRIVES

Control characteristics of induction machines. Phase-controlled induction machines, Stator voltage control, Slip energy recovery scheme, frequency control and vector control of induction motor drives. Closed loop control. Variable frequency control of synchronous motor drives, self-controlled synchronous motor drives- Applications

UNIT – IV TRACTION DRIVES

Traction Drives – Characteristics of Traction Drives; Drive Power Requirement; DC and AC Traction-Traction motors – control. Constant current systems, multiple unit control, thyristor and feedback controls. Regenerative braking – conditions in traction. BLDC motor – speed control – Effect of commutating current on torque ripples- Application in Electric vehicle.

UNIT- V ENERGY CONSERVATION IN INDUSTRIAL DRIVES

Classification of Energy Efficiency - Energy Efficient Motor starting and control- Load over Time - Applications with Variable and Constant Torque - Life Cycle Costs and System Savings Using Regenerated Power. Energy conservation through servo control and special motor drives.

TEXT BOOKS:

1. Bimal K Bose, "Modern Power Electronics and AC Drives", Pearson Education Asia, 2012.
2. R. Krishnan, "Electric Motor Drives- Modeling, Analysis and Control", Prentice Hall Inc.

REFERENCE BOOKS:

1. G. K. Dubey, Fundamentals of Electrical Drives, Narosa Publishing House, New Delhi , 2001
2. N. K. De and P. K. Sen, Electric Drives, PHI Learning Pvt. Ltd., New Delhi , 1999

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3		2	1	1	--	--	--	--	--	--	3	2	2
CO2	3	3		3	--	2	--	--	--	--	--	--	1	3	2
CO3	3	2	2	1	2	2	--	--	--	--	--	--	2	2	1
CO4	3	3	2	3	--	2	--	--	--	--	--	--	2	3	3
Average	3.00	2.75	1.00	2.25	0.75	1.75	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.50	2.00
Level of Correlation of the Course	3	3	1	3	1	2							2	3	2

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B.Tech – I Semester (EEE)

L	T	P	C
3	1	-	4

20AEEB3 ARTIFICIAL INTELLIGENCE IN INDUSTRIAL AUTOMATION APPLICATIONS

Minor Degree (Industry relevant Track-IV)

COURSE OUTCOMES:

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

CO1: Understand basic AI algorithms.

CO2: Identify appropriate AI methods to solve a given problem.

CO3: Acquire knowledge about AI/ ML/DL techniques in Industrial automation.

CO4: Uunderstand the levels of automation

CO5: Solve AI techniques and intelligent control in industrial automation

UNIT I INTRODUCTION TO INDUSTRIAL AUTOMATION

Automation in Production System, Principles and Strategies of Automation, Basic Elements of an Automated System, Advanced Automation Functions, Levels of Automations. Production Economics - Methods of Evaluating Investment Alternatives, Costs in Manufacturing, Break Even Analysis, Unit cost of production, Cost of Manufacturing Lead time and Work-in-process.

UNIT II INTRODUCTION TO ARTIFICIAL INTELLIGENCE

Introduction-Foundations of AI- History of AI Intelligent agents: Agents and Environment- Reactive agent- deliberative- goal-driven, utility driven, and learning agents -Artificial Intelligence programming techniques. Introduction to ML and DL Concepts Knowledge Representation and Reasoning –Onto logies-foundations of knowledge representation and reasoning-representing and reasoning about objects-relations-

UNIT III INDUSTRIAL AUTOMATION TECHNIQUES

Events actions- time- and space- predicate logic-situation calculus-description logics-reasoning with defaults,-reasoning about knowledge-sample applications- Representing Knowledge and reasoning in an Uncertain Domain- Bayes rule-bayesian networks-probabilistic inference sample applications-

UNIT IV PLANNING

Planning as search- partial order planning- construction and use of planning graphs. Expert systems -Expert systems – Architecture of expert systems, Roles of expert systems – Knowledge Acquisition – Meta knowledge, Heuristics.

UNIT V TYPICAL EXPERT SYSTEMS

MYCIN, DART, XOON. Industrial AI applications and Case studies - Applications of Industrial AI in Monitoring, optimization and control.AI applications in Industry Automation using -natural language processing-computer vision-speech recognition-computer vision.

