



# **SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES**

**(AUTONOMOUS)**

**Dr. Visveswaraya Road, (Bangalore-Tirupathi Bye-pass Road),  
Murukambattu, Chittoor – 517127, Andhra Pradesh, India.**

## **B.Tech Course Structures and Syllabi Under R20 Regulations**

**(Applicable for 2021-2022 Regular Students & 2022-2023 Lateral Students)**

**Department of  
Electrical and Electronics Engineering**



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
STUDIES. (AUTONOMOUS)  
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**INSTITUTE VISION**

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

**INSTITUTE MISSION**

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

**DEPARTMENT VISION**

To excel in the domains of electrical and electronics engineering through academic excellence, research innovation, actively addressing challenges, developing sustainable solutions, and making a Positive societal impact, with the aim of further strengthening research and promoting holistic development among students.

**DEPARTMENT MISSION**

- Provide quality education and training in electrical and electronics engineering.
- Foster research and innovation in the field.
- Address real-world challenges with sustainable solutions.
- Promote holistic development and ethical values.
- Enhance industry collaborations and practical learning opportunities.

**PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)**

**PEO1:** To cultivate graduates of the EEE program with a strong foundation in electrical and electronics engineering principles and practices, equipping them with the knowledge and skills necessary for successful careers or further studies in the field (**Competent Professional**)

**PEO2:** To develop graduates who can conduct research, innovate, and apply their knowledge effectively to address real-world challenges in electrical and electronics engineering, contributing to technological advancements and sustainable solutions (**Innovative Engineers**)

**PEO3:** To foster graduates who demonstrate professionalism, ethical conduct, leadership qualities, effective communication, and teamwork skills, enabling them to make a Positive societal impact, engage in lifelong learning, and adapt to the evolving needs of the industry. (**Professionally Ethical and adaptable Leadership**)



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**PROGRAMME OUTCOMES (PO's)**

On Successful completion, the graduate will be able to,

- PO1.Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2. Problem analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO10.Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO11.Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO12.Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.



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**PROGRAM SPECIFIC OUTCOMES (PSO's)**

**PSO1:** Graduates will demonstrate proficiency in applying electrical and electronics engineering principles and practices to design, analyze, and implement solutions in diverse application areas.

**PSO2:** Graduates will Possess research aptitude, innovation skills, and the ability to address real-world challenges by developing sustainable solutions in the field of electrical and electronics engineering.



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**ACADEMIC REGULATIONS (R-20) FOR B.TECH  
(Regular-Full Time)**

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

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

**1. Eligibility for Admission**

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

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

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

- a. For regular entry students, shall pursues a course of study in not less than four and not more than eight academic years.
- b. For lateral entry students, shall pursue a course of study for not less than three academic years and in not more than six academic years.
- c. For regular entry students, after eight academic years from the year of their admission, he/she shall forfeit their seat in B.Tech course and their admission stands cancelled.
- d. For lateral entry students, after six academic years from the year of their admission, he/she shall forfeit their seat in B.Tech course and their admission stands cancelled.
- e. For regular entry students shall register for 160 credits and must secure all the 160 credits. For lateral entry students shall register for 121 credits and secure all 121 credits
- f. A student shall be eligible for the award of B.Tech degree with Honors or Minor if he/she earns 20 credits in addition to the 160 credits for Regular entry students /121 credits for lateral entry students.
- g. A student shall be permitted to register either for Honors or for Minor and not for both simultaneously.

**3. Structure of the Undergraduate Engineering program:**

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



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

**4. Assigning of Credits:**

- 1 Hr. Lecture (L) per week- 1 Credit
- 1 Hr. Tutorial (T) per week- 1 Credit
- 1 Hr. Practical (P) per week- 0.5 Credits
- 2 Hours Practical (Lab) per week - 1 Credit

**5. Induction Program for I. B.Tech Program**

- There shall be mandatory student induction program for fresher's, 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 Department / Branch and Innovations etc., shall be included in the guidelines issued by AICTE.

**6. Assessment**

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



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**Internal Examination**

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

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

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

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

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

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

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

For Example:

- Marks obtained in First Mid-Term: 25
- Marks obtained in Second Mid-Term: 25
- Internal Marks:  $(25 \times 0.8) + (25 \times 0.2) = 25$
- Final internal marks = Internal Marks + Assignment marks

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

For Example:

- Marks obtained in First Mid-Term: Absent
- Marks obtained in Second Mid-Term: 25
- Internal Marks:  $(25 \times 0.8) + (0 \times 0.2) = 20$
- Final internal marks = Internal Marks + Assignment marks

For practical courses there shall be 30 internal marks. 15 marks allotted for Internal Practical Examination to be conducted before the last working day and 15 marks for Day-to-Day work in the laboratory shall be evaluated by



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the concerned laboratory teacher based on the regularity / record / viva - voce.

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

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

**Semester End Examination**

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

There shall be two parts, Part-A and Part-B.

Part-A shall contain 10 compulsory short answer questions for a total of 20 marks such that each question carries 2 marks. There shall be 2 short answer questions from each unit.

Part-B Shall be either-or type questions of 10 marks each. Student shall answer any one of it.

Each of these questions from Part-B shall cover each unit of the syllabus.

End examination of practical courses shall have the following pattern:

End Semester Examination shall be for 70 marks.

The end examination shall be conducted by the concerned laboratory teacher and senior expert in the same subject of the department.

In a practical subject consisting of two parts (ex: Engineering Workshop & IT Workshop), the End Semester Examination shall be conducted for 35 marks in each part.

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

**Drawing Courses**

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

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

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

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

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



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

**Mandatory Audit Courses**

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

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

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

In grade sheet the completion of the course indicated as Pass – “P”, and No marks or letter grade shall be allotted, for all non-credit mandatory audit courses.

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

**Professional Elective Courses**

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

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

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

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

**Open Elective Courses**

A student shall opt for any 4 courses from the list given by the institute from time to time, complying with the requirement of the prerequisite course(s), if any. Students have to choose Open Elective Courses OEC- I in V semester, OEC-II in VI semester and OEC-III, OEC-IV in VII semester from the list of elective courses given.

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

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

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



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

**Massive Online Open Courses**

MOOC courses under Professional Elective / Open Elective

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

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.

**Mandatory Internships**

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

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

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

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

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

**Project work and Internships**

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

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

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

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



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

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

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

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

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

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

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

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

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

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

**Eligibility to appear for Semester End Examinations**

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

Condonation for shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee. Shortage of Attendance below 65% in aggregate shall in NO case be condoned.

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



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

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

**Issue of Photocopy of Answer Script**

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

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

The application forms can be obtained from the examination section.

**Revaluation**

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

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

The application forms can be obtained from the examination section.

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

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

**Challenge Valuation**

A student can apply for challenge valuation by prescribed fee. Challenging valuation shall be carried out by an external subject expert.

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

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

The application forms can be obtained from the examination section.

**7. Promotion Rules**

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

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



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- a. **One** regular and **three** supplementary examinations of I B.Tech I Semester.
- b. **One** regular and **two** supplementary examinations of I B.Tech II Semester.
- c. **One** regular and **one** supplementary examinations of II B.Tech III Semester.
- d. **One** regular examination of II B. Tech IV semester.

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

- a. **One** regular and **five** supplementary examinations of I B.Tech I Semester.
- b. **One** regular and **four** supplementary examinations of I B.Tech II Semester.
- c. **One** regular and **three** supplementary examinations of II B.Tech III Semester.
- d. **One** regular and **two** supplementary examinations of II B.Tech IV Semester.
- e. **One** regular and **one** supplementary examinations of III B.Tech V Semester.
- f. **One** regular examination of III B. Tech VI Semester.

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

- a. One regular and three supplementary examinations of II B. Tech III Semester.
- b. One regular and two supplementary examinations of II B. Tech IV Semester.
- c. One regular and one supplementary examination of III B. Tech V Semester.
- d. One regular examination of III B.Tech VI Semester.

### **8. Extra-Curricular Activities**

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

### **9. Skill Oriented / Skill Advanced Courses**

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



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**10. Curricular Framework for Honors Program**

- a. Under Graduate degree with Honors shall be issued by the Institution to the students who fulfill to the students who fulfill all the academic eligibility requirements for the B.Tech program and Honors program.
- b. Students of a Department are eligible to opt for Honors Program offered by the same Department / Discipline, subject to a maximum of two additional courses per semester.
- c. A student shall be permitted to register for Honors program at the beginning of IV semester provided that the student must have acquired a minimum average of 8.0 SGPA up to the end of II semester without any backlogs. In case of the declaration of the III semester results after the commencement of the IV semester and if a student fails to score the required minimum of 8.0 SGPA, his/her registration for Honors Program stands cancelled and he/she shall continue with the regular Program.
- d. Students can select the additional and advanced courses from their respective branch in which they are pursuing the degree and get an honors degree in the same. In addition to fulfilling all the requisites of a Regular B.Tech Program, a student shall earn 20 additional credits to be eligible for the award of B.Tech (Honors) degree. This is in addition to the credits essential for obtaining the Under Graduate Degree in Major Discipline (i.e. 160/121 credits).
- e. Of the 20 additional Credits to be acquired, and 16 credits (four courses) shall be earned by undergoing specified courses listed as pools (two courses per pool either theory course or theory with lab component), and each carrying 4 credits. The remaining 4 credits (two courses) must be acquired through two MOOCs, which shall be domain specific, each with 2 credits and with a minimum duration of 8/12 weeks as recommended by the Board of studies.
- f. The courses offered in each pool (two courses per pool) shall be domain specific courses and advanced courses.
- g. MOOC courses must be of minimum 8 weeks in duration. Attendance will not be monitored for MOOC courses. Students have to acquire a certificate from the agencies approved by the BOS with grading or marks or pass/fail in order to earn 4 credits. If the MOOC course is a pass/fail course without any grades, the grade to be assigned will be as decided by the academic council.
- h. It is the responsibility of the student to acquire/complete prerequisite before taking the respective course.
- i. The concerned BOS shall decide on the minimum enrolments for offering Honors program by the department. If minimum enrolments criteria are not met then the students shall be permitted to register for the equivalent.



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- j. MOOC courses as approved by the concerned Head of the department in consultation with BOS.
- k. The concerned BOS shall also consider courses listed under professional Elective Courses of the respective B.Tech programs for the requirements of B.Tech (Honors). However, a student shall be permitted to choose only those courses that he/she has not studied in any form during the Program.
- l. If a student drops or is terminated from the Honors program, the additional credits so far earned cannot be converted into open or core electives; they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate). In such cases, the student may choose between the actual grade or a "pass (P)" grade and also choose to omit the mention of the course as for the following: All the courses done under the dropped Honors will be shown in the transcript. None of the courses done under the dropped Honors will be shown in the transcript.
- m. In case a student fails to meet the CGPA requirement for Degree with Honors at any point after registration, he/she will be dropped from the list of students eligible for Degree with Honors and they will receive regular B.Tech degree only. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.
- n. Honors must be completed simultaneously with a major degree program. A student cannot earn Honors after he/she has already earned bachelor's degree.

**11. Curricular Framework for Minor Program**

- a. Under graduate Degree with Minor Program shall be issued by the Institution to the students who fulfill all the academic eligibility requirements for the B.Tech program and Minor Program.
- b. Students who are desirous of pursuing their special interest areas other than the chosen discipline of Engineering may opt for additional courses in minor specialization groups offered by a department other than their parent department. For example, If Mechanical Engineering student selects subjects from Computer Science Engineering under this scheme; he/she will get Major degree of Mechanical Engineering with minor degree of Computer Science Engineering. Student can also opt for Industry relevant tracks of any branch to obtain the Minor Degree, for example, a B.Tech Mechanical student can opt for the industry relevant tracks like Data Mining track, IOT track, Machine learning track etc.
- c. The concerned BOS shall identify as many tracks as Possible in the areas of emerging technologies and industrial relevance / demand. For example, the minor tracks can be the fundamental courses in CSE, ECE, EEE, CE, ME etc or industry tracks such as



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- d. Artificial Intelligence (AI), Machine Learning (ML), Data Science (DS), Robotics, Electric vehicles, Virtual Reality, VLSI etc.
- e. The list of disciplines/branches eligible to opt for a particular industry relevant minor specialization shall be clearly mentioned by the respective BOS.
- f. The concerned BOS shall decide on the minimum enrolments for offering Minor program by the department. If a minimum enrolments criterion is not met, then the students may be permitted to register for the equivalent MOOC courses as approved by the concerned Head of the department in consultation with BOS.
- g. A student shall be permitted to register for Minors program at the beginning of IV semester subject to a maximum of two additional courses per semester, provided that the student must have acquired 8.0 SGPA (Semester Grade point average) up to the end of II semester without any history of backlogs. It is expected that the III semester results may be announced after the commencement of the IV semester. If a student fails to acquire 8.0 SGPA up to III semesters or failed in any of the courses, his registration for Minors program shall stand cancelled. An SGPA of 8.0 has to be maintained in the subsequent semesters without any backlog in order to keep the Minors registration active.
- h. A student shall earn additional 20 credits in the specified area to be eligible for the award of B.Tech degree with Minor. This is in addition to the credits essential for obtaining the Under Graduate Degree in Major Discipline (i.e. 160/121 credits).
- i. Of the 20 additional Credits to be acquired and 16 credits shall be earned by undergoing specified courses listed in course structure and each carrying 4 credits. The remaining 4 credits must be acquired through two MOOCs, which shall be domain specific, each with 2 credits and with a minimum duration of 8/12weeks as recommended by the Board of studies.
- j. Attendance will not be monitored for MOOC courses. Student has to acquire a certificate from the agencies approved by the BOS with grading or marks or pass/fail in order to earn 4 credits. If the MOOC course is a pass/fail course without any grades, the grade to be assigned as decided by the BOS.
- k. A student shall be permitted to choose only those courses that he/she has not studied in any form during the Program.
- l. If a student drops or terminated from the Minor program, they cannot convert the earned credits into open or core electives; they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate).



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- m. In such cases, the student may choose between the actual grade or a “pass (P)” grade and also choose to omit the mention of the course as for the following: All the courses done under the dropped Minors will be shown in the transcript. None of the courses done under the dropped Minor will be shown in the transcript.
- n. In case a student fails to meet the CGPA requirement for B.Tech degree with Minor at any point after registration, he/she will be dropped from the list of students eligible for degree with Minors and they will receive B.Tech degree only. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.
- o. Minor must be completed simultaneously with a major degree program. A student cannot earn the Minor after he/she has already earned bachelor’s degree.

### 12. Grading

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

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

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

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

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

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



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

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

where 'S<sub>j</sub>' is the SGPA of the j<sup>th</sup> semester and C<sub>j</sub> is the total number of credits in that semester

- c. Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.
- d. While computing the SGPA/CGPA, the subjects in which the student is awarded Zero grade points will also be included.
- e. **Grade Point:** It is a numerical weight allotted to each letter grade on a 10-point scale.
- f. **Letter Grade:** It is an index of the performance of students in a said course. Grades are denoted by letters S, A, B, C, D, E and F.
- g. As per AICTE regulations, conversion of CGPA into equivalent percentage as follows:

$$\text{Equivalent Percentage} = (\text{CGPA} - 0.50) \times 10.$$

#### 14. Award of Class

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

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

#### 15. With-Holding the Result

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

#### 16. Transitory Regulations and Gap – Year

1. Discontinued, detained, or failed candidates are eligible for readmission as and when the semester is offered after fulfillment of academic regulations. Candidates who have been detained for attendance shortage or not fulfilled academic requirements or who have failed after having undergone the



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2. course in earlier regulations or have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered and they will be in the academic regulations into which they get readmitted.
3. Gap Year – concept of Student Entrepreneur in Residence shall be introduced and outstanding students who wish to pursue entrepreneurship are allowed to take a break of one year at any time after I year/ II year/ III year to pursue entrepreneurship full time. This period shall be counted for the maximum time for graduation.
4. An evaluation committee at university level shall be constituted to evaluate the proposal submitted by the student and the committee shall decide on permitting the student for availing the Gap Year.
5. Candidates who were permitted with Gap Year shall be eligible for rejoining into the succeeding year of their B.Tech from the date of commencement of class work and they will be in the academic regulations into which the candidate is presently rejoining.

### **17.Industrial Collaborations**

1. Institution-Industry linkages refer to the interaction between firms and universities or public research centers with the goal of solving technical problems, working on R&D, innovation projects and gathering scientific as well as technological knowledge.
2. The Departments are permitted to design any number of Industry oriented minor tracks as the respective BOS feels necessary. In this process the departments can plan to have industrial collaborations in designing the minor tracks and to develop the content and certificate programs.

### **18.Community Service Project**

1. Community Service Project should be an integral part of the curriculum, as an alternative to the Internships, whenever there is an exigency when students cannot pursue their internships.
2. Every student should put in a minimum of 144 hours for the Community Service Project during the summer vacation. Each class/section should be assigned with a mentor.
3. 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
4. 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.



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3. 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 programs of NSS/NCC/Green Corps/Red Ribbon Club, etc. Minor project report should be submitted by each student. An internal Viva shall also be conducted by a committee constituted by the principal of the college. Award of marks shall be made as per the guidelines of Internship.
4. 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.
5. 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 Villageor Ward volunteers; rather, it could be another primary source of data.
6. Secondly, the student/s could take up a social activity, concerning their domain or subject area. The different areas, could be like – Agriculture, Health, Marketing and Cooperation Animal Husbandry, Horticulture, Fisheries, Sericulture, Revenue and Survey, Natural Disaster Management, Irrigation, Law & Order, Excise and Prohibition, Mines and Geology,Energy, Internet, Free Electricity, Drinking Water etc.,

### **19.Transfer Details**

1. Student transfers shall be as per the guidelines issued by the Governmentof Andhra Pradesh from time to time.

### **20.Preservation of Records**

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

### **21.Amendments to Regulations**

The Academic Council of SITAMS (Autonomous) reserves the right to revise, amend or change the Regulations, Scheme of Examinations, and / or Syllabi or any other policy relevant to the needs of the society or industrial requirements etc., with the recommendations of the concerned Board(s) of Studies.