TEXT BOOKS:

1. Rich and Knight, "Artificial Intelligence", 3rd Edition, Tata McGraw Hill, 2014.

2. M.P.Groover, “Automation, Production Systems and Computer Integrated Manufacturing”, 5th edition, Pearson Education, 2009.

REFERENCE BOOKS:

1. Anuradha Srinivasaraghavan, Vincy Joseph “Machine Learning”, Wiley, 2019

2. Stuart Russell and Peter Norvig, “Artificial Intelligence: A Modern Approach”, 2nd Edition, Prentice Hall, 2003.

3. Rajiv Chopra, “Deep Learning”, 1st edition, Khanna Publishing House,2018.

Mapping of CO’s- PO’s-PSO’s

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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	3
CO3	3	3	3	2		--	--	--	--	--	--	--	2	3	3
CO4	3	3	2	3	2	-	--	--	--	--	--	--	2	3	3
CO5	3	2	3	2	3	-	--	3	--	--	--	--	3	3	2
Average	3.00	2.80	1.6	2.60	1	0.00	0.00	0.60	0.00	0.00	0.00	0.00	2.60	3.00	2.80
Level of Correlation of the Course	3	3	2	3	1								3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

III B.Tech – II Semester (EEE)

L	T	P	C
3	1	-	4

20AEEB4 SENSORS FOR INDUSTRAIL AUTOMATION APPLICATIONS

Minor Degree (Industry relevant Track-IV)

COURSE OUTCOMES:

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

CO1: Analyze various automation technologies in manufacturing and process industries.

CO2: Apply various automation tools and methods in manufacturing industry.

CO3: Implement various control and automation method in process industries.

CO4: Analyze various communication technologies in manufacturing and process Industries.

CO5: Modify the automation tools and methods in communication and industry

UNIT I AUTOMATION IN MANUFACTURING INDUSTRIES

Introduction- Automation in production system, Principles and strategies of automation, Basic elements of an automated system, Advanced automation functions, Levels of automations, Automated flow lines and transfer mechanisms, Analysis of transfer lines without storage, Automated flow lines with storage buffers.

UNIT II MATERIAL HANDLING AND IDENTIFICATION TECHNOLOGIES

Overview of material handling systems, Types of material handling equipment, Design of the system, Conveyor system, Automated guided vehicle system, Automated storage systems, Interfacing handling and storage with manufacturing, Overview of Automatic Identification Methods.

UNIT III AUTOMATED MANUFACTURING SYSTEMS

Components, Classification and overview of manufacturing systems, Cellular manufacturing, Flexible manufacturing system(FMS), FMS and its planning and implementation, Automated assembly system – design and types of automated assembly systems, Analysis of multi station and single station assembly machine. Automation in Process Industries Introduction to computer based industrial automation- Direct Digital Control (DDC), Distributed Control System (DCS) and supervisory control and data acquisition (SCADA) based architectures.

UNIT IV SCADA FOR PROCESS INDUSTRIES

Understanding of RTUs, Pumping stations, Evacuation processes, Mass Flow Meters and other flow meters, Leak-flow studies of pipelines, Transport Automation. Programmable Logic Controller (PLC)- Block diagram of PLC, Programming languages of PLC, Basic instruction sets, Design of alarm and interlocks, Networking of PLC, Overview of safety of PLC with case studies.

UNIT V PROCESS SAFETY AUTOMATION

Levels of process safety through use of PLCs, Integrating Process safety PLC and DCS, Application of international standards in process safety control. Distributed Control System- Local Control Unit (LCU) architecture, LCU Process Interfacing Issues, Block diagram and Overview of different LCU security design approaches, Networking of DCS. Introduction to communication protocols- Profibus, Field bus, HART protocols. Data gathering, Data analytics, Real-time analysis of data stream from DCS, Historian build, Integration of business inputs with process data, Leveraging RTU (as different from PLCs and DCS)

TEXT BOOKS:

1. M.P.Groover, “Automation, Production Systems and Computer Integrated Manufacturing”, 5 th Edition, Pearson Education, 2009.
2. John W. Webb and Ronald A. Reis, “Programmable Logic Controllers: Principles and Applications”, 5th Edition, Prentice Hall Inc., New Jersey, 2003.
3. Krishna Kant, “Computer - Based Industrial Control”, 2nd Edition, Prentice Hall, New Delhi, 2011.
4. Frank D. Petruzella, “Programmable Logic Controllers”, 5th Edition, McGraw- Hill, New York, 2016.