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**22. General**

1. The academic regulations should be read as a whole for purpose of any interpretation. Malpractices rules- nature and punishments are appended.
2. Where the words "he", "him", "his", occur in the regulations, they also include "she", "her", "hers", respectively.

**23. Conduct and Discipline**

1. Students shall conduct themselves within and outside the precincts of the Institute in a manner befitting the students of an Institute of National importance.
2. As per the order of the Hon'ble Supreme Court of India, ragging in any form is banned: acts of ragging will be considered as gross indiscipline and will be severely dealt with.
3. The following additional acts of omission and /or commission by the students within or outside the precincts of the college shall constitute gross violation of code of conduct and are liable to invoke disciplinary measures
  - a. Ragging
  - b. Lack of courtesy and decorum: indecent behavior anywhere within or outside the campus.
  - c. Willful damages or stealthy removal of any property / belongings of the Institute / Hostel or of fellow students
  - d. Possession, consumption or distribution of alcoholic drinks or any kind of hallucinogenic drugs
  - e. Mutilation or unauthorized Possession of library books
  - f. Hacking in computer systems
  - g. Furnishing false statements to the disciplinary committee, or willfully withholding information relevant to an enquiry
  - h. Organizing or participation in any activity that has potential for driving fellow students along lines of religion caste batch of admission hostel or any other unhealthy criterion.
  - i. Resorting to noisy and unseemly behavior, disturbing studies of students.
  - j. Physical or mental harassment of fresher through physical contact or oral abuse
  - k. Adoption of unfair means in the examination
  - l. Organizing or participating in any group activity except purely academic and scientific Programmers in company with others in or outside campus without prior permission of the principal.
  - m. Disturbing in drunken state or otherwise an incident in academic or students function or any other public event.



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- a. Disturbing in drunken state or otherwise an incident in academic or students function or any other public event.
  - b. Not obeying traffic rules in campus not following safety practices or causing potential danger to oneself or other persons in any way.
  - c. Any other act or gross indiscipline
7. Commensurate with the gravity of the offence the punishment may be reprimand fine and expulsion from the hostel debarment from an examination rustication for a specified period or even outright expulsion from the College.
  8. The reprimanding Authority for an offence committed by students in the Hostel and in the Department or the classroom shall be respectively, the managers of the Hostels and the Head of the concerned Department
  9. In all the cases of offence committed by students in jurisdictions outside the purview the principal shall be the Authority to reprimand them.
  10. All Major acts of indiscipline involving punishment other than mere reprimand shall be considered and decided by the Principal Students Disciplinary Committee appointed by the principal.
  11. All other cases of Indiscipline of Students like adoption of unfair means in the examinations shall be reported to the Vice-Principal for taking appropriate action and deciding on the punishment to be levied.
  12. In all the cases of punishment levied on the students for any offence committed the aggrieved party shall have the right to appeal to the Principal who shall constitute appropriate Committees to review the case.



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<b>NATURE OF MALPRACTICES/ IMPROPER CONDUCT PUNISHMENT</b>	<b>PUNISHMENT</b>
<p>1. (a) Possesses or keeps access 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/ practical) in which he/she 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.</p>	<p>Expulsion from the examination hall and cancellation of the performance in that subject Only.</p>
<p>1. (b) Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons inside or outside the exam hall in respect of any matter. Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he/she will be handed over to the police and a case is registered against him/her.</p>	<p>Expulsion from the examinations hall and cancellation of the performance in that subject only of all the candidates involved in case of an outsider He / She will be handed over to the police and a case is registered against him/her.</p>



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<p>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.</p>	<p>Expulsion from the examinations hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and projects 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 will be cancelled and retained by the CE.</p>
<p>3. Impersonates any other candidate in connection with the examination.</p>	<p>The candidate who has impersonated shall be expelled from examination hall and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practical's and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all university examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.</p>



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<p>4. Smuggles in the answer book or additional sheet or takes out or arranges to send out the question paper or answer book or additional sheet, during or after the examination.</p>	<p>If the imposter is an outsider, he/she will be handed over to the police and a case is registered against him/her. Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all university examinations. The continuation of the course by the <del>candidate</del> is subject to the academic regulations in connection with forfeiture of seat.</p>
<p>5. Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.</p>	<p>Cancellation of the performance in that subject.</p>
<p>6. Ref uses to obey the orders of the Chief - Superintendent / Assistant- Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall or causes any injury to his person or to any of his relatives whether by offensive words spoken or written or by signs or by visible representation or assaults the officer-in- charge, or any person on duty inside or outside the examination hall or any of his relatives, or indulges in any other act of misconduct or mischief which results in</p>	<p>In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates are also debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.</p>



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<p>damage to or destruction of property in the examination hall or any part of the college campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt</p> <p style="text-align: center;">the orderly conduct of the examination.</p>	
<p>7. Leaves the exam hall taking away answer script or intentionally tears off the script or any part thereof inside or outside the examination hall.</p>	<p>Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all the external examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.</p>
<p>8. Possesses any lethal weapon or fire arm in the examination hall.</p>	<p>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.</p>



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

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



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**B. Tech R20 – COURSE STRUCTURE AND SYLLABI (2021 Admitted batch)**

**Semester I (First Year)**

S.NO	COURSE CODE	COURSE TITLE	SCHEME OF INSTRUCTIONS HOURS PER WEEK				SCHEME OF EXAMINATION MAXIMUM MARKS			
			L	T	P	C	I	E	TOTAL	
1	20BSC111	Algebra and Calculus	2	1	0	3	30	70	100	
2	20BSC112	Applied Chemistry	3	0	0	3	30	70	100	
3	20BSC113	Applied Physics	3	0	0	3	30	70	100	
4	20ESC111	Engineering Graphics	1	0	4	3	30	70	100	
5	20CSE111	C and Data Structures	2	1	0	3	30	70	100	
6	20BSC114	Engineering Chemistry Lab	0	0	2	1	30	70	100	
7	20BSC115	Engineering Physics Lab	0	0	2	1	30	70	100	
8	20CSE112	C and Data Structure Lab	0	0	3	1.5	30	70	100	
9	20ESC112	Engineering Workshop and IT Workshop	0	0	2	1	30	70	100	
Contact Hours per week			11	2	13	-	-	-	-	
Total Hours per week			26				-	-	-	-
Total credits (5 Theory + 3 Labs)							19.5	-	-	-
Total Marks							270	630	900	

**Semester II (First Year)**

S.NO	COURSE CODE	COURSE TITLE	SCHEME OF INSTRUCTIONS HOURS PER WEEK				SCHEME OF EXAMINATION MAXIMUM MARKS			
			L	T	P	C	I	E	TOTAL	
1	20HSM111	Communicative English for Engineers	3	0	0	3	30	70	100	
2	20BSC121	Differential Equations and Transformation Techniques	2	1	0	3	30	70	100	
3	20EEE121	Electrical Circuit Analysis	2	1	0	3	30	70	100	
4	20EEE122	Generation of Electrical Power	3	0	0	3	30	70	100	
5	20ESC115	Programming with Python	2	1	0	3	30	70	100	
6	20HSM112	Communicative English Language Lab	0	0	3	1.5	30	70	100	
7	20EEE123	Electrical Circuit Analysis Lab	0	0	3	1.5	30	70	100	
8	20ESC118	Programming with Python Lab	0	0	3	1.5	30	70	100	
Contact Hours per week			12	3	9	-	-	-	-	
Total Hours per week			24				-	-	-	-
Total credits (5 Theory + 3 Labs)							19.5	-	-	-
Total Marks							240	560	800	



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**Semester III (Second Year)**

S.No	Course Code	Course Title	Scheme of Instructions Hours Per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	TOTAL
1	20BSC232	Special Functions and Complex Analysis	2	1	0	3	30	70	100
2	20ESC231	Fluid Mechanics and Machinery	2	1	0	3	30	70	100
3	20EEE231	Network Analysis	2	1	0	3	30	70	100
4	20ECE236	Semiconductor Devices and Circuits	2	1	0	3	30	70	100
5	20ECE237	Switching Theory and Logic Design	2	1	0	3	30	70	100
6	20HSM231	Soft Skills	0	1	2	2	30	70	100
7	20ESC232	Fluid Mechanics and Machinery Lab	0	0	3	1.5	30	70	100
8	20ECE238	Semiconductor Devices and Circuits Lab	0	0	3	1.5	30	70	100
9	20EEE232	Network Analysis Lab	0	0	3	1.5	30	70	100
10	20MAC231	Environmental Science	2	0	0	0	P	-	-
Contact Hours per week			12	6	11	-	-	-	-
Total Hours per week			29				-	-	-
Total credits							21.5		
Total Marks							270	630	900

**Semester IV (Second Year)**

S.No	Course Code	Course Title	Scheme of Instructions Hours Per Week				Scheme of Examination Maximum Marks			
			L	T	P	C	I	E	TOTAL	
1	20BSC241	Electromagnetics	3	1	0	4	30	70	100	
2	20EEE241	Control System	2	1	0	3	30	70	100	
3	20EEE242	Electrical Machines -I	2	1	0	3	30	70	100	
4	20EEE243	Electrical Power Transmission	2	1	0	3	30	70	100	
5	20EEE244	Measurements and Instrumentation	3	0	0	3	30	70	100	
6	20ECE249	Electronic Circuits and IC Applications (SOC)	2	0	0	2	30	70	100	
7	20EEE245	Control System Lab	0	0	3	1.5	30	70	100	
8	20EEE246	Electrical Machines -I Lab	0	0	3	1.5	30	70	100	
9	20EEE247	Measurements and Instrumentation Lab	0	0	3	1.5	30	70	100	
10		Internship During Summer Vacation	-	-	-	-	-	-	-	
Contact Hours per week			14	4	9	-	-	-	-	
Total Hours per week			27				-	-	-	
Total credits							22.5	-	-	
Total Marks							270	630	900	
1		Honors / Minor Courses*	HNR/ MNR	4	0	0	4	30	70	100



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**Semester V (Third Year)**

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks			
			L	T	P	C	I	E	Total	
1	20EEE351	Electrical Machines –II	2	1	0	3	30	70	100	
2	20EEE352	Electrical Power Distribution	3	0	0	3	30	70	100	
3	20EEE353	Power Electronics	2	1	0	3	30	70	100	
4	20EEE354	Professional Elective Course – 1	3	0	0	3	30	70	100	
5	OE-I	Open Elective Course – 1	3	0	0	3	30	70	100	
6	20ECE359	Circuit Design and Applications (SOC)	0	1	2	2	30	70	100	
7	20EEE355	Electrical Machines –II lab	0	0	3	1.5	30	70	100	
8	20EEE356	Power Electronics Lab	0	0	3	1.5	30	70	100	
9	20MAC351	Constitution of India	2	0	0	-	P	-	100	
10	20EEE357	Industry Internship / Community Service Project – Evaluation	0	0	0	1.5	-	-	100	
Contact Hours per week			15	3	8	-	-	-	-	
Total Hours per week			26				-	-	-	-
Total credits							21.5	-	-	-
Total Marks								240	560	800
1		Honors / Minor Courses*	3	1	-	4	30	70	100	

**Semester VI (Third Year)**

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks			
			L	T	P	C	I	E	Total	
1	20ECE369	Microprocessors and Interfacing	3	0	0	3	30	70	100	
2	20EEE361	Power System Analysis	2	1	0	3	30	70	100	
3	20HAS241	Principles of Management	3	0	0	3	30	70	100	
4	20EEE362	Professional Elective Course – 2	3	0	0	3	30	70	100	
5	OE-II	Open Elective Course – 2	3	0	0	3	30	70	100	
6	20EEE363	Control of Electric Drives (SAC)	2	0	0	2	30	70	100	
7	20EEE364	Power System and Simulation Lab	0	0	3	1.5	30	70	100	
8	20ECE370	Microprocessors and Interfacing Lab	0	0	3	1.5	30	70	100	
9	20EEE365	Project Skill Lab	0	0	3	1.5	30	70	100	
10	20MAC352	Design Thinking for Innovation	2	0	0	0	P			
11	-	Industrial / Research Internship during Summer Vacation	-	-	-	-	-	-	-	
Contact Hours per week			16	3	9	-	-	-	-	
Total Hours per week			26				-	-	-	-
Total credits							21.5	-	-	-
Total Marks								300	630	900
1		Honors / Minor Courses*	3	1	-	4	30	70	100	



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**Semester VII (Fourth Year)**

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20HSM471	Humanities and Social Science Elective	3	0	0	3	30	70	100
2	20HSM472	Universal Human Values and Ethics	3	0	0	3	30	70	100
3	20EEE471	Professional Elective Course -3	3	0	0	3	30	70	100
4	20EEE472	Professional Elective Course - 4	3	0	0	3	30	70	100
5	20EEE473	Professional Elective Course -5	3	0	0	3	30	70	100
6	OE-III	Open Elective Course - 3	3	0	0	3	30	70	100
7	OE-IV	Open Elective Course - 4	3	0	0	3	30	70	100
8	20EEE474	Electric Vehicles (SAC)	2	0	0	2	30	70	100
	20EEE475	Industrial / Research Internship Evaluation	-	-	-	2	-	-	100
Contact Hours per week			23	0	0	-	-	-	-
Total Hours per week			23			-	-	-	-
Total credits						25	-	-	-
Total Marks							210	490	800
1		Honors / Minor Courses*	3	1	-	4	30	70	100

**Semester VIII (Fourth Year)**

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20EEE481	Project Work	0	0	0	12	30	70	100
Contact Hours per week			0	0	0	12	-	-	-
Total Hours per week			-			-	-	-	-
Total credits						12	-	-	-
Total Marks							30	70	100

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



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**Professional Elective Course – 1 (Semester V)**

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20EEE354A	Digital Control Systems	3	-	-	3	30	70	100
2	20EEE354B	Switchgear and Protection	3	-	-	3	30	70	100
3	20EEE354C	Nonconventional Energy Sources	3	-	-	3	30	70	100
4	MOOC	Massive Open Elective Course	-	-	-	3	-	-	-

**Professional Elective Course – 2 (Semester VI)**

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20EEE362A	System Theory	3	-	-	3	30	70	100
2	20EEE362B	Power System Economics	3	-	-	3	30	70	100
3	20EEE362C	Utilization of Electrical Energy	3	-	-	3	30	70	100
4	MOOC	Massive Open Elective Course	-	-	-	3	-	-	-

**Professional Elective Course – 3 (Semester VII)**

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20EEE471A	Energy Auditing and Demand Side Management	3	-	-	3	30	70	100
2	20EEE471B	Power System Operation and Control	2	1	-	3	30	70	100
3	20EEE471C	Power System Dynamics	3	-	-	3	30	70	100
4	MOOC	Massive Open Elective Course	-	-	-	3	-	-	-

**Professional Elective Course – 4 (Semester VII)**

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20EEE472A	HVDC Transmission Systems	3	-	-	3	30	70	100
2	20EEE472B	Power Quality	3	-	-	3	30	70	100
3	20EEE472C	Special Electrical Machines	3	-	-	3	30	70	100
4	MOOC	Massive Open Elective Course	-	-	-	3	-	-	-

**Professional Elective Course – 5 (Semester VII)**

S.No	Course Code	Course Title	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	I	E	Total
1	20EEE473A	Flexible AC Transmission System	3	-	-	3	30	70	100
2	20EEE473B	Power System Transient	3	-	-	3	30	70	100
3	20EEE473C	Elements of Smart Grid	3	-	-	3	30	70	100
4	MOOC	Massive Open Elective Course	-	-	-	3	-	-	-



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**Open Elective Course – 1 (Semester V)**

S.No	Course Code	Course Title	Offered Department	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
				L	T	P	C	I	E	Total
1	20OCIV351	Air Pollution and Control	CIV	3	-	-	3	30	70	100
2	20O MEC351	Industrial Robotics	MEC	3	-	-	3	30	70	100
3	20OECE351	Automotive Electronics	ECE	3	-	-	3	30	70	100
4	20OCSE351	Relational Database Management System	CSE/CSM	3	-	-	3	30	70	100
5	20OHSM351	Graph Theory with Applications	S&H	3	-	-	3	30	70	100

**Open Elective Course – 2 (Semester VI)**

S.No	Course Code	Course Title	Offered Department	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
				L	T	P	C	I	E	Total
1	20OCIV361	Building Technology	CIV	3	-	-	3	30	70	100
2	20O MEC361	3D Printing Concepts	MEC	3	-	-	3	30	70	100
3	20OECE361	Communication Networks	ECE	3	-	-	3	30	70	100
4	20OCSE361	Data Communication and Networks	CSE/CSM	3	-	-	3	30	70	100
5	20OHSM361	LASER and Fiber Optics	S&H	3	-	-	3	30	70	100

**Open Elective Course – 3 (Semester VII)**

S.No	Course Code	Course Title	Offered Department	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
				L	T	P	C	I	E	Total
1	20OCIV471	Disaster Mitigation and Management	CIV	3	-	-	3	30	70	100
2	20O MEC471	Product Design and Innovation	MEC	3	-	-	3	30	70	100
3	20OECE471	Medical Electronics	ECE	3	-	-	3	30	70	100
4	20OCSM471	Fundamentals of Artificial Intelligence	CSE/CSM	3	-	-	3	30	70	100
5	20OHSM471	Nano Science and Technology	S&H	3	-	-	3	30	70	100

**Open Elective Course – 4 (Semester VII)**

S.No	Course Code	Course Title	Offered Department	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
				L	T	P	C	I	E	Total
1	20OCIV472	Industrial Waste Treatment and Disposal	CIV	3	-	-	3	30	70	100
2	20O MEC472	Solar Energy Technology	MEC	3	-	-	3	30	70	100
3	20OECE472	Pattern Recognition	ECE	3	-	-	3	30	70	100
4	20OCSM472	Foundations of Machine Learning	CSE/CSM	3	-	-	3	30	70	100
5	20OHSM472	Total Quality Management	S&H	3	-	-	3	30	70	100



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**Humanities and Social Science Elective Course (Semester VII)**

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

**SUMMARY OF CREDIT ALLOCATION**

S.NO	SUBJECT AREA	CREDITS AS PER SEMESTER								TOTAL CREDITS	PERCENTAGE WISE CREDIT DISTRIBUTION
		I	II	III	IV	V	VI	VII	VIII		
1.	HSMC	-	4.5	-	-	-	-	6		10.5	6.44%
2.	BSC	11	3	3	4	-	-	-	-	21	12.88%
3.	ESC	8.5	9	9	-	-	-	-	-	26.5	16.25%
4.	PCC	-	3	7.5	16.5	12	13.5	-	-	52.5	32.20%
5.	SOC/SAC	-	-	2	2	2	2	2	-	10	6.13%
6.	PEC	-	-	-	-	3	3	9	-	15	9.20%
7.	OEC	-	-	-	-	3	3	6	-	12	7.36%
8	PROJ	-	-	-	-	1.5	-	2	12	15.5	9.50%
9	MAC	-	-	-	-	-	-	-	-	-	-
<b>Total</b>		<b>19.5</b>	<b>19.5</b>	<b>21.5</b>	<b>21.5</b>	<b>22.5</b>	<b>21.5</b>	<b>25</b>	<b>12</b>	<b>163</b>	<b>100</b>

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



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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**20BSC111**

**ALGEBRA AND CALCULUS  
(Common to All Branches)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>

**PRE-REQUISITES: Nil**

**COURSE EDUCATIONAL OBJECTIVES:**

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

**UNIT-1: MATRICES**

**(9)**

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

**UNIT -2: DIFFERENTIAL CALCULUS AND ITS APPLICATIONS**

**(9)**

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

**UNIT-3: MULTIPLE INTEGRALS**

**(9)**

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

**UNIT-4: VECTOR DIFFERENTIAL CALCULUS**

**(9)**

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

**UNIT-5: VECTOR INTEGRAL CALCULUS**

**(9)**

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

**TOTAL HOURS: 45**





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STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**I B.Tech. – I Semester**

**20BSC112**

**APPLIED CHEMISTRY**  
**(Common to E.C.E, E.E.E, C.S.E, CSM, AI & DS)**

L	T	P	C
3	0	0	3

**PRE-REQUISITES: Nil**

**COURSE EDUCATIONAL OBJECTIVES:**

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

**UNIT-1: WATER AND WATER FOR INDUSTRIAL PURPOSE (9)**

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

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

**UNIT -2: SCIENCE OF CORROSION (9)**

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

**UNIT -3: POLYMERS (9)**

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

**UNIT - 4: ELECTRO CHEMISTRY AND APPLICATIONS (9)**

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

**UNIT - 5: FUNDAMENTAL ASPECTS OF INSTRUMENTAL METHODS (9)**

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

**TOTAL HOURS: 45**





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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## I B.Tech. – I Semester

20BSC113

APPLIED PHYSICS

(Common to E.C.E, E.E.E, C.S.E, CSM, AI&DS)

L	T	P	C
3	0	0	3

**PRE-REQUISITES: Nil**

### **COURSE EDUCATIONAL OBJECTIVES:**

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

### **UNIT-1 WAVE OPTICS**

**(7)**

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

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

### **UNIT-2 LASERS & FIBER OPTICS**

**(9)**

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

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

### **UNIT-3 DIELECTRIC MATERIALS & MAGNETIC MATERIALS**

**(9)**

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

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

### **UNIT 4: QUANTUM MECHANICS, FREE ELECTRON AND BAND THEORY OF SOLIDES**

**(10)**

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

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

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



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## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

### UNIT 5: SEMICONDUCTOR PHYSICS & NANOMATERIALS

(10)

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

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

**TOTAL HOURS: 45**

#### COURSE OUTCOME:

On successful completion of the course the students will be able to		Pos & PSOs
<b>CO1</b>	Identify the importance and applications Wave Optics in various Streams of Engineering	<b>PO1, PO2</b>
<b>CO2</b>	Understand the working principle and applications of Lasers and Optical fibers	<b>PO1, PO2</b>
<b>CO3</b>	elucidate the importance, properties and applications of Magnetic materials and dielectrics	<b>PO1, PO2, PSO2</b>
<b>CO4</b>	Use ideas with mathematical solutions to Quantum mechanics and its applications in various atomic phenomena	<b>PO1, PO2</b>
<b>CO5</b>	Provide knowledge about semiconductors and Nanomaterials	<b>PO1, PO2, PO12, PSO2</b>

#### TEXT BOOKS:

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

#### REFERENCE BOOKS:

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

#### REFERENCE WEBSITE:

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

#### CO-PO MAPPING:

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>	3	2	-	-	-	-	-	-	-	-	-	-	-	-
<b>CO2</b>	3	2	-	-	-	-	-	-	-	-	-	-	-	-
<b>CO3</b>	3	2	-	-	-	-	-	-	-	-	-	-	-	1
<b>CO4</b>	3	2	-	-	-	-	-	-	-	-	-	-	-	-
<b>CO5</b>	3	2	-	-	-	-	-	-	-	-	-	2	-	1
<b>CO*</b>	3	2	-	-	-	-	-	-	-	-	-	2	-	1



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
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**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**I B.Tech. – I Semester**

<b>20ESC111</b>	<b>ENGINEERING GRAPHICS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>(Common to all branches)</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>3</b>

**PRE-REQUISITES: Nil**

**COURSE EDUCATIONAL OBJECTIVES:**

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

**CONCEPTS AND CONVENTIONS (Not for Examination) (3)**

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

**UNIT – 1: ENGINEERING CURVES (9)**

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

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

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

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

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

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

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

**UNIT – 5: ORTHOGRAPHIC PROJECTIONS AND PERSPECTIVE PROJECTIONS (1)**

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

**Total Hours: 60**



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## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

### COURSE OUTCOMES:

On Successful Completion Of The Course, Students Will Be Able To		POS & PSOS
<b>CO1</b>	Construct the Engineering curves and generate tangent and normal for those curves.	<b>P01, P02, P03, P10, PSO1</b>
<b>CO2</b>	Draw the projection of points, lines and plane surfaces.	<b>P01, P02, P03, P10</b>
<b>CO3</b>	Draw the projection of solids, sections of solids like prisms, pyramids, cylinder and cone.	<b>P01, P02, P03, P10</b>
<b>CO4</b>	Draw the isometric projections and views and also develop the development of surfaces.	<b>P01, P02, P03, P10</b>
<b>CO5</b>	Draw the orthographic and perspective projections of solids.	<b>P01, P02, P03, P10</b>

### TEXT BOOKS:

1. N.D. Bhatt and V. M. Panchal , "Engineering Drawing" , Charotar Publishing House, 5th edition, 2010.
2. K.V.Natrajan, " A Text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2009.

### REFERENCES BOOKS:

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

### REFERENCE WEBSITE:

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

### CO-PO MAPPING:

CO-PO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02
<b>CO1</b>	3	2	2	-	-	-	-	-	-	-	-	1	-	1
<b>CO2</b>	3	3	3	-	-	-	-	-	-	-	-	1	-	-
<b>CO3</b>	3	3	3	-	-	-	-	-	-	-	-	1	-	-
<b>CO4</b>	3	3	3	-	-	-	-	-	-	-	-	2	-	-
<b>CO5</b>	3	3	3	-	-	-	-	-	-	-	-	2	-	-
<b>CO*</b>	3	<b>2.8</b>	<b>2.8</b>	-	-	-	-	-	-	-	-	<b>1.4</b>	-	1



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**I B.Tech. – I Semester**

**20CSE111**

**C & DATA STRUCTURES**  
**(Common to ECE, EEE, CSE, CSM)**

L	T	P	C
2	1	0	3

**PRE-REQUISITES: Nil**

**COURSE EDUCATIONAL OBJECTIVES:**

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

**UNIT -1: INTRODUCTION TO C**

**(9)**

**Overview of Computers:** Computer Software- Algorithm-Flowchart-Software Development Method.

**C Programming Basics:** Introduction to "C" Programming – Characteristics of C – Structure of a "C" program – Tokens – Constants- Variables – Data Types – Operators and their types- Expressions – Operator Precedence and Associativity.

**UNIT -2: CONTROL STATEMENTS AND FUNCTIONS**

**(9)**

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

**UNIT -3: POINTERS, STRUCTURES AND UNIONS**

**(9)**

**Pointers:** Definition-Initialization-Pointers Arithmetic-Pointers and Arrays.

**Structures and Union:** Introduction – Need for Structure Data type – Structure Definition – Structure Declaration – Accessing Structure Members - Structure within a Structure – Copying and Comparing Structure Variables - Structures and Arrays – Union.

**UNIT-4: INTRODUCTION TO DATA STRUCTURES**

**(9)**

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

**UNIT-5: SORTING AND SEARCHING TECHNIQUES**

**(9)**

**Sorting Techniques:** Insertion sort - Selection sort - Bubble sort - Quick sort - Merge sort.

**Searching Techniques:** Linear search - Binary Search

**TOTAL HOURS: 45**





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**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**I B.Tech. – I Semester**

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

**PRE-REQUISITES: Nil**

**COURSE EDUCATIONAL OBJECTIVES:**

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

**LIST OF EXPERIMENTS:**

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

**COURSE OUTCOMES:**

<b>On successful completion of the course the students will be able to</b>		<b>Pos &amp; PSOs</b>
<b>CO1</b>	Prepare standard solutions	<b>PO1,PO3, PSO1</b>
<b>CO2</b>	Acquire knowledge about volumetric analysis of estimation copper by EDTA and by Iodometry	<b>PO1,PO2,PO3, PSO1</b>
<b>CO3</b>	Acquire analytical skills in estimation of hardness of water,Alkanility and Acidity of water, dissolved oxygen in water and estimation of iron through laboratory methods	<b>PO1,PO2,PO3,PO6,PO12, PSO1</b>
<b>CO4</b>	Acquire skills to use instrumental techniques for the determination of electrical conductance of electrolytes and viscosity of lubricants	<b>PO1,PO2,PO3, PSO1</b>
<b>CO5</b>	Provide solutions for environmental issues through determination of quality of water	<b>PO1,PO2,PO3,PO6,PO7, PSO1</b>
<b>CO6</b>	Communicate verbally and in written form pertaining to results of the Experiments	<b>PO1,PO2,PO8,PO9, PSO1</b>
<b>CO7</b>	Learns to perform experiments involving chemistry in future years.	<b>PO1,PO2,PO8,PO9, PO10 PSO1</b>
<b>CO8</b>	Communicate verbally and in written form, the understanding about the experiments.	<b>PO1,PO2,PO8,PO9,PO10 PSO1</b>
<b>CO9</b>	Continue updating their skill related to chemistry laboratory.	<b>PO1,PO2,PO8, PO9,PO10 PSO1</b>



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STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**CO-PO MAPPING:**

CO-PO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02
C01	2	-	2	-	-	-	-	-	-	-	-	-		
C02	2	2	2	-	-	-	-	-	-	-	-	-		
C03	2	2	2	-	-	2	-	-	-	-	-	2		
C04	2	2	2	-	-	-	-	-	-	-	-	-		
C05	2	2	2	-	-	2	2	-	-	-	-	-		
C06	2	2	-	-	-	-	-	2	2	-	-	-		
C07	2	2	-	-	-	-	-	2	2	2	-	-		
C08	2	2	-	-	-	-	-	2	2	2	-	-		
C09	2	2	-	-	-	-	-	2	2	2	-	-		
<b>CO*</b>	<b>3</b>	<b>2</b>	<b>2</b>	-	-	<b>2</b>	<b>2</b>	-	-	-	-	<b>2</b>		



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**I B.Tech. – I Semester**

**20BSC115**

**ENGINEERING PHYSICS LABORATORY  
(Common to E.C.E, E.E.E, C.S.E, CSM)**

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

**COURSE EDUCATIONAL OBJECTIVES:**

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

<b>S. NO.</b>	<b>NAME OF THE EXPERIMENT</b>
<b>1</b>	Diffraction grating - Measurement of wavelength of given Laser.
<b>2</b>	To determine the frequency of AC using Sonometer
<b>3</b>	Determination of magnetic field along the axis of a current carrying circular coil - Stewart Gees method
<b>4</b>	Determination of numerical aperture and acceptance angle of an optical fiber
<b>5</b>	Determination of particle size using a laser source
<b>6</b>	Parallel fringes – Determination of thickness of thin object using wedge method
<b>7</b>	Newton's rings – Determination of radius of curvature of given plano convex lens
<b>8</b>	B-H curve – Determination of hysteresis loss for a given magnetic material
<b>9</b>	Determination of Energy band gap of semiconductor
<b>10</b>	To find the rigidity modulus of the material using torsional pendulum

**COURSE OUTCOMES:**

<b>On completion of the laboratory course the student will be able to</b>		<b>Pos &amp; PSOs</b>
<b>CO1</b>	Demonstrate Knowledge on measurement of various physical quantities using optical methods and fundamentals of magnetic fields	<b>PO1, PSO1</b>
<b>CO2</b>	Identify different physical properties of materials like band gap, magnetic field intensity etc, for engineering and technological applications	<b>PO2, PSO1</b>
<b>CO3</b>	Provide valid conclusions on phenomena Interference and Diffraction	<b>PO4, PSO1</b>
<b>CO4</b>	Follow the ethical principles in implementing the programs	<b>PO8, PSO1</b>
<b>CO5</b>	Do experiments effectively as an individual and as a team member in a group.	<b>PO9, PSO1</b>
<b>CO6</b>	Communicate verbally and in written form, the understanding about the experiments.	<b>PO10, PSO1</b>
<b>CO7</b>	Continue updating their skill related to loops, pointers and files implementing programs in future.	<b>PO12, PSO1</b>





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## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

### I B.Tech. – I Semester

20CSE112

**C AND DATA STRUCTURE LAB**  
(Common to CSE, ECE, EEE, CSM, AI&DS)

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

#### COURSE EDUCATIONAL OBJECTIVES:

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

#### EXERCISES:

1. a. Write a C Program to Calculate the Simple Interest.  
b. Write a C Program to Convert the Temperature Unit from Fahrenheit to Celsius using the Formula  $C = (F-32)/1.8$ .  
c. Assume that any Month is of 30 Days. Now you are given Total Days. Write a C Program to find out the exact Number of Years - Months & Days.
2. a. Write a Program that Prints the Given 3 Integers in Ascending Order using if - else.  
b. Write a Program to Calculate Commission for the Input Value of Sales Amount. Commission is calculated as per the Following Rules:
  - i) Commission is NIL for Sales Amount Rs. 5000.
  - ii) Commission is 2% for Sales when Sales Amount is  $>Rs. 5000$  and  $\leq Rs. 10000$ .
  - iii) Commission is 5% for Sales Amount  $>Rs. 10000$ .  
c. Write a C Program to find the Roots of Quadratic Equation.
3. a. Write a Program, which takes two integer Operands and one Operator from the User, Performs the Operation and then Prints the Result. (Consider the Operators +, -, \*, /, %, use switch Statement).  
b. A Character is entered through Keyboard. Write a Program to determine whether the Character Entered is a Capital Letter, a Small Case Letter, a Digit or a Special Symbol. The Following Table shows the Range of ASCII values for various Characters.

Characters	ASCII values
A - Z	65 - 90
a - z	97- 122
0 - 9	48 - 57
Special Symbols	0 - 47, 58 - 64, 91- 96, 123 - 127.
4. a. Write a C Program to find the Sum of Individual Digits of a Positive Integer.  
b. A Fibonacci sequence is defined as follows: the First and Second terms in the Sequence are 0 and 1. Subsequent terms are found by adding the Preceding two terms in the Sequence. Write a C Program to Generate the first n terms of the Sequence.
5. a. i) A Perfect Number is a Number that is the Sum of all its Divisors Except Itself. Six is the Perfect Number. The only Numbers that Divide 6 evenly are 1, 2, 3 and 6 (i.e.,  $1+2+3=6$ ).  
ii) An Abundant Number is one that is Less than the Sum of its Divisors (Ex:  $12 < 1+2+3+4+6$ ).  
iii) A Deficient number is one that is Greater than the Sum of its Divisors (Ex:  $9 > 1+3$ ).  
Write a Program to Classify N Integers (Read N from keyboard) each as Perfect, Abundant or Deficient.  
b. An Armstrong Number is a Number that is the Sum of the Cubes of its Individual Digits. Write a C Program to Print Armstrong Numbers below 1000.



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6. a. Write a C Program to generate all the Prime Numbers between 1 And N, Where N is a Value Supplied by the User.  
b. Write a C Program to Calculate the Following Sum:  $\text{Sum} = 1 - x^2/2! + x^4/4! - x^6/6! + x^8/8! - x^{10}/10!$
7. a. Write a C Program to find both the Largest and Smallest Number in a List of Integers using Arrays.  
b. Write a C Program to Perform the Following:  
i) Addition of Two Matrices. ii) Multiplication of Two Matrices.
8. a. Write C Programs that use both Recursive and Non-Recursive Functions to find the Factorial of a given Integer.  
b. Write C Programs that use both Recursive and Non-Recursive Functions to find the GCD (Greatest Common Divisor) of two given integers.  
c. Write C Program to solve Towers of Hanoi Problem using recursive function.
9. a. Write C Programs for Swap/Exchange values of two Integer variables using Call by Reference.  
b. Write a C Program using Pointers to Read in an Array of Integers and Print its Elements in Reverse Order.
10. Write a C Program using Dynamic Memory Allocation.
11. You are supposed to generate a Result Table which Consists of Student Id - Student Name - Marks of three Subject and Total Marks. Write a Program which takes Input for Five Students and Displays Result Table. Also Display Student Information Separately Who Got the Highest Total? Use Structures to do it.
12. Write C programs to perform the following searching operations for a key value in a given list of integers: i) Linear search ii) Binary search
13. Write a C program that implements the following sorting methods to sort a given list of integers in ascending order i) Bubble sort ii) Selection sort iii) Insertion sort
14. Write a C Program that Implements the Following Sorting Methods to Sort a Given List of Integers in Ascending Order i) Quick sort ii) Merge sort

### COURSE OUTCOMES:

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



# SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES. (AUTONOMOUS)

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

### REFERENCE BOOKS:

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

### REFERENCE WEBSITES:

1. [https://onlinecourses.swayam2.ac.in/cec22\\_cs11](https://onlinecourses.swayam2.ac.in/cec22_cs11)
2. [https://onlinecourses.nptel.ac.in/noc22\\_cs40](https://onlinecourses.nptel.ac.in/noc22_cs40)
3. <https://www.geeksforgeeks.org>.