REFERENCE BOOKS:

1. Curtis D. Johnson, “Process Control Instrumentation Technology”, 8th Edition, Pearson New International, 2013.
2. Lukas M.P, “ Distributed Control Systems”, Van Nostrand Reinhold Co., New York, 1986. 3. N. Viswanandham, Y. Narahari, “Performance Modeling of Automated Manufacturing Systems”, 1st Edition, 2009. 4. https://nptel.ac.in/syllabus/108108098/

Mapping of CO’s- PO’s-PSO’s

Course	Program Outcomes	Program Specific

Outcome													Outcomes		
	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	3
CO3	3	3	3	3	--	--	--	--	--	--	--	--	3	3	3
CO4	3	3	2	3	--	2	--	--	--	--	--	--	3	3	3
CO5	3	2	3	2	--	2	--	-	--	--	--	--	3	3	2
Average	3.00	2.80	1.6	2.80	0.00	0.8	0.00	0.00	0.00	0.00	0.00	0.00	3.00	3.00	2.80
Level of Correlation of the Course	3	3	2	3		1							3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

III B.Tech – II Semester (EEE)

L	T	P	C
3	1	-	4

20AEEB5 IOT FOR INDUSTRIAL AUTOMATION

Minor Degree (Industry relevant Track-IV)

COURSE OUTCOMES:

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

CO1: Develop automation system for manufacturing and process industries.

CO2: Analyze with various automation technologies in manufacturing and process industries.

CO3: Apply various automation tools and methods in manufacturing industry.

CO4: Analyze various control and automation method in process industries.

CO5: Analyze various communication technologies in manufacturing and process industries.

UNIT I

AUTOMATION IN MANUFACTURING INDUSTRIES : Introduction- Automation in production system, Principles and strategies of automation, Basic elements of an automated system, Advanced automation functions, Levels of automations, Automated flow lines and transfer mechanisms, Analysis of transfer lines without storage, Automated flow lines with storage buffers.

UNIT II

MATERIAL HANDLING AND IDENTIFICATION TECHNOLOGIES: Overview of material handling systems, Types of material handling equipment, Design of the system, Conveyor system, Automated guided vehicle system, Automated storage systems, Interfacing handling and storage with manufacturing, Overview of Automatic Identification Methods. Automated Manufacturing Systems-Components.

UNIT III

DESIGN AND ANALYSIS OF AUTOMATION SYSTEMS : Classification and overview of manufacturing systems, Cellular manufacturing, Flexible manufacturing system(FMS), FMS and its planning and implementation, Automated assembly system – design and types of automated assembly systems, Analysis of multi station and single station assembly machine.

UNIT IV

AUTOMATION IN PROCESS INDUSTRIES: Introduction to computer based industrial automation- Direct Control (DDC), Distributed Control System (DCS) and supervisory control and data acquisition (SCADA) based architectures. SCADA for process industries includes understanding of RTUs, Pumping stations, Evacuation processes, Mass Flow Meters and other flow meters, Leak-flow studies of pipelines, Transport Automation.

UNIT V

PROGRAMMABLE LOGIC CONTROLLER (PLC) Block diagram of PLC, Programming languages of PLC, Basic instruction sets, Design of alarm and interlocks, Networking of PLC, Overview of safety of PLC with case studies. Process Safety Automation: Levels of process safety through use of PLCs, Integrating Process safety PLC and DCS, Application of international standards in process safety control.

TEXT BOOKS:

1. M.P. Groover,“ Automation, Production Systems and Computer Integrated Manufacturing”, 5 th Edition, Pearson Education, 2009.
2. John W. Webb and Ronald A. Reis, “Programmable Logic Controllers: Principles and Applications”, 5th Edition, Prentice Hall Inc., New Jersey, 2003.

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2. Frank D. Petruzella, “Programmable Logic Controllers”, 5th Edition, McGraw- Hill, New York, 2016.