### CO-PO MAPPING:

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
C01	3	3	3	-	-	-	-	-	-	-	-	-		
C02	3	3	3	-	-	-	-	-	-	-	-	-		
C03	3	3	-	-	-	-	-	-	-	-	-	-		
C04	3	3	-	3	-	-	-	-	-	-	-	-		
C05	3	3	-	-	-	-	-	-	-	-	-	-		
C06	-	-	-	-	-	-	-	3	-	-	-	-		
C07	-	-	-	-	-	-	-	-	3	-	-	-		
C08	-	-	-	-	-	-	-	-	-	3	-	-		
C09												3		
CO*	3	3	3	3	-	-	-	3	3	3		3		





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### TEXT BOOKS:

1. Lab manual provided by the department.

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	-	-	-	-	-	-	-	-	-	-	-	2	-
C02	-	2	-	-	-	-	-	-	-	-	-	-	2	-
C03	-	-	2	-	-	-	-	-	-	-	-	-	2	-
C04	-	-	-	-	2	-	-	-	-	-	-	-	2	-
C05	-	-	-	-	-	-	-	3	-	-	-	-	2	-
C06	-	-	-	-	-	-	-	-	3	-	-	-	2	-
C07	-	-	-	-	-	-	-	-	-	3	-	-	2	-
C08	-	-	-	-	-	-	-	-	-	-	-	3	2	-
C09	3	2	2	-	2	-	-	3	3	3	-	3	2	-
CO*	3	-	-	-	-	-	-	-	-	-	-	-	2	-

### IT WORKSHOP

#### PC HARDWARE

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

#### LATEX AND WORD

7. Word Orientation: The mentor needs to give an overview of LaTeX and Microsoft (MS) office 2007/ equivalent (FOSS) tool word: Importance of LaTeX and MS office 2007/ equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.



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8. Using LaTeX and Word to create project certificate. Features to be covered: -Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

### **EXCEL**

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

### **LATEX AND MS/EQUIVALENT (FOSS) TOOL POWER POINT**

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

### **INTERNET& WORLD WIDE WEB**

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

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

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

### **COURSE OUTCOMES (IT WORKSHOP):**

<b>On the successful completion of this course, the student should be able to,</b>		<b>Pos &amp; PSOs</b>
<b>CO1</b>	Acquire knowledge on computer system such as system unit, input devices, and output devices connected to the computer.	<b>PO1</b>
<b>CO2</b>	Demonstrate the booting process that includes switching on the system, execution of POS & PSOST routine, then bootstrap loader, and loading of the operating system, and getting it ready for use.	<b>PO2</b>
<b>CO3</b>	Demonstrate the working of the internet that include the use of protocols, domains, IP addresses, URLs, web browsers, web servers, mail-servers, etc.	<b>PO3</b>



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STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

<b>CO4</b>	Familiarize with parts of MS Office, to create and save a document, To set page settings, create headers and footers, To use various formatting features such as bold face, italicize, underline, subscript, superscript, line spacing, etc.	<b>PO5</b>
<b>CO5</b>	Follow the ethical principles in implementing the programs	<b>PO8</b>
<b>CO6</b>	Do experiments effectively as an individual and as a team member in a group.	<b>PO9</b>
<b>CO7</b>	Communicate verbally and in written form, the understanding about the experiments and	<b>PO10</b>
<b>CO8</b>	Continue updating their skill related to MS Office, Internet and Computer in future.	<b>PO12</b>

**REFERENCE BOOKS:**

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

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>	3	-	-	-	-	-	-	-	-	-	-	-		
<b>CO2</b>	-	3	-	-	-	-	-	-	-	-	-	-		
<b>CO3</b>	-	-	3	-	-	-	-	-	-	-	-	-		
<b>CO4</b>	-	-	-	3	-	-	-	-	-	-	-	-		
<b>CO5</b>	-	-	-	-	3	-	-	-	-	-	-	-		
<b>CO6</b>	-	-	-	-	-	-	-	3	-	-	-	-		
<b>CO7</b>	-	-	-	-	-	-	-	-	3	-	-	-		
<b>CO8</b>	-	-	-	-	-	-	-	-	-	3	-	-		
<b>CO9</b>	-	-	-	-	-	-	-	-	-	-	-	3		
<b>CO*</b>	3	3	3	3	3	-	-	3	3	3	-	3		



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**I B.Tech. – II Semester**

<b>20HSM111</b>	<b>COMMUNICATIVE ENGLISH FOR ENGINEERS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>(Common to All Branches)</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**PRE-REQUISITES: Nil**

**EDUCATIONAL OBJECTIVES:**

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

**UNIT-1: COMMUNICATION SKILLS FOR PROFESSIONALS (9)**

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

**UNIT-2: TECHNOLOGY WITH A HUMAN FACE A LECTURE BY E.F. SCHUMACHER (9)**

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

**UNIT-3: AZIM PREMJI-AN ENTREPRENEUR (9)**

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

**UNIT-4: REFLECTIONS OF FUTURE THE YEAR –BY THEODORE J. GORDON (9)**

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

**UNIT-5: Y. SUBBA ROW (9)**

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









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STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**I B.Tech. – II Semester**

**20EEE121**

**ELECTRICAL CIRCUIT ANALYSIS**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>

**PRE-REQUISITES: Nil**

**COURSE EDUCATIONAL OBJECTIVES:**

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

**UNIT-1: FUNDAMENDAL CONCEPTS OF ELECTRICAL CIRCUITS (9)**

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

**UNIT-2: SINGLE PHASE AC CIRCUITS (9)**

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

**UNIT-3: MAGNETIC CIRCUITS & RESONANCE (9)**

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

**UNIT-4: NETWORK THEOREMS FOR DC EXCITATION (9)**

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

**UNIT-5: NETWORK THEOREMS FOR AC EXCITATION (9)**

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

**Total hours: 45**

**COURSE OUTCOMES:**

<b>On successful completion of the course the student will be able to,</b>		<b>Pos &amp; PSOs</b>
<b>CO1</b>	Analyze electrical circuits	PO1, PO2, PO3,PSO12
<b>CO2</b>	Investigate different various periodic waveforms	PO1, PO2, PO3,PSO12
<b>CO3</b>	Analyze the magnetically coupled circuits and evaluate the resonance condition for series and parallel RLC network.	PO1, PO2, PO3,PSO12
<b>CO4</b>	Apply circuit theorems for DC circuits	PO1, PO2, PO3,PO12
<b>CO5</b>	Apply circuit theorems for AC circuits	PO1, PO2, PO3,PO12



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STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**TEXT BOOKS:**

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

**REFERENCE BOOKS:**

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

**REFERENCE WEBSITE:**

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

**CO-PO Mapping:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
C01	3	2	2	-	-	-	-	-	-	-	-	2	2	-
C02	3	3	2	-	-	-	-	-	-	-	-	2	2	-
C03	3	2	2	-	-	-	-	-	-	-	-	2	2	-
C04	3	3	2	-	-	-	-	-	-	-	-	2	2	-
C05	3	3	2	-	-	-	-	-	-	-	-	2	2	-
C0*	<b>3</b>	<b>2.6</b>	<b>2</b>									<b>2</b>	2	-



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
STUDIES. (AUTONOMOUS)  
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**I B.Tech. – II Semester**

**20EEE122**

**GENERATION OF ELECTRICAL POWER**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**COURSE EDUCATIONAL OBJECTIVES:**

- 1:** To acquire knowledge on Thermal power station
- 2:** To impart knowledge on Hydro power station
- 3:** To acquire knowledge on Nuclear power station
- 4:** To acquire knowledge on solar and wind Energy
- 5:** To attain the knowledge on different methods of tariffs

**UNIT 1: THERMAL POWER STATIONS**

**(9)**

Line Diagram of Thermal power station (TPS) - Showing paths of coal, steam, water, air, ash and flue gases-Brief discussion of TPS components: Economizers - Boilers - Super heaters - Turbines- Condensers - Chimney and cooling towers.

**UNIT 2: HYDRO AND NUCLEAR POWER STATIONS**

**(9)**

Selection of site - classification - layout - description of main components: penstock, surge tank, forebay, types of turbines. Run off river plant with and without pondage. Advantages and disadvantages.

**UNIT 3: NUCLEAR POWER STATIONS**

**(9)**

Nuclear Fission and chain Reaction-Nuclear Fuels-Principle of Operation of Nuclear Reactor-Reactor Components: Moderators - Control Rods - Ref lectors and Coolents-Radiation Hazards: Shielding and Safety Precautions-Types of Nuclear Reactors and Brief Description of PWR - BWR and FBR.

**UNIT 4: BASICS OF SOLAR AND WIND ENERGY**

**(9)**

Role and Potential of Solar Energy Options - Principles of Solar Radiation - Flat plate and Concentrating Solar Energy Collectors - Different methods of Solar energy Storage- Solar applications: Heating Energy - Cooling - Distillation and Drying-Economic aspects. Role and Potential of wind energy, horizontal vertical axis wind mills- performance characteristics- Betz criterion-applications.

**UNIT 5: ECONOMIC ASPECTS OF POWER GENERATION AND TARIFF METHODS**

**(9)**

Load Curve- Load duration and integrated load duration curves-Load - Demand- Diversity - Capacity - Utilization and Plant Use factors- Numerical Problems - Costs of generation and their division into Fixed-Semi-fixed and Running Costs. Desirable characteristics of a tariff method- Tariff method: Flat rate- Block-Rate -Two-Part - Three-Part and Power factor Tariff methods and Numerical Problems.

**TOTAL HOURS: 45**





**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
STUDIES. (AUTONOMOUS)  
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**I B.Tech. – II Semester**

**20ESC115**

**PROGRAMMING WITH PYTHON  
(Common to All Branches)**

L	T	P	C
2	1	0	3

**PRE-REQUISITES: Nil**

**COURSE EDUCATIONAL OBJECTIVES:**

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

**UNIT 1: BASICS OF PYTHON**

**(9)**

**Python programming language:** About Python- Introduction to various IDEs- IDLE- PyCharm, Spyder- Sublime text- Jupyter Notebook.

**Literals:** Numeric literals - String literals- Variables and Identifiers: Variable assignment and keyboard input - Identifiers - keywords and other predefined identifiers.

**Control Structures:** Sequential control- Selection control- Iterative control statements.

**UNIT 2: LISTS, DICTIONARIES AND SETS**

**(9)**

**Lists:** List structures - Common list operations - List traversal - Lists in Python - Python list type - Tuples - sequences - Nested lists - Iterating over lists in python.

**Dictionaries and Sets:** Dictionary types in Python - Set data type- Strings and its operations.

**UNIT 3: FUNCTIONS AND TEXT FILES**

**(9)**

**Functions:** Function declaration- Category of Functions- Parameter Passing -Keyword Arguments in Python - Default Arguments in Python - Variable Scope, Lambda function.

**Files:** Fundamentals - opening, reading and writing text files, .csv and .xlsx files.

**UNIT 4: OBJECT-ORIENTED CONCEPTS USED IN PYTHON**

**(9)**

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

**UNIT 5: INTRODUCTION TO PYTHON LIBRARIES**

**(9)**

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

**Total hours: 45**





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STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**I B.Tech. – II Semester**

<b>20HSM112</b>	<b>COMMUNICATIVE ENGLISH LANGUAGE LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>(Common to All Branches)</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**PRE-REQUISITES: Nil**

**COURSE EDUCATIONAL OBJECTIVES:**

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

**LIST OF TOPICS:**

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



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE OUTCOMES:**

<b>At the end of the course, students will able to</b>		<b>Pos &amp; PSOs</b>
<b>C01</b>	Remembering the concepts on developing Soft Skills and its techniques. (Topics from 1 to 5)	<b>PO1</b>
<b>C02</b>	Understand and Develop Knowledge on the use of technology in giving presentations. (Topic No:6)	<b>PO5</b>
<b>C03</b>	Apply one's skills in Preparing a Resume before applying for a job.(Topic 7 to 9)	<b>PO6</b>
<b>C04</b>	Analyze and execute body language while participating in Group Discussions. (Topics 10 to 12)	<b>PO2</b>
<b>C05</b>	Evaluate by weighing one's communicative skills in facing Job Interviews through Mock Interviews. (Topics 13 to 15)	<b>PO10</b>

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

**REFERENCES:**

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

**CO-PO MAPPING:**

CO-PO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02
<b>C01</b>	3	-		-	-	-	-	-	-	-	-	-	2	-
<b>C02</b>	-	-		-	3	-	-	-	-	-	-	-	2	-
<b>C03</b>	-	-	-	-	-	3	-	-	-	-	-	-	2	-
<b>C04</b>	-	3	-	-	-	-	-	-	-	-	-	-	2	-
<b>C05</b>	-	-	-	-	-	-	-	-	-	3	-	-	2	-
<b>C0*</b>	<b>3</b>	<b>3</b>	-	-	<b>3</b>	<b>3</b>	-	-	-	<b>3</b>	-	-	2	-



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**I B.Tech. – II Semester**

**20EEE123**

**ELECTRICAL CIRCUIT ANALYSIS LAB**

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

**PRE-REQUISITES: Nil**

**COURSE OBJECTIVES:**

- 1:** Gain practical experience on fundamental electric laws.
- 2:** Gain practical experience on verification of theorems.
- 3:** Evaluate the phase angle of RLC circuits practically.
- 4:** Introduce the practical approach on identifying the resonance circuits
- 5:** Evaluate the key parameters of mutually coupled coils through experimentation.

**ANY TEN OF THE FOLLOWING**

1. Verification of KCL and KVL.
2. Mesh & Nodal Analysis
3. Verification of Thevenin's Theorem.
4. Verification of Norton's Theorem.
5. Determination of Self, Mutual Inductances and Coefficient of Coupling.
6. Verification of Superposition Theorem.
7. Verification of Maximum Power Transfer Theorem.
8. Series and Parallel Resonance for RLC Circuit.
9. Verification of Compensation Theorem.
10. Verification of Reciprocity Theorem.
11. Verification of Millman's Theorem.
12. Verification of Tellegen's Theorem.
13. Phase Angle Calculation of RL, RC and RLC Circuits
14. Phase Angle Calculation of Parallel RL, RC and RLC Circuits.

**COURSE OUTCOMES:**

<b>At the end of the course, students will able to</b>		<b>Pos &amp; PSOs</b>
<b>CO1</b>	Understand the fundamental electrical laws in engineering applications.	<b>PO1</b>
<b>CO2</b>	Verify different network theorems practically.	<b>PO2</b>
<b>CO3</b>	Design electrical circuits for measuring complicated electrical parameters.	<b>PO3</b>
<b>CO4</b>	Approach the electrical circuits practically for identifying the resonance condition.	<b>PO4</b>
<b>CO5</b>	Evaluate the self-inductance, mutual inductance and coefficient of coupling of mutually coupled coils through experimentation.	<b>PO4</b>
<b>CO6</b>	Follow the ethical principles in implementing the experiments.	<b>PO8</b>
<b>CO7</b>	Do experiments effectively as an individual and as a team	<b>PO9</b>





# SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES. (AUTONOMOUS)

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## I B.Tech. – II Semester

20ESC118

**PROGRAMMING WITH PYTHON LAB**  
(Common to All Branches)

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

**PRE-REQUISITES: Nil**

### **COURSE EDUCATIONAL OBJECTIVES:**

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

### **RECOMMENDED SYSTEMS/SOFTWARE REQUIREMENTS:**

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

### **LIST OF TASKS:**

#### **TASK-1: BASICS**

- a) Develop a simple python scripts to illustrate numeric literals and string literals.
- b) Write a Python Program to Convert Kilometres to Miles

#### **TASK-2: LOOPS**

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

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

#### **TASK-3: LOOPS**

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

```
1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30
```

.

```
91 92 93 94 95 96 97 98 99 100
```

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

#### **TASK-4: DICTIONARIES**

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

#### **TASK-5: STRINGS**

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



# SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES. (AUTONOMOUS)

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

### TASK-6: FUNCTIONS

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

### TASK-7: PATTERN PRINTING

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

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

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

```
A
B C
D E F
G H I J
K L M N O
P Q R S T U
V W X Y Z
```

### TASK-8: TURTLE

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

### TASK-9: FILES

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

### TASK 10: FILE HANDLING

Write a python program to perform the following tasks:

- Copy the contents of one file into another file.
- Count number of lines in a file.
- Count number of characters in a file.
- Count number of words in a file.

### TASK 11: INHERITANCE

- Write a python program to illustrate the inheritance concept.

### TASK-12: MATH LIBRARIES

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

### TASK-13: PANDAS

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

### TASK-14: PANDAS

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



# SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES. (AUTONOMOUS)

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

### COURSE OUTCOMES:

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

### REFERENCE BOOKS:

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

### REFERENCE WEBSITES:

1. [https://onlinecourses.swayam2.ac.in/aic20\\_sp33](https://onlinecourses.swayam2.ac.in/aic20_sp33)
2. [https://onlinecourses.nptel.ac.in/noc22\\_cs32](https://onlinecourses.nptel.ac.in/noc22_cs32)
3. <https://spoken-tutorial.org>
4. <https://www.w3schools.com/python>.
5. <https://www.geeksforgeeks.org>.

### CO-PO Mapping:

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>	3	3	3	-	2	-	-	-	-	-	-	-	2	-
<b>CO2</b>	3	3	3	-	2	-	-	-	-	-	-	-	2	-
<b>CO3</b>	3	3	3	-	2	-	-	-	-	-	-	-	2	-
<b>CO4</b>	3	3	3	-	2	-	-	-	-	-	-	-	2	-
<b>CO5</b>	3	3	3	3	2	-	-	-	-	-	-	-	2	-
<b>CO6</b>	-	-	-	-	-	-	-	3	-	-	-	-	2	-
<b>CO7</b>	-	-	-	-	-	-	-	-	3	-	-	-	2	-
<b>CO8</b>	-	-	-	-	-	-	-	-	-	3	-	-	2	-
<b>CO9</b>	-	-	-	-	-	-	-	-	-	-	-	3	2	-
<b>CO*</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	-	-	<b>3</b>	<b>3</b>	<b>3</b>	-	<b>3</b>	<b>2</b>	-



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**II B.Tech- III Semester**

<b>20BSC232</b>	<b>SPECIAL FUNCTIONS AND COMPLEX ANALYSIS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>(Common to EEE and ECE Branches)</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>

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

**COURSE EDUCATIONAL OBJECTIVES:**

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

**UNIT - 1: SPECIAL FUNCTIONS (9)**  
Beta and Gamma functions – Properties (without proof) - Evaluation of Integrals (Simple examples) Bessel Function - Generating function (without proof) - Recurrence Relations - Orthogonality.

**UNIT - 2: COMPLEX FUNCTIONS (9)**  
Functions of a complex variable - Elementary functions: Exponential, Trigonometric, Hyperbolic and Logarithmic functions and their properties. Continuity - Differentiability - Analyticity – Properties - Cauchy-Riemann equations in Cartesian and polar coordinates - Harmonic and conjugate harmonic functions - Milne-Thompson method.

**UNIT - 3: CONFORMAL MAPPING AND BILINEAR TRANSFORMATION (9)**  
Conformal Mapping: Definitions - Transformation by  $e^z$ ,  $\ln z$ ,  $z^2$ ,  $\sin z$ ,  $\cos z$  - Translation - Rotation - Inversion and Bilinear transformation - Fixed point - Cross ratio - Determination of bilinear transformation.

**UNIT - 4: COMPLEX INTEGRATION AND COMPLEX POWER SERIES (9)**  
**Complex Integration:** Line integral - Evaluation along curves and closed contours - Cauchy's theorem, Cauchy's integral formula & Generalized Cauchy's integral formula (without proof). **Complex Power Series:** Taylor's and Laurent series expansions of complex functions - Singular point - Isolated singular point - Pole of order  $m$  - Essential singularity.

**UNIT - 5: RESIDUE CALCULUS (9)**  
Residue - Evaluation of residue by formula - Residue theorem (without proof) - Evaluation of integrals using residue theorem - Evaluation of improper and real integrals of the type

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

**Total Hours: 45**





**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**II B.Tech- III Semester**

<b>20ESC231</b>	<b>FLUID MECHANICS AND MACHINERY</b> <b>(Common to MECH and EEE Branches)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>

**PRE-REQUISITES:** Nil

**COURSE EDUCATIONAL OBJECTIVES:**

1. To understand the properties of fluids and concept of kinematic of flow.
2. To study the applications of the conservation laws to flow through pipes.
3. To understand the importance of dimensional analysis and basics of turbo machinery.
4. To understand the importance of various types of flow in turbines.
5. To understand the importance of various types of flow in pumps.

**UNIT –1: PROPERTIES OF FLUIDS, BUOYANCY AND KINEMATICS OF FLOW (9)**

**Properties of Fluids:** Fluid properties – Compressibility, surface tension and capillarity. **Pressure Measurements:** Variation of static pressure – Atmospheric, absolute, gauge and vacuum pressure – Pressure measurements – Piezometer, U-tube and differential manometers. **Buoyancy and Floatation:** Concepts of buoyancy, buoyancy force, center of buoyancy, meta center and meta centric height (theory only). **Kinematics of Flow:** Principles of fluid flow – Types of fluid flow – Rate of flow – Continuity equation.

**UNIT –2: DYNAMICS OF FLUID FLOW AND FLOW THROUGH PIPES (9)**

**Dynamics of Fluid Flow:** Equations of motion – Euler's equation – Bernoulli's equation for real fluid – Application of Bernoulli's equation in venturimeter, orifice meter and pitot tube. **Boundary Layer Theory:** Boundary layer characteristics – Boundary layer, displacement, momentum and energy thickness (Basics only). **Forces on Submerged bodies:** Expression for Drag and Lift – Drag on a sphere. **Flow Through Pipes:** Reynold's experiment – Loss of energy in pipes – Darcy's Weisbach equation and Chezy's formula – Minor energy losses – Pipes in series and parallel – Equivalent pipe.

**UNIT –3: DIMENSIONAL ANALYSIS AND TURBOMACHINERY (9)**

**Dimensional Analysis:** Dimensions – Dimensional homogeneity – Rayleigh method – Buckingham  $\pi$ -method – Selection of repeating variables – Model analysis – Similitude and similarities – Forces acting in moving fluid – Dimensionless numbers – Similarity laws – Model testing of partially submerged bodies – Distorted and undistorted models. **Basics of Turbo Machinery:** Force exerted by the jet on a stationary and moving flat, inclined and curved – Jet on a hinged plate – Jet striking centrally and at tip of curved plate.

**UNIT –4: HYDRAULIC TURBINES (9)**

**Hydraulic Turbines:** Classification of hydraulic turbines – Heads and efficiencies – Working principles of Pelton wheel, Francis turbine and Kaplan turbine – Velocity triangle diagrams, work done, heads and efficiencies – Draft tube - Unit quantities and specific speed – Characteristics curves – Governing of turbines – Water hammer – Surge tank.

**UNIT –5: HYDRAULIC PUMPS (9)**

**Centrifugal Pumps:** Principles of working – Work done – Heads and efficiencies – Minimum starting speed – Multi stage centrifugal pump – Specific speed – Model testing – Priming – Characteristics curves – Cavitations – Suction height – NPSH. **Reciprocating Pumps:** Principles of working – Slip – Work saved by fitting air vessels.

**Total Hours: 45**



# SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES. (AUTONOMOUS)

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

### COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos & PSOs
<b>CO1</b>	Apply mathematical knowledge to predict the properties and characteristics of a fluid, analysis.	<b>PO1, PO2, PO12</b>
<b>CO2</b>	Demonstrate knowledge and understanding the basic equations of fluid flows, compute drag and lift coefficients and solve problems in flow of fluids	<b>PO1, PO2, PO3, PO4, PO12</b>
<b>CO3</b>	Analyze the model and the prototype using dimensional analysis and force exerted in turbo machinery.	<b>PO1, PO2, PO3, PO4, PO12</b>
<b>CO4</b>	Design the working proportions of hydraulic turbines and analysis to improve the performances.	<b>PO1, PO2, PO3, PO4, PO12</b>
<b>CO5</b>	Analyze to improve the performance of pumps and ability to engage in independent.	<b>PO1, PO2, PO3, PO4, PO12</b>

### TEXT BOOKS:

1. Hydraulics and Fluid Mechanics, "P.N. Modi and S.M. Seth", Standard Book House, Delhi, 18/e, 2011.
2. Fluid Mechanics, "Yunus A. Cengel and John Cimbala", McGraw Hill Education Private Ltd., 2017.

### REFERENCE BOOKS:

1. Bruce R. Munson, Donald F. Young, Theodore H. Okiishi, "Fundamentals of Fluid Mechanics", McGraw Hill, New York, 5/e, 2008.
2. S.K. Som and G. Biswas, "Introduction to Fluid Machines", Tata McGraw-Hill Education, Pvt. Ltd., Noida, 2/e, 2010.
3. R.K. Bansal, "Fluid Mechanics and Hydraulic Machines", Laxmi Publications (P) Ltd., 10/e, 2018.
4. A.K. Jain, "Fluid Mechanics", Khanna Publishers, New Delhi, 11/e, 2012.
5. R.K. Rajput, "Fluid Mechanics and Hydraulic Machinery", S. Chand & Company, Pvt. Ltd., New Delhi, 4/e, 2010.

### REFERENCE WEBSITE:

1. <https://nptel.ac.in/courses/112/105/112105171/>
2. <https://nptel.ac.in/courses/112/105/112105287/>
3. <https://nptel.ac.in/courses/105/103/105103192/>

### CO-PO MAPPING:

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
<b>CO1</b>	3	2	-	-	-	-	-	-	-	-	-	1	2	-
<b>CO2</b>	3	2	1	1	-	-	-	-	-	-	-	1	2	-
<b>CO3</b>	3	2	1	1	-	-	-	-	-	-	-	1	2	-
<b>CO4</b>	3	2	1	1	-	-	-	-	-	-	-	1	2	-
<b>CO5</b>	3	2	1	1	-	-	-	-	-	-	-	1	2	-
<b>CO*</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>1</b>	-	-	-	-	-	-	-	<b>1</b>	2	-



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**II B.Tech- III Semester**

**20EEE231**

**NETWORK ANALYSIS**

**L T P C  
2 1 0 3**

**COURSE EDUCATIONAL OBJECTIVES:**

1. To demonstrate knowledge on three phase balanced and unbalanced circuits
2. To analyze DC and AC transients
3. To impart knowledge on graph theory of networks
4. To design and analyze two port networks
5. To understand and design of filters and attenuators

**UNIT – 1: THREE PHASE CIRCUITS**

**(9)**

Phase sequence – star and delta connection-relation between line and phase voltages and currents in balanced systems-analysis of balanced and unbalanced three phase circuits – measurement of active and reactive power- Two-wattmeter method of measurement of three phase power- Analysis of unbalanced three phase circuits loop method-applications of Millman’s theorem-star delta transformation technique.

**UNIT-2: TRANSIENT ANALYSIS**

**(9)**

Transient response of RL, RC, RLC Series circuits for DC excitation sinusoidal excitations –Initial conditions –solution method using differential equations and Laplace transforms response of RL and RC networks to pulse excitation.

**UNIT-3: NETWORK TOPOLOGY**

**(9)**

Definitions- graph, tree, basic cut set, and basic tie set matrices for planar networks -loop and nodal methods of analysis of networks with dependent and independent voltage and current sources-duality and dual networks.

**UNIT-4: TWO PORT NETWORKS**

**(9)**

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

**UNIT-5: FILTERS&SYMMETRICAL ATTENUATORS**

**(9)**

Filters-Constant-K Low pass filter, High pass filter- m –derived, T-section-band pass filter and band elimination filter. Symmetrical Attenuators-T-type Attenuators-Type Attenuators, Bridged T type attenuator-Lattice Attenuators.

**TOTAL HOURS 45**

**COURSE OUTCOMES:**

<b>On successful completion of the course the student will be able to</b>		<b>Pos &amp; PSOs</b>
<b>CO1</b>	Demonstrate knowledge on three phase balanced and unbalanced circuits and Analyze unbalanced three phase circuits by different methods	<b>PO1, PO2</b>
<b>CO2</b>	To determine and analyze the transient response of RL, RC and RLC circuits and the solutions for different types of excitations	<b>PO1, PO2,</b>
<b>CO3</b>	Demonstrate knowledge on graph theory and Analyze the networks with different network reduction methods	<b>PO1, PO2</b>
<b>CO4</b>	To determine and analyze the different two port networks	<b>PO1, PO2</b>
<b>CO5</b>	Demonstrate knowledge on attenuator and filters and design different types of attenuator and filters	<b>PO1, PO2, PO3</b>





**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**II B.Tech- III Semester**

**20ECE236**

**SEMICONDUCTOR DEVICES AND CIRCUITS**

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

**COURSE EDUCATIONAL OBJECTIVES:**

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

**UNIT-I: JUNCTION DIODE CHARACTERISTICS (9)**

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

**UNIT-2: RECTIFIERS AND FILTERS (9)**

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

**UNIT-3: BJT TRANSISTOR CHARACTERISTICS: (9)**

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

**UNIT-4: FET TRANSISTOR CHARACTERISTICS: (9)**

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

**UNIT-5: SPECIAL SEMICONDUCTOR DEVICES (9)**

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

**Total Hours: 45**

**COURSE OUTCOMES**

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





**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**II B.Tech- III Semester**

**20ECE237**

**SWITCHING THEORY AND LOGIC DESIGN**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>

**COURSE EDUCATIONAL OBJECTIVES:**

**1:** To Provide Knowledge On

- Fundamentals of Digital logic design, Different Types Of Number Systems
- Conversions Of Number Systems, Arithmetic And Logical Operations, Weighted and Non Weighted Codes.
- Differences between Boolean And Ordinary Algebra and Minimization of Switching Functions Using Boolean Algebra.

**2:** To develop skill to minimize switching functions in effective way using K-MAP

**3:** To develop skill to design combinational logic circuits and realize the design using PLD's.

**4:** To provide knowledge on memory elements and develop skill to design sequential circuits.

**5:** To develop the skill to design and analyze finite state machines of different models.

**UNIT - 1: NUMBER SYSTEMS & CODES**

**(9)**

Review of Number Systems- Binary Arithmetic-Subtraction with  $r$  and  $(r-1)$ 's Complements- Weighted & Non Weighted Codes- Error Detection and Error Correction Codes- Hamming Code.

**Boolean Algebra :** Boolean Theorems-Basic Logic Operations (NOT,OR,AND)-Complement and Dual of Logical Expressions- Universal Gates- EX-OR & EX-NOR Gates- Standard SOP and POS - Minimization of Logic Functions using Theorems.

**UNIT – 2: MINIMIZATION OF SWITCHING FUNCTIONS**

**(9)**

Minimization of Switching Functions using K-Map upto 6 variables- Minimal SOP and POS Realization-Problem Solving using K-Map for Boolean Functions in SOP and POS Forms.

**UNIT – 3: COMBINATIONAL LOGIC CIRCUITS & PLD'S**

**(9)**

Design of Half Adder - Full Adder - Half Subtractor- Full Subtractor- 4-Bit Binary Adder-4-Bit Adder Subtractor- BCD Adder-Carry Look Ahead Adder -Magnitude Comparator – Decoder- Encoder- Multiplexer – De Multiplexer.

**PLDS:**PROM – PLA – PAL ,Realization of Switching Functions using PROM - PLA and PAL - Comparison of PROM, PLA, and PAL.

**UNIT- 4: SEQUENTIAL CIRCUITS-I**

**(9)**

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

**UNIT – 5: SEQUENTIAL CIRCUITS –II**

**(9)**

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

**Total Hours: 45**





# SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES. (AUTONOMOUS)

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

II B.Tech- III Semester

20HSM231

**SOFTSKILLS**  
(Common to All Braches)

L T P C  
0 1 2 2

**PRE-REQUISITE:** NIL

## **COURSE OBJECTIVES:**

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

### **UNIT -1: Soft Skills & Communication Skills**

**(9)**

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

#### **Activities:**

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

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

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

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

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

### **UNIT -2: CRITICAL THINKING**

**(9)**

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

**Activities:**Gathering information and statistics on a topic - sequencing - assorting - reasoning - critiquing issues -placing the problem - finding the root cause - seeking viable solution - judging with rationale - evaluatingthe views of others - Case Study, Story Analysis

### **UNIT -3: PROBLEM SOLVING & DECISION MAKING**

**(9)**

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

**Activities:** Placing a problem which involves conflict of interests, choice and views - formulating the problem - exploring solutions by proper reasoning - Discussion on important professional, career and organizational decisions and initiate debate on the appropriateness of the decision. Case Study & Group Discussion

### **UNIT -4: EMOTIONAL INTELLIGENCE & STRESS MANAGEMENT**

**(9)**

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

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



# SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES. (AUTONOMOUS)

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

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

### UNIT – 5: LEADERSHIP SKILLS

(9)

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

#### Activities:

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

#### NOTE-:

1. The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes, epics, scriptures, autobiographies and literary sources which bear true relevance to the prescribedskill.

Case studies may be given wherever feasible for example for Decision Making- The decision of King Lear or for good Leadership – Mahendar Singh Dhoni etc.

**TOTAL HOURS: 45**

#### COURSE OUTCOMES:

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

#### TEXTBOOKS:

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



# SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES. (AUTONOMOUS)

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

### REFERENCE BOOKS:

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

### REFERENCE WEBSITES:

1. [https://youtu.be/DUlsNJtg2L8?list=PLLy\\_2iUCG87CQhELCYtvXh0E\\_y-bOO1\\_q](https://youtu.be/DUlsNJtg2L8?list=PLLy_2iUCG87CQhELCYtvXh0E_y-bOO1_q)
2. [https://youtu.be/xBaLgJZ0t6A?list=PLzf4HHlsQFwJZel\\_j2PUy0pwjVUqj7KlJ](https://youtu.be/xBaLgJZ0t6A?list=PLzf4HHlsQFwJZel_j2PUy0pwjVUqj7KlJ)
3. <https://youtu.be/-Y-R9hDI7IU>
4. <https://youtu.be/gkLsn4ddmTs>
5. <https://youtu.be/2bf9K2rRWwo>
6. <https://youtu.be/FchfE3c2jzc>

### CO-PO MAPPING:

CO-PO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02
C01	3	-	-	-	-	2	2	2	2	3		2	2	-
C02	3	-	-	-	-	2	2	2	2	2		2	2	-
C03	3	2	-	-	-	2	2	2	2	2		2	2	-
C04	3	-	-	-	-	2	2	2	2	2		2	2	-
C05	3	-	-	-	-	2	2	2	2	2	3	2	2	-
C0*	<b>3</b>	<b>2</b>	-	-	-	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2.2</b>	<b>3</b>	2	2	-



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**II B.Tech- III Semester**

**20ESC232**

**FLUID MECHANICS MACHINERY LAB  
(Common to MECH and EEE Branches)**

L	T	P	C
0	0	3	1.5

**COURSE EDUCATIONAL OBJECTIVES:**

- 1:** To understand the properties of fluid, types of fluid and types of flow.
- 2:** To understand about flow measuring devices based on Bernoulli's principle and notches.
- 3:** To help the students acquire knowledge about various loss in fluids flow through pipes.
- 4:** To acquire knowledge on basics of turbo machinery.
- 5:** To perform characteristic study of turbines and pumps.

**LIST OF EXPERIMENTS**

1. Calibration of venturimeter and orifice meter.
2. Determination of coefficient of discharge for small orifice by a constant head method.
3. Determination of coefficient of discharge for an external mouth piece by variable head method.
4. Calibration of contracted rectangular notch and triangular notch.
5. Determination of coefficient of loss of head in a sudden contraction and friction factor.
6. Verification of Bernoulli's theorem.
7. Impact of jet on vanes.
8. Turbine flow meter.
9. Study of hydraulic jump.
10. Performance test on hydraulic turbine.
  - a) Pelton wheel.
  - b) Francis turbine
  - c) Kaplan turbine
11. Performance test on centrifugal pump.
  - a) Single stage centrifugal pump.
  - b) Multi stage centrifugal pump.
12. Performance test on reciprocating pump.



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE OUTCOMES:**

<b>On successful completion of the course, students will be able to</b>		<b>Pos &amp; PSOs</b>
<b>CO1</b>	Demonstrate the knowledge on properties of fluids and fluid flow characteristics of various hydraulic machines.	PO1
<b>CO2</b>	Measure and analyze the flow parameters using orifice, mouth piece and notches also Analyze the performance of centrifugal, reciprocating pumps and also ability to engage in independent	PO2
<b>CO3</b>	Determine and design the pipe flow by considering various loss of energy	PO3
<b>CO4</b>	Understand working, performance of hydraulic turbine by conduct investigation.	PO4
<b>CO5</b>	Follow the ethical principles while doing the experiments	PO8
<b>CO6</b>	Do the experiments effectively as an individual and as a team member in a group.	PO9
<b>CO7</b>	Communicate verbally and in written form pertaining to results of the experiments	PO10
<b>CO8</b>	Continue updating their skills related to fluid mechanics and hydraulic machines in future.	PO12

**TEXT BOOKS: Lab manual provided by the department.**

**REFERENCE WEBSITE:**

1. <https://nptel.ac.in/courses/112/105/112105171/>
2. <https://nptel.ac.in/courses/112/105/112105287/>
3. <https://nptel.ac.in/courses/105/103/105103192/>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>	3	-	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO2</b>	-	3	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO3</b>	-	-	3	-	-	-	-	-	-	-	-	-	2	-
<b>CO4</b>	-	-	-	3	-	-	-	-	-	-	-	-	2	-
<b>CO5</b>	-	-	-	-	-	-	-	3	-	-	-	-	2	-
<b>CO6</b>	-	-	-	-	-	-	-	-	3	-	-	-	2	-
<b>CO7</b>	-	-	-	-	-	-	-	-	-	3	-	-	2	-
<b>CO8</b>	-	-	-	-	-	-	-	-	-	-	-	3	2	-
<b>CO*</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	-	-	-	<b>3</b>	<b>3</b>	<b>3</b>	-	<b>3</b>	<b>2</b>	-



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**II B.Tech- III Semester**

**20ECE238**

**SEMICONDUCTOR DEVICES AND CIRCUITS LAB**

L	T	P	C
0	0	3	1.5

**COURSE EDUCATIONAL OBJECTIVES:**

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

**PART A:**

**Electronic Workshop Practice**

1. Identification, Specifications, Testing of RLC Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs, LEDs, LCDs, SCR, UJT.
3. Soldering Practice- Simple circuits using active and passive components.
4. Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter, Function Generator, Regulated Power Supply and CRO.

**PART B:**

**List of Experiments**

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

**Equipment required for Laboratory**

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multimeters
5. Decade Résistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components
10. Bread Boards
11. Connecting Wires



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE OUTCOMES:**

successful completion of the course the student will be able to,		Pos & PSOs
<b>CO1</b>	Demonstrate knowledge on identification and specification also testing of passive components.	<b>PO1</b>
<b>CO2</b>	Demonstrate knowledge on identification and specification also testing of active components.	<b>PO1</b>
<b>CO3</b>	Soldering practice on simple electronic circuits for future applications	<b>PO3</b>
<b>CO4</b>	Demonstrate knowledge on operation of PN diode and Zener diode with practical characteristics	<b>PO1.</b>
<b>CO5</b>	Analyze the practical characteristics of transistor in CB, CE, CC configurations	<b>PO2</b>
<b>CO6</b>	Do experiments effectively as an individual and as a member in a group.	<b>PO9</b>
<b>CO7</b>	Communicate verbally and in written form, the understandings about the experiments.	<b>PO10</b>
<b>CO8</b>	Follow ethical principles on analysis of different electronic circuits which is used for project works.	<b>PO8</b>
<b>CO9</b>	Continue updating their skill related to electronic devices and their applications during their life time	<b>PO12</b>

**TEXT BOOKS:**

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

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>	3	-	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO2</b>	-	3	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO3</b>	-	-	3	-	-	-	-	-	-	-	-	-	2	-
<b>CO4</b>	-	-	-	3	-	-	-	-	-	-	-	-	2	-
<b>CO5</b>	-	-	-	-	-	-	-	3	-	-	-	-	2	-
<b>CO6</b>	-	-	-	-	-	-	-	-	3	-	-	-	2	-
<b>CO7</b>	-	-	-	-	-	-	-	-	-	3	-	-	2	-
<b>CO8</b>	-	-	-	-	-	-	-	-	-	-	-	3	2	-
<b>CO*</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	-	-	-	<b>3</b>	<b>3</b>	<b>3</b>	-	<b>3</b>	<b>2</b>	-



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**II B.Tech- III Semester**

**20EEE232**

**NETWORK ANALYSIS LAB**

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

**COURSE EDUCATIONAL OBJECTIVES:**

- 1: To apply transient response of first order RL and RC circuits.
- 2: To provide practical experience for the determination of two port network Parameters.
- 3: To provide practical experience for measuring active and reactive power.
- 4: To provide practical experience with simulation of electrical circuits.
- 5: To verify Thevenin's, Norton's and superposition theorems using simulation.

**Any Ten of the following experiments are required to be conducted**

1. Time Response of First Order RL And RC Circuits
2. Z and Y Parameters.
3. Transmission and Hybrid Parameters.
4. Measurement of Active Power for Star and Delta Connected Balanced Loads
5. Measurement of Reactive Power by Single Watt Meter for Star and Delta Connected Balanced Loads
6. Measurement of Three Phase Power by Two wattmeter Method for Unbalanced Loads
7. Simulation of DC Transient Response.
8. Simulation of Thevenin's Theorem and Norton's Theorem.
9. Simulation of Maximum Power Transfer Theorem.
10. Simulation of Super position Theorem and Reciprocity theorem.
11. Simulation of Symmetrical Attenuators: T-Type And  $\Pi$ -Type
12. Simulation of Symmetrical Attenuators: Bridged T Type and Lattice Attenuators.

**COURSE OUTCOMES:**

<b>On successful completion of the course, student will be able to</b>		<b>Pos &amp; PSOs</b>
<b>C01</b>	Understand transient response of first order system	<b>PO1</b>
<b>C02</b>	Determine two port network parameters	<b>PO2</b>
<b>C03</b>	Understand practical experience with simulation of electrical circuits	<b>PO1</b>
<b>C04</b>	Understand and apply circuit theorems and concepts in engineering applications	<b>PO1</b>
<b>C05</b>	Application of Thevenin's, Norton's and Super position theorems using simulation	<b>PO8</b>
<b>C06</b>	Do experiments effectively as an individual and as a member in a group.	<b>PO9</b>
<b>C07</b>	Communicate verbally and in written form, the understandings about the experiments.	<b>PO10</b>
<b>C08</b>	Follow ethical principles on analysis of different electronic circuits which is used for project works.	<b>PO8</b>
<b>C09</b>	Continue updating their skill related to electronic devices and their applications during their life time	<b>PO12</b>



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**TEXT BOOKS:**

1. C. Alexander and M. Sadiku "Fundamentals of Electric Circuits", ,5/e McGraw Hill company 2014.
2. Chakrabarthy, Circuit Theory 3/e DhanpatRai and co., 2003.
3. Electric Circuits by Schaum series

**REFERENCE WEBSITE LINK:**

<https://nptel.ac.in/courses/108/105/108105159/>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>	3	-	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO2</b>	-	3	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO3</b>	3	-	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO4</b>	3	-	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO5</b>	3	-	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO6</b>	-	-	-	-	-	-	-	-	3	-	-	-	2	-
<b>CO7</b>	-	-	-	-	-	-	-	-	-	3	-	-	2	-
<b>CO8</b>	-	-	-	-	-	-	-	3	-	-	-	-	2	-
<b>CO9</b>	-	-	-	-	-	-	-	-	-	-	-	3	-	-
<b>CO*</b>	<b>3</b>	-	-	-	-	-	-	<b>3</b>	<b>3</b>	<b>3</b>	-	<b>3</b>	<b>2</b>	-



# SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES. (AUTONOMOUS)

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

II

B.Tech- III Semester

20MAC231

ENVIRONMENTAL SCIENCE

L T P C

(Common To All Branches)

2 0 0 0

**PRE-REQUISITES:** NIL

### **COURSE EDUCATIONAL OBJECTIVES:**

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

### **UNIT-1: INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES (6)**

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

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

### **UNIT -2: CONCEPT OF ECOSYSTEM AND BIODIVERSITY (6)**

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

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

### **UNIT -3: ENVIRONMENTAL POLLUTION AND WASTE MANAGEMENT (6)**

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

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

### **UNIT -4: SOCIAL ISSUES AND THE ENVIRONMENT (6)**

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



# SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES. (AUTONOMOUS)

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

### UNIT –5: HUMAN POPULATION AND THE ENVIRONMENT

(6)

**Population growth:** variation among nations-Population explosion – Family Welfare Programme-Environment and human health-Human Rights-Value Education-HIV/AIDS. Women and Child Welfare-Role of Information Technology in Environment and human Case Studies.

**Total hours: 30**

#### COURSE OUTCOMES:

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

#### TEXT BOOKS:

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

#### REFERENCE BOOKS:

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

#### REFERENCE WEBSITE:

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

#### CO-PO MAPPING:

CO-PO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02
<b>C01</b>	3	2	1	2	2	2	3	-	-	-	-	-	2	-
<b>C02</b>	3	2	1	2	2	2	3	-	-	-	-	-	2	-
<b>C03</b>	3	2	1	2	2	2	3	-	-	-	-	-	2	-
<b>C04</b>	3	2	1	2	2	2	3	-	-	-	-	-	2	-
<b>C05</b>	3	2	1	2	2	2	3	-	-	-	-	-	2	-
<b>CO*</b>	<b>3</b>	2	1	2	2	2	<b>3</b>	-	-	-	-	-	2	-



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**II B.Tech-IV Semester**

**20BSC241**

**ELECTROMAGNETICS**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

**PRE-REQUISITES: A Course on Network Analysis**

**COURSE EDUCATIONAL OBJECTIVES:**

- 1: To demonstrate knowledge on static electric field.
- 2: To impart knowledge on Laplace and Poisson's equations, and capacitance.
- 3: To impart knowledge on Magneto static field.
- 4: To create awareness on effect of magnetic field, inductance.
- 5: To impart knowledge on time varying electromagnetic field

**UNIT-1: ELECTROSTATIC FIELD**

**(9)**

Sources and effects of electromagnetic fields – Coordinate Systems – Vector fields – Gradient, Divergence, Curl – theorems and applications - Coulomb's Law – Electric field intensity – Field due to discrete and continuous charges – Gauss's law and applications.

**UNIT -2: ELECTROSTATIC APPLICATIONS**

**(9)**

Electric potential – Electric field and equipotential plots, Uniform and Non-Uniform field, Utilization factor – Electric field in free space, conductors, dielectrics - Dielectric polarization – Dielectric strength - Electric field in multiple dielectrics – Boundary conditions, Poisson's and Laplace's equations, Capacitance, Energy density, Applications.

**UNIT-3: STEADY OF ELECTRO-MAGNETIC FIELDS**

**(9)**

Lorentz force, magnetic field intensity (H) – Biot-Savart's Law - Ampere's Circuit Law – H due to straight conductors, circular loop, infinite sheet of current, Magnetic flux density (B) – B in free space, conductor, magnetic materials – Magnetization, Magnetic field in multiple media – Boundary conditions, scalar and vector potential, Poisson's Equation, Magnetic force, Torque, Inductance, Energy density, Applications

**UNIT-4: MAGNETO STATICS AND APPLICATIONS**

**(9)**

Magnetic Circuits - Faraday's law – Transformer and motional EMF – Displacement current - Maxwell's equations (differential and integral form) – Relation between field theory and circuit theory – Applications.

**UNIT-5: CURRENT DENSITY AND WAVE PROPAGATION**

**(9)**

Electromagnetic wave generation and equations – Wave parameters; velocity, intrinsic impedance, propagation constant – Waves in free space, lossy and lossless dielectrics, conductors- skin depth - Poynting vector – Plane wave reflection and refraction.

**Total Hours 45**



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE OUTCOMES:**

<b>On successful completion of the course, student will be able to</b>		<b>Pos &amp; PSOs</b>
<b>CO1</b>	Demonstrate knowledge on electrostatic field due to different types of electric charges.	<b>PO1, PO2, PO5, PSO1, PSO2.</b>
<b>CO2</b>	Develop knowledge on Laplace and Poisson equations, and capacitance	<b>PO1, PO3, PO5 PSO1, PSO2</b>
<b>CO3</b>	Develop knowledge on Magnetostatic field due to steady current.	<b>PO1, PO2, PO3, PO4, PO5 PSO1, PSO2</b>
<b>CO4</b>	Analyze the effects of magnetic field.	<b>PO1, PO2, PO3, PO5 PSO1, PSO2</b>
<b>CO5</b>	Develop knowledge on wave propagation.	<b>PO1, PO4, PO5 PSO1, PSO2</b>

**TEXT BOOKS**

1. Mathew N. O. Sadiku, 'Principles of Electromagnetics', 6th Edition, Oxford University Press Inc. Asian edition, 2015.
2. William H. Hayt and John A. Buck, 'Engineering Electromagnetics', McGraw Hill Special Indian edition, 2014.

**REFERENCE BOOKS**

1. David K Cheng, "Field and Wave Electromagnetics", Pearson Education, 2<sup>nd</sup> edition, 2004.
2. John D. Kraus, "Electromagnetics" McGraw Hill, 5th Edition, 1999.
3. N. Narayana Rao, "Elements of Engg. Electro Magnetics", Prentice Hall of India, 6<sup>rd</sup> Edition, 2008.
4. T.V.S. Arun Murthy, "Electromagnetic Fields", S.Chand, 2008. 5. David J Griffiths, "Introduction to Electrodynamics, PHI, 3<sup>rd</sup> edition, 2008

**REFERENCE WEBSITE:**

<https://nptel.ac.in/courses/117/103/117103065/>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>	<b>3</b>	<b>3</b>			<b>3</b>	-	-	-	-	-	-	-	<b>3</b>	<b>2</b>
<b>CO2</b>	<b>3</b>		<b>3</b>		<b>3</b>	-	-	-	-	-	-	-	<b>3</b>	<b>2</b>
<b>CO3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	-	-	-	-	-	-	-	<b>2</b>	<b>2</b>
<b>CO4</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	-	-	-	-	-	-	-	<b>2</b>	<b>1</b>
<b>CO5</b>	<b>3</b>	<b>3</b>	<b>3</b>		<b>3</b>	-	-	-	-	-	-	-	<b>1</b>	<b>2</b>
<b>CO*</b>	<b>3</b>	<b>3</b>		<b>3</b>	<b>3</b>								<b>2.2</b>	<b>1.8</b>



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**II B.Tech-IV Semester**

**20EEE241**

**CONTROL SYSTEMS**

L	T	P	C
2	1	0	3

**PRE-REQUISITES: A Course on Network Analysis**

**COURSE EDUCATIONAL OBJECTIVES:**

1. The concepts of open and closed loop control systems.
2. Analyse the Time and frequency domain response of second order systems.
3. Design a compensator to meet the design specifications of control system.
4. Solve problems pertaining to control systems to provide feasible solutions in real time environment.
5. Apply the conceptual knowledge of control systems in domestic and industrial applications.

**UNIT-1: MATHEMATICAL MODELING OF SYSTEMS:**

**(9)**

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

**UNIT-2: TIME RESPONSE AND STABILITY ANALYSIS:**

**(9)**

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

**UNIT-3: FREQUENCY DOMAIN ANALYSIS:**

**(9)**

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

**UNIT-4: CONTROLLERS AND COMPENSATORS:**

**(9)**

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

**UNIT-5: STATE SPACE ANALYSIS:**

**(9)**

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

**Total Hours: 45**



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE OUTCOMES:**

<b>On successful completion of the course, students will be able to</b>		<b>Pos &amp; PSOs</b>
<b>CO1</b>	Demonstrate knowledge on the concepts of open and closed loop control systems.	<b>PO1,PO2,PO3,PO4</b>
<b>CO2</b>	Analyze Time and frequency domain response of second order systems.	<b>PO1,PO2,PO3,PO4</b>
<b>CO3</b>	Design a compensator to meet the design specifications of control system.	<b>PO1,PO2, PO3</b>
<b>CO4</b>	Solve problems pertaining to control systems to provide feasible solutions in real time environment.	<b>PO1,PO2,PO4</b>
<b>CO5</b>	Apply the conceptual knowledge of control systems in domestic and industrial applications.	<b>PO1,PO2,PO12</b>

**TEXT BOOKS:**

1. Nagrath I.J. and Gopal M, "Control Systems Engineering" New Age International Publications, 5th edition, 2010.
2. Katsuhiko Ogata," Modern Control Engineering", Pearson Education Publishers, 5th edition, 2010.

**REFERENCE BOOKS:**

1. Richard C. Dorf and Robert H. Bishop, "Modern Control Systems", Prentice Hall, 12th edition,2010.
2. Benjamin C.Kuo and Farid Golnaraghi, "Automatic Control Systems", John Wiley & Sons Publications, 8th edition, 2002.
3. A.Nagoorkani, "Control Systems", RBA Publications, 2nd edition,2006.
4. Anandkumar, "Control Systems" PHI learning Pvt Ltd., 2ndedition, 2014.

**REFERENCE WEBSITE:**

- NPTEL Video Lecture Notes on "Control Engineering "by Prof. S. D. Agashe, IIT Bombay.

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
<b>CO1</b>	3	2	2	1	-	-	-	-	-	-	-	-	2	-
<b>CO2</b>	3	3	2	2	-	-	-	-	-	-	-	-	2	-
<b>CO3</b>	3	3	<b>2</b>	-	-	-	-	-	-	-	-	-	2	-
<b>CO4</b>	3	3	-	<b>2</b>	-	-	-	-	-	-	-	-	2	-
<b>CO5</b>	3	3	-	-	-	-	-	-	-	-	-	2	2	-
<b>CO*</b>	<b>3</b>	<b>2.8</b>	<b>2</b>	<b>1.6</b>								<b>2</b>	<b>2</b>	<b>-</b>



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**II B.Tech-IV Semester**

**20EEE242**

**ELECTRICAL MACHINES-I**

**L T P C  
2 1 0 3**

**PRE-REQUISITES: A Course on Basic Electrical Engineering**

**COURSE EDUCATIONAL OBJECTIVES:**

1. To demonstrate knowledge on construction, operation and design of armature windings Of DC generator.
2. To demonstrate knowledge on construction, operation and characteristics of D C motor.
3. To analyze the operation of DC motor for various speed conditions
4. Demonstrate knowledge on construction and working of transformers.
5. Demonstrate knowledge on testing of poly phase transformers

**UNIT-1: D.C. GENERATORS**

**(9)**

Principle of Operation, Constructional Features, EMF Equation of a D.C. Generator, Collection and Flow of Current from Armature, Armature Reaction, Methods to Reduce Effects of Armature Reaction and Commutation Process, Armature Winding Diagram (Lap and Wave), Methods of Excitation, Generator Characteristics, Parallel Operation, Losses occur in DC Generator, Power Stages in D.C. Generator, Efficiency, Condition for Maximum Efficiency of a dc generator and Applications.

**UNIT-2: D.C. MOTORS**

**(9)**

Principle of operation, Types of DC Motors, Significance of Back Emf, condition for maximum power, Torque and Speed Equations, Starting and necessity of Starters, Types of Starters, DC Motor characteristics, Speed Control Methods of a D.C. Motors, Losses occur in DC Motors, Power Stages in D.C. Motor, Condition for Maximum Efficiency and Applications.

**UNIT-3: TESTING OF D.C. MOTORS**

**(9)**

Testing of D.C machines- losses – constants & variable losses – calculation of efficiency –condition for maximum efficiency .Methods of testing-direct, indirect & regenerative testing –brake test – Swinburne’s test – Hopkinson’s test – field’s test – retardation test – separation of stray losses in a D.C Motors test.

**UNIT-4: TRANSFORMERS**

**(9)**

Principle of operation, Constructional features, Types of Transformers, emf equation of a Transformer, Ideal Transformer, Practical Transformer on No-Load and Load and its vector diagrams, Equivalent Circuit of a Transformers, Losses in a Transformer, Voltage Regulation and Efficiency, Testing of a Transformers, All Day Efficiency, Condition for Maximum Efficiency of a Transformer, auto transformers, tap changers on transformers, Parallel Operation of single phase transformers.

**UNIT -5: THREE PHASE TRANSFORMERS**

**(9)**

Three-phase Transformers, Three-phase Transformer Connections, Star/Star or Y/Y Connection, Delta-Delta or Connection, Wye/Delta or Y/Connection, Delta/Wye or /Y Connection, Open-Delta or Y-Y Connection, Power supplied by Y-Y Bank, Three-phase to Two-Phase conversion and vice-versa, Parallel operation of 3- phase Transformers.

**Total Hours: 45**



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE OUTCOMES:**

<b>On successful completion of course, student will be able to</b>		<b>Pos &amp; PSOs</b>
<b>CO1</b>	Acquire knowledge on the construction, operation, safety and design of DC generator.	<b>PO1,PO2,PO3,PO4</b>
<b>CO2</b>	Acquire knowledge on construction, operation, design, safety and characteristics of various types DC motors.	<b>PO1,PO2,PO4</b>
<b>CO3</b>	Acquire knowledge on the operation, analysis and safety of DC motors for various speed conditions.	<b>PO1,PO2,PO3,PO4</b>
<b>CO4</b>	Demonstrate knowledge on construction and working of transformers.	<b>PO1, PO2</b>
<b>CO5</b>	Demonstrate knowledge on testing of poly phase transformers	<b>PO1,PO2,PO3</b>

**TEXT BOOKS:**

1. P.S. Bimbhra, 'Electrical Machinery', Khanna Publishers, 2003.
2. B.L.Theraja & A.K.Theraja," A Text Book of Electrical Technology" S.Chand, New Delhi, 2012.

**REFERENCE BOOKS:**

1. A.E. Fitzgerald, Charles Kingsley, Stephen.D.Umans, "Electric Machinery", Tata McGraw Hill publishing Company Ltd, 2003.
2. J.B. Gupta, "Theory and Performance of Electrical Machine", S.K.Kataria and Sons, 2002.
3. D.P. Kothari and I.J. Nagrath, "Electric Machines", Tata McGraw Hill Publishing Company Ltd, 2002.

**REFERENCE WEBSITE LINK:**

<https://nptel.ac.in/courses/108/105/108105131/>

**CO-PO MAPPING:**

<b>CO-PO</b>	<b>P01</b>	<b>P02</b>	<b>P03</b>	<b>P04</b>	<b>P05</b>	<b>P06</b>	<b>P07</b>	<b>P08</b>	<b>P09</b>	<b>P010</b>	<b>P011</b>	<b>P012</b>	<b>PS01</b>	<b>PS02</b>
<b>CO1</b>	3	2	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO2</b>	3	2	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO3</b>	3	2	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO4</b>	3	2	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO5</b>	3	2	3	-	-	-	-	-	-	-	-	-	2	-
<b>CO*</b>	<b>3</b>	<b>2</b>	<b>3</b>										<b>2</b>	<b>-</b>



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
STUDIES. (AUTONOMOUS)  
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**II B.Tech-IV Semester**

**20EEE243**

**ELECTRICAL POWER TRANSMISSION**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>

**PRE-REQUISITES:** A Course on Generation of Electrical Power

**Course Educational Objectives:**

- 1:** To make students capable to understand the electrical line parameters.
- 2:** To impart knowledge on short, medium and long transmission lines.
- 3:** To provide the knowledge about the system transients and transmission line parameters.
- 4:** To acquire knowledge on the concepts of corona, sag and tension calculations.
- 5:** To provide knowledge on the issues related to overhead line insulators and underground cables.

**UNIT-1: TRANSMISSION LINE PARAMETERS (9)**

Types of conductors - calculation of resistance for solid conductors - Calculation of inductance for single phase and three phase, single and double circuit lines, concept of GMR & GMD, symmetrical and asymmetrical conductor configuration with and without transposition, Numerical Problems - Calculation of capacitance for 2 wire and 3 wire systems, effect of ground on capacitance, capacitance calculations for symmetrical and asymmetrical single and three phase, single and double circuit lines, Numerical Problems.

**UNIT-2: PERFORMANCE OF SHORT, MEDIUM AND LONG TRANSMISSION LINES (9)**

Classification of Transmission Lines - Short, medium and long line and their model - representations - Nominal-T, Nominal-Pi and A, B, C, D Constants. Numerical Problems. Mathematical Solutions to estimate regulation and efficiency of all types of lines - Numerical Problems. Long Transmission Line-Rigorous Solution, evaluation of A, B, C, D Constants, Interpretation of the Long Line Equations - Representation of Long lines - Equivalent T and Equivalent  $\pi$  - surge Impedance and surge Impedance loading - Ferranti effect, Charging current.

**UNIT-3: POWER SYSTEM TRANSIENTS (9)**

Types of system transients-Travelling or propagation of surges- attenuation, distortion, reflection and refraction coefficients- termination of lines with different types of conditions - open circuited line, short circuited line, T-junction (numerical problems)-Bewley Lattice diagrams (for all cases mentioned with numerical examples).

**UNIT-4: CORONA, SAG AND TENSION CALCULATIONS (9)**

Corona - Description of the phenomenon, factors affecting corona, critical voltages and power loss, Radio Interference. Sag and Tension Calculations with equal and unequal heights of towers, Effect of Wind and Ice on weight of Conductor, Numerical Problems - Stringing chart and sag template and its applications.

**UNIT-5: OVERHEAD LINE INSULATORS AND UNDERGROUND CABLES (9)**

Types of Insulators, String efficiency and Methods for improvement, Numerical Problems - voltage distribution, calculation of string efficiency, Capacitance grading and Static Shielding. Types of Cables, Construction, Types of Insulating materials, Calculations of Insulation resistance and stress in insulation, Numerical Problems. Capacitance of Single and 3-Core belted cables, Numerical Problems. Grading of Cables - Capacitance grading, Numerical Problems, Description of Inter-sheath grading.

**TOTAL HOURS: 45**



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE OUTCOMES:**

<b>On successful completion of course, student will be able to</b>		<b>Pos &amp; PSOs</b>
<b>CO1</b>	Ability to do calculation of resistance, Inductance and Capacitance of Transmission Lines.	<b>PO1, PO2</b>
<b>CO2</b>	Ability to apply the knowledge on short, medium and long transmission lines.	<b>PO1, PO2</b>
<b>CO3</b>	Demonstrate knowledge on power system transients.	<b>PO1, PO2</b>
<b>CO4</b>	Understand the concepts of corona, sag and tension calculations.	<b>PO1, PO2, PO3</b>
<b>CO5</b>	Able to analyze the overhead line insulators and underground cables.	<b>PO1, PO2, PO3</b>

**TEXT BOOKS:**

1. C.L.Wadwa "Electrical Power Systems", New Age International Publishers–New Delhi. 6/e2012.
2. D.P.Kothari, I.J. Nagarath, 'Power System Engineering', Mc Graw-Hill Publishing Company limited, New Delhi, Second Edition, 2008.

**REFERENCE BOOKS:**

1. V.K.Mehta, S.Chand "Principles of Power systems ", S.Chand Publications – New Delhi 4/e 2005
2. William D Stevenson "Elements of Power systems"–4/e 1982 - Tata McGraw – Hill Education Pvt. Ltd.. Noida
3. B.R.Gupta "Power system analysis and design ", S.chand&co, 6<sup>th</sup> revised edition
4. John j Grainger, William D Stevenson "Power system analysis", TMC Companies, 4<sup>th</sup> edition.

**REFERENCE WEBSITE:**

<https://nptel.ac.in/courses/108/106/108106160/>

**CO-PO MAPPING:**

CO-PO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02
<b>C01</b>	3	3	-	-	-	-	-	-	-	-	-	-	2	-
<b>C02</b>	3	3	-	-	-	-	-	-	-	-	-	-	2	-
<b>C03</b>	3	3	-	-	-	-	-	-	-	-	-	-	2	-
<b>C04</b>	3	3	2	-	-	-	-	-	-	-	-	-	2	-
<b>C05</b>	3	3	2	-	-	-	-	-	-	-	-	-	2	-
<b>CO*</b>	<b>3</b>	<b>3</b>	<b>2</b>	-	-								<b>2</b>	<b>-</b>







**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**II B.Tech-IV Semester**

<b>20ECE249</b>	<b>ELECTRONIC CIRCUITS AND IC APPLICATIONS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>(Skill oriented Course)</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>

**COURSE EDUCATIONAL OBJECTIVES:**

1. To develop the basic understanding of small signal and large signal amplifiers
2. To provide knowledge on different types of feedback amplifiers and oscillators.
3. To provide knowledge on characteristics of operational amplifier.
4. To apply the ideas of op-amp on various applications and data converters
5. To introduce the concepts of 555 timer and special function ICs

**UNIT-1: SMALL SIGNAL and LARGE SIGNAL AMPLIFIERS (9)**

**SMALL SIGNAL AMPLIFIERS**

Review of CB, CE & CC amplifiers-Classification of amplifiers, approximate analysis, CE, CB, CC amplifiers comparison.

**LARGE SIGNAL AMPLIFIERS**

Class-A, Class-B power amplifiers and its Efficiency, transformer coupled, push- pull, complementary symmetry circuits, transistor power dissipation, Thermal runaway, Heat sinks.

**UNIT-2: FEEDBACK AMPLIFIERS and OSCILLATORS (9)**

**FEEDBACK AMPLIFIERS:** Classification of Feedback amplifiers, general characteristics negative feedback amplifiers, Voltage series, Voltage shunt, Current series, Current shunt configurations.

**OSCILLATORS:** Conditions & Frequency of oscillations for RC- RC phase shift & Wien bridge Oscillators, LC type- Hartley & Colpitts oscillators.

**UNIT 3: CHARACTERISTICS OF OP-AMP (9)**

IC Classification, chip size and circuit complexity, Ideal & practical Op-amp Characteristics, inverting and Non inverting amplifier, differential amplifier, frequency response of op -amp - Application of op-amp – adder, subtractor, comparator, differentiator, integrator.

**UNIT 4: APPLICATIONS OF OP-AMP (9)**

Instrumentation amplifier, comparators-Multivibrators, Wave generators-Clippers, Clampers, D/A converter- R-2R ladder & weighted resistor types, A/D converter- dual slope, successive approximation.

**UNIT 5: 555 TIMER & IC APPLICATIONS (9)**

Introduction to 555 timer- functional diagram, monostable and astable multivibrator, 566 voltage control oscillator circuit, 565 PLL, LM 317, LM 723 regulator, three terminal voltage regulators: 78xx, 79xx, LM 380 power amplifier, ICL 8038 function generator IC.

**Total Hours: 45**





**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**II B.Tech-IV Semester**

**20EEE245**

**CONTROL SYSTEM LAB**

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

**COURSE EDUCATIONAL OBJECTIVES:**

- 1 To demonstrate knowledge on different types of controllers.
- 2 To determine the characteristics of DC and AC servomotors.
- 3 To apply skills in DC Position control and temperature control systems.
- 4 To obtain the transfer function of DC motors by conducting suitable tests.
- 5 To evaluate stability of Control system by different methods using MATLAB.

**Any Ten of the following experiments are required to be conducted**

1. Time Response of Second Order System.
2. Characteristics of Synchros.
3. Transfer Function of Armature Controlled DC Machine.
4. Transfer Function of Separately Excited DC Generator.
5. Effect of P - PD - PI - PID Controller on A Second Order Systems
6. Lag and Lead Compensation – Magnitude and Phase Plot
7. Characteristics of Magnetic Amplifiers
8. Effect of feedback on DC Servo Motor
9. Characteristics of AC Servo Motor
10. Temperature control using PID controller
11. Linear System Analysis (Time Domain Analysis - Error Analysis) Using MATLAB
12. Stability Analysis of Control System - Bode Plot, Root Locus and Nyquist Plot Using MATLAB.

**COURSE OUTCOMES:**

<b>On successful completion of course, student will be able to</b>		<b>Pos &amp; PSOs</b>
<b>C01</b>	Demonstrate knowledge on different types of controllers.	<b>PO1</b>
<b>C02</b>	Analyze the characteristics of DC and AC servomotors	<b>PO2</b>
<b>C03</b>	Determine the transfer function of DC motors by conducting suitable tests.	<b>PO4</b>
<b>C04</b>	Select appropriate design tools and procedure to evaluate stability of Control system	<b>PO5</b>
<b>C05</b>	Follow ethical principles to evaluate performance of AC machines.	<b>PO8</b>
<b>C06</b>	Do experiments effectively as an individual and as a member in a group.	<b>PO9</b>
<b>C07</b>	Communicate verbally and in written form, the understandings about the experiments.	<b>PO10</b>
<b>C08</b>	Continue updating their skill related to electronic devices and their applications during their life time	<b>PO12</b>
<b>C09</b>	Analyze rotary inverter pendulum using LABVIEW.	<b>PO3</b>



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**TEXT BOOKS:**

1. Anandkumar, Control Systems, PHI learning Pvt Ltd., 2nd edition, 2014.
2. Katsuhiko Ogata, Modern Control Engineering, Pearson Education Publishers, 5th edition, 2010.

**REFERENCE WEBSITE:**

<https://nptel.ac.in/courses/107/106/107106081/>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	-	-	-	-	-	-	-	-	-	-	-	2	-
C02	-	3	-	-	-	-	-	-	-	-	-	-	2	-
C03	-	-	-	3	-	-	-	-	-	-	-	-	2	-
C04	-	-	-	-	3	-	-	-	-	-	-	-	2	-
C05	-	-	-	-	-	-	-	3	-	-	-	-	2	-
C06	-	-	-	-	-	-	-	-	3	-	-	-	2	-
C07	-	-	-	-	-	-	-	-	-	3	-	-	2	-
C08	-	-	-	-	-	-	-	-	-	-	-	3	2	-
C09	-	-	3	-	-	-	-	-	-	-	-	-	-	-
CO*	3	3	3	3	3			3	3	3		3	2	



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**II B.Tech-IV Semester**

**20EEE246**

**ELECTRICAL MACHINES-I LAB**

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

**COURSE EDUCATIONAL OBJECTIVES:**

1. To demonstrate knowledge on various parts of DC machine
2. To analyze the performance of various DC machines.
3. To obtain the performance characteristics of DC machines.
4. To obtain the transfer function of DC motors by conducting suitable tests.
5. To evaluate efficiency of DC machines by conducting suitable test

**Any Ten of the following experiments are required to be conducted**

1. Magnetization Characteristics of DC Shunt Generator. Determination of Critical Field Resistance And Critical Speed
2. Swinburne's Test and Speed Control of Dc Shunt Motor. Predetermination of Efficiencies
3. Brake Test on DC Shunt Motor. Determination of Performance Curves
4. Brake Test on DC Compound Motor. Determination of Performance Curves
5. Separation of Losses In Dc Shunt Motor
6. Retardation Test on Dc Shunt Motor. Determination of Losses At Rated Speed
7. Load Test on DC Separately Excited Generator To Determine Its Characteristics.
8. Load Test on DC Shunt Generator. Determination of Characteristics
9. Load Test on a DC Compound Generator. Determination of Characteristics
10. Load Test on DC Series Generator. Determination of Characteristics
11. Hopkinson's Test on Dc Shunt Machine. Predetermination Of Efficiency.
12. Field's Test on DC Series Machines. Determination of Efficiency

**COURSE OUTCOMES:**

<b>On successful completion of course, student will be able to</b>		<b>Pos &amp; PSOs</b>
<b>CO1</b>	Demonstrate knowledge on various parts of DC machine.	<b>PO1</b>
<b>CO2</b>	Analyze the performance of various DC machines.	<b>PO2</b>
<b>CO3</b>	Determine various losses of DC machines by conducting suitable test	<b>PO4</b>
<b>CO4</b>	Analyze Field's Test on DC Series Motor.	<b>PO5</b>
<b>CO5</b>	Select appropriate design tools and procedure to evaluate performance of DC machines	<b>PO8</b>
<b>CO6</b>	Follow ethical principles to evaluate performance of DC machines.	<b>PO9</b>
<b>CO7</b>	Do experiments effectively as an individual and as a member in a group.	<b>PO10</b>
<b>CO8</b>	Communicate verbally and in written form, the understandings about the experiments.	<b>PO12</b>
<b>CO9</b>	Continue updating their skill related to various testing of DC machines during their life time	<b>PO12</b>



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**TEXT BOOKS:**

1. P.S. Bimbhra, 'Electrical Machinery', Khanna Publishers, 2003.
2. B.L.Theraja&A.K.Theraja," A Text Book of Electrical Technology" S.Chand, New Delhi, 2012.

**REFERENCE WEBSITE:**

<https://nptel.ac.in/courses/108/105/108105131/>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>	3	-	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO2</b>	-	3	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO3</b>	-	-	-	3	-	-	-	-	-	-	-	-	2	-
<b>CO4</b>	-	-	-	-	3	-	-	-	-	-	-	-	2	-
<b>CO5</b>	-	-	-	-	-	-	-	3	-	-	-	-	2	-
<b>CO6</b>	-	-	-	-	-	-	-	-	3	-	-	-	2	-
<b>CO7</b>	-	-	-	-	-	-	-	-	-	3	-	-	2	
<b>CO8</b>	-	-	-	-	-	-	-	-	-	-	-	<b>3</b>	2	
<b>CO9</b>	-	-	<b>3</b>	-	-	-	-	-	-	-	-	3		
<b>CO*</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>			<b>3</b>	<b>3</b>	<b>3</b>		<b>3</b>	<b>2</b>	



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**II B.Tech-IV Semester**

**20EEE247**

**MEASUREMENTS AND INSTRUMENTATION LAB**

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

**COURSE EDUCATIONAL OBJECTIVES:**

- 1 To provide practical experience on procedures for measuring Resistance, Inductance and Capacitance of different ranges
- 2 To evaluate the three phase power, frequency, core losses.
- 3 To design experiments for calibration of measuring instruments, LVDT and resistance strain gauge.
- 4 To determine the resistance, inductance and capacitance parameters using DC and AC bridges
- 5 To know the industrial practices of Measuring earth resistance, dielectric strength of transformer oil & Testing of underground cables

**Any Ten of the following experiments are required to be conducted**

1. Calibration And Testing of Single Phase Energy Meter
2. Crompton D.C. Potentiometer – Calibration of PMMC Ammeter And PMMC Voltmeter
3. Kelvin's Double Bridge – Measurement of Resistance – Determination of Tolerance.
4. Measurement of Unknown Inductance Using Anderson's Bridge
5. Measurement of 3 Phases Reactive Power with Single-Phase Wattmeter.
6. Measurement of Parameters of A Choke Coil Using 3 Voltmeter And 3 Ammeter Methods.
7. Calibration LPF Wattmeter – By Phantom Testing
8. Measurement of 3 Phase Power with Two Watt Meter Method (Balanced & Un Balanced).
9. Whetstone's Bridge For Measurement Of Medium Resistance
10. Measurement of Unknown Capacitance Using Schering Bridge
11. Resistance Strain Gauge – Strain Measurements and Calibration.
12. LVDT and Capacitance Pickup – Characteristics and Calibration.

**COURSE OUTCOMES:**

<b>On successful completion of the course, student will be able to</b>		<b>Pos &amp; PSOs</b>
<b>CO1</b>	Demonstrate knowledge on procedures for measuring Resistance, Inductance and Capacitance of different ranges.	<b>PO1</b>
<b>CO2</b>	Analyze and evaluate the three phase power, frequency, core losses	<b>PO2</b>
<b>CO3</b>	Design and calibrate of various measuring instruments	<b>PO3</b>
<b>CO4</b>	Determine the resistance, inductance and capacitance parameters using DC and AC bridges	<b>PO4</b>
<b>CO5</b>	Follow ethical principles to evaluate performance of AC machines.	<b>PO8</b>
<b>CO6</b>	Do experiments effectively as an individual and as a member in a group.	<b>PO9</b>
<b>CO7</b>	Communicate verbally and in written form, the understandings about the experiments.	<b>PO10</b>
<b>CO8</b>	Continue updating their skill related to electronic devices and their applications during their life time	<b>PO12</b>



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT  
STUDIES. (AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**TEXT BOOKS:**

1. A.K. Sawhney, 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, 2010.
2. J. B. Gupta, 'A Course in Electronic and Electrical Measurements', S. K. Kataria & Sons, Delhi, 2013.

**REFERENCE WEBSITE:**

<https://nptel.ac.in/courses/108/105/108105153/>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	-	-	-	-	-	-	-	-	-	-	-	2	-
C02	-	3	-	-	-	-	-	-	-	-	-	-	2	-
C03	-	-	-	3	-	-	-	-	-	-	-	-	2	-
C04	-	-	-	-	3	-	-	-	-	-	-	-	2	-
C05	-	-	-	-	-	-	-	3	-	-	-	-	2	-
C06	-	-	-	-	-	-	-	-	3	-	-	-	2	-
C07	-	-	-	-	-	-	-	-	-	3	-	-	2	-
C08	-	-	-	-	-	-	-	-	-	-	-	3	2	-
CO*	3	3		3	3			3	3	3		3	2	



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
**(AUTONOMOUS)**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**III**

**B.Tech-V Semester**

**20EEE351**

**ELECTRICAL MACHINES II**

**L T P C**  
**2 1 0 3**

**PRE-REQUISITES:** A Course on Electrical Machines-I

**COURSE EDUCATIONAL OBJECTIVES:**

1. Impart knowledge on construction, working of induction machines and analyze the behavior of induction machines for various operating conditions.
2. Understand Methods of Starting and Speed Control of Induction Motors
3. Demonstrate knowledge on construction and performance of synchronous generators.
4. Demonstrate knowledge on parallel operation of synchronous generators and analyze effect of change of excitation and mechanical power input.
5. Impart knowledge on Construction, principle of operation and performance of single phase induction motors and Special machines.

**UNIT-1: THREE PHASE INDUCTION MOTORS**

**(9)**

Principle of operation, Constructional details, Rotating Magnetic field, Types of rotors, Slip, Stator and Rotor current frequencies, Development of torque and torque calculations, Torque-Speed Characteristics, Power flow and performance calculations, Equivalent circuit, Calculation of equivalent circuit parameters from No-load and Rotor-blocked tests.

**UNIT-2: STARTING AND SPEED CONTROL METHODS**

**(9)**

Predetermination of performance characteristics using circle diagram and load test, Starting of Induction motors using Rheostat/reactor starter, Auto-transformer starter, Star-Delta starter, and Rotor Resistance starter, Crawling and cogging, Brief description of the induction motor speed control using Voltage control, frequency control, pole changing, rotor resistance control, cascading, and rotor EMF injection, Induction generator and principle of operation, Double-cage rotors.

**UNIT-3: SYNCHRONOUS GENERATORS**

**(9)**

Basic requirements, Constructional details, EMF equation, Effect of chording and distribution of winding, Armature reaction, Phasor diagram, Regulation of Synchronous Generators using EMF, MMF and ZPF method.

**UNIT-4: PARALLEL OPERATION OF SYNCHRONOUS GENERATORS**

**(9)**

Synchronization Of Alternators, Parallel Operation Of Two-Alternators, Parallel Operation Of Synchronous Generator To Infinite Bus, Sharing Of Real And Reactive Powers, Capability Curve, Salient-Pole Synchronous Machine, Two-Reaction Theory, Determination Of Direct Axis And Quadrature Axis Reactances Of Salient-Pole Machines, Power-Angle Characteristics Of Cylindrical And Salient-Pole Machines.

**UNIT-5: SYNCHRONOUS AND SINGLE PHASE MOTORS**

**(9)**

Principle of operation, starting methods, phasor diagram, effect of changing load and changing excitation on machine performance, V and Inverter 'V' curves, Hunting, Damper winding, power developed by synchronous motor. Single phase induction motors-Double-field revolving theory, principle of operation of split phase, capacitor start, capacitor start and run motors.

**Total Hours: 45**



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**COURSE OUTCOMES:**

<b>On successful completion of the course, students will be able to</b>		<b>Pos &amp; PSOs</b>
<b>CO1</b>	Analyze the behavior of induction machines for various operating conditions.	PO1,PO2
<b>CO2</b>	Demonstrate knowledge on Methods of Starting and Speed Control and design suitable accessories/techniques for the starting and speed control of induction motors.	PO1, PO2, PO3, PO12
<b>CO3</b>	Demonstrate knowledge on construction and performance of synchronous generators.	PO1,PO2,PO3
<b>CO4</b>	Acquire knowledge on operation of synchronous motor, methods of starting of synchronous motor and mathematical analysis for Power developed.	PO1,PO2
<b>CO5</b>	Demonstrate knowledge on Construction, principle of operation and performance of single phase induction motors and Special machines.	PO1,PO2,PO12

**TEXT BOOKS:**

1. P.S. Bimbhra, 'Electrical Machinery', Khanna Publishers, 2003.
2. D.P. Kothari and I.J. Nagrath, 'Electric Machines', Tata McGraw Hill Publishing Company Ltd, 2002.

**REFERENCE BOOKS:**

1. A.E. Fitzgerald, Charles Kingsley, Stephen.D.Umans, 'Electric Machinery', Tata McGraw Hill publishing Company Ltd, 2003.
2. J.B. Gupta, 'Theory and Performance of Electrical Machines', S.K.Kataria and Sons, 2002.
3. M G SAY 'Electrical Machines'.
4. KOSAO 'Electrical Machines and transformers'.

**REFERENCE WEBSITE LINK:**

<https://nptel.ac.in/courses/108/105/108105017/>

**CO-PO MAPPING**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
<b>CO1</b>	3	3	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO2</b>	3	3	1	-	-	-	-	-	-	-	-	2	2	-
<b>CO3</b>	3	2	2	-	-	-	-	-	-	-	-	-	2	-
<b>CO4</b>	3	3	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO5</b>	3	3	-	-	-	-	-	-	-	-	-	2	2	-
<b>CO*</b>	<b>3</b>	<b>2.8</b>	<b>0.6</b>	-	-	-	-	-	-	-	-	<b>2</b>	<b>2</b>	-



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
**(AUTONOMOUS)**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**III B.Tech-V Semester**

**20EEE352**

**ELECTRICAL POWER DISTRIBUTION**

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

**PRE-REQUISITES:** A Course on Electrical Power Transmission

**COURSE EDUCATIONAL OBJECTIVES:**

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

- 1** Acquire knowledge of Distribution system, types of loads and their characteristics.
- 2** Impart knowledge on methods of classification of different distribution systems and determine voltage drops in DC distribution systems.
- 3** Impart knowledge on methods of classification of different distribution systems and determine voltage drops in AC distribution systems.
- 4** Capitalize knowledge of various types of substations and their optimal locations. To gain knowledge of different bus bars and their operation.
- 5** Know the importance and improvement of power factor and voltage control in distribution systems.

**UNIT -1: GENERAL CONCEPTS**

**(9)**

Introduction to distribution systems, Load factor, Diversity factor, Capacity factor, Utilization factor, Coincidence factor, Contribution factor, loss factor – Relationship between the load factor and loss factor. Load curve and load duration curves – Classification of loads (residential, commercial, agricultural and industrial) and their characteristics.

**UNIT -2: DC DISTRIBUTION SYSTEMS**

**(9)**

Classification of Distribution systems – Comparison of DC vs AC and Underground vs Overhead distribution systems – Requirements and design features of Distribution systems- Voltage drop Calculations (Numerical Problems) in DC Distributors for the following cases: Radial DC Distributor fed from one end and fed from the both the ends (equal/unequal Voltages) – Ring main distributor. Distributors with concentrated and uniform loading – numerical problems.

**UNIT-3: AC DISTRIBUTION SYSTEMS**

**(9)**

Requirements and design features of AC Distribution feeders: Radial and loop types of primary feeders, feeder voltage levels, feeder loading – Basic design practice of the secondary distribution system. Voltage drop calculations (Numerical Problems) in AC Distributors for the following cases: Power factors referred to receiving end voltage and with respect to respective load voltages.

**UNIT-4: SUBSTATIONS**

**(9)**

Classification of substations – Indoor, Outdoor, transformer substations, layout of 33kV/11kV, 11kV/400V substations showing the location of all the equipments, symbols for equipments in the substations, Applications of Isolators, Earthing switches and load break switches, Optimal substation location – Bus bar arrangements: single, double, main and transfer, ring, one and half bus bar schemes and their operation.



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**UNIT -5: PROTECTION AND COORDINATION OF DISTRIBUTION SYSTEMS. (9)**

Causes and effects of low power factor – Methods of improving PF- Most economical PF for constant kW load – numerical problems. Importance of voltage control, methods of voltage control: shunt, series capacitors, synchronous condensers, tap changing and booster transformers. Objectives of distribution system protection, Protective Devices: Principle of operation of fuses, circuit reclosures, line sectionalizers, and circuit breakers- Coordination of protective devices: General coordination procedure.

**TOTAL HOURS: 45**

**COURSE OUTCOMES:**

On successful completion of the course, students will be able to		Pos & PSOs
<b>CO1</b>	Demonstrate knowledge on distribution system, types of loads and their characteristics.	<b>PO1,PO2</b>
<b>CO2</b>	Acquire knowledge on methods of classification of different distribution systems and determine voltage drops in DC distribution systems.	<b>PO1,PO2,PO3</b>
<b>CO3</b>	Acquire knowledge on methods of classification of different distribution systems and determine voltage drops in AC distribution systems.	<b>PO1,PO2,PO3</b>
<b>CO4</b>	Incurs knowledge of various types of substations and their optimal locations, different bus bars and their operation.	<b>PO1,PO5</b>
<b>CO5</b>	Knows the importance and improvement of power factor and voltage control in distribution systems. Can understand coordination of protective devices.	<b>PO1,PO2,PO3, PO4</b>

**TEXT BOOKS:**

1. Dr. H.P. Inamdar of Electric Power – by, Electrotech Publication, 1<sup>st</sup> Edition, 2011.
2. Electrical Power Distribution systems – by V.Kamaraju, McGraw Hill Publishers, 2017.

**REFERENCE BOOKS:**

1. Electrical Power Distribution system Engineering, Turan Gonen, McGraw Hill Publishers, 1986.
2. Electrical Power Distribution, A.S. Pabla, McGraw Hill Publishers, 2004.
3. Principles of Power Systems, 4<sup>th</sup> Edition, V.K.Mehta, S.Chand Publishers.

**REFERENCE WEBSITE LINK:**

<https://nptel.ac.in/courses/108/107/108107112/>

**CO-PO MAPPING:**

CO-PO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02
<b>C01</b>	3	2	-	-	-	-	-	-	-	-	-	-	2	-
<b>C02</b>	3	3	3	-	-	-	-	-	-	-	-	-	2	-
<b>C03</b>	3	3	2	-	-	-	-	-	-	-	-	-	2	-
<b>C04</b>	3	-	-	-	2	-	-	-	-	-	-	-	2	-
<b>C05</b>	3	3	3	2	-	-	-	-	-	-	-	-	2	-
<b>CO*</b>	<b>3</b>	<b>2.2</b>	<b>2.6</b>	<b>2</b>	<b>2</b>								<b>2</b>	<b>-</b>



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
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**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**III B.Tech-V Semester**

**20EEE353**

**POWER ELECTRONICS**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>

**PRE-REQUISITES:** A Course on Electronic Devices and Circuits

**COURSE EDUCATIONAL OBJECTIVES:**

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

1. Impart knowledge on Different types of power semiconductor devices and their switching.
2. Impart knowledge on Operation, characteristics and performance parameters of controlled rectifiers.
3. Impart knowledge on Operation, switching techniques and basics topologies of DC-DC switching regulators.
4. Impart knowledge on Different modulation techniques of pulse width modulated inverters and to understand harmonic reduction methods.
5. Impart knowledge on Operation of AC voltage controller and various configurations.

**UNIT-1: POWER