Mapping of CO’s- PO’s-PSO’s

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3		--	--	--	--	--	--	--	3	3	3
CO2	3	3	3	3		--	--	--	--	--	--	--	3	3	3
CO3	3	3	3	2	2	--	--	--	--	--	--	--	3	3	2
CO4	3	3	2	3	3	-	--	--	--	--	--	--	2	3	3
CO5	3	2	3	2	3	-	--	3	--	--	--	--	3	3	2
Average	3.00	2.80	2.80	2.60	1.6	0.00	0.00	0.60	0.00	0.00	0.00	0.00	2.80	3.00	2.60
Level of Correlation of the Course	3	3	3	3	2								3	3	3

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

IV B.Tech – I Semester (EEE)

L	T	P	C
3	1	-	4

20AEEB6 ROBOTICS AND CONTROL

Minor Degree (Industry relevant Track-IV)

COURSE OUTCOMES:

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

CO1: Analyze the automation of hydraulics systems using Robotics

CO2: Apply different applications in CNC machines using Robotics

CO3: Design generic model for the robotics

CO4: Design and control for industrial machines

CO5: Analyze the power transmission techniques used for CNC machines

UNIT I : AUTOMATION:

Definition, Advantages, goals, types, need, laws and principles of Automation. Elements of Automation. Fluid power and its elements, application of fluid power, Pneumatics vs. Hydraulics, benefit and limitations of pneumatics and hydraulics systems, Role of Robotics in Industrial Automation.

UNIT II : MANUFACTURING AUTOMATION:

Classification and type of automatic transfer machines; Automation in part handling and feeding, Analysis of automated flow lines, design of single model, multimode and mixed model production lines. Programmable Manufacturing Automation CNC machine tools, Machining centers, Programmable robots, Robot time estimation in manufacturing operations.

UNIT III : ROBOTICS:

Definition, Classification of Robots - Geometric classification and Control classification, Laws of Robotics, Robot Components, Coordinate Systems, Power Source. Robot anatomy, configuration of robots, joint notation schemes, work volume, manipulator kinematics, position representation, forward and reverse transformations, homogeneous transformations in robot kinematics, D-H notations, kinematics equations, introduction to robot arm dynamics.

UNIT IV: ROBOT DRIVES AND POWER TRANSMISSION SYSTEMS:

Robot drive mechanisms: Hydraulic/Electric/Pneumatics, servo & stepper motor drives, Mechanical transmission method: Gear transmission, Belt drives, Rollers, chains, Links, Linear to Rotary motion conversion, Rotary-to-Linear motion conversion, Rack and Pinion drives, Lead screws, Ball Bearings. Robot end Effectors: Classification of End effectors – active and passive grippers, Tools as end effectors, Drive system for rippers. Mechanical, vacuum and magnetic grippers. Gripper force analysis and gripper design.

UNIT V : ROBOT SIMULATION:

Methods of robot programming, Simulation concept, Off-line programming, advantages of offline programming. Robot Applications: Robot applications in manufacturing-Material transfer and machine loading/unloading, Processing operations like Welding & painting, Assembly operations, Inspection automation, Limitation of usage of robots in processing operation. Robot cell design and control, Robot cell layouts-Multiple robots & Machine interference.

TEXT BOOKS:

1. An Introduction to Robot Technology, by Coifet Chirroza, Kogan Page.
2. Robotics for Engineers, by Y. Koren, McGraw Hill.
3. Robotic: Control, Sensing, Vision and Intelligence, by Fu, McGraw Hill.

REFERENCE BOOKS:

1. Introduction to Industrial Robotics, by Nagrajan, Pearson India.
2. Robotics, by J.J. Craig, Addison-Wesley.
3. Industrial Robots, by Groover, McGraw Hill.
4. Robotic Engineering - An Integrated Approach : Richard D. Klafter Thomas A.
5. Robots & Manufacturing Automation, by Asfahl, Wiley.

Mapping of CO's- PO's-PSO's

Course Outcome	Program Outcomes												Program Specific Outcomes		
	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	3
CO3	3	3	3	2	1	--	--	--	--	--	--	--	2	3	3
CO4	3	3	2	3	2	2	--	--	--	--	--	--	2	3	3
CO5	3	2	3	2	2	3	--	3	--	--	--	--	3	3	2
Average	3.00	2.80	1.6	2.60	1.00	1.00	0.00	0.60	0.00	0.00	0.00	0.00	2.60	3.00	2.80
Level of Correlation of the Course	3	3	2	3	1	1							3	3	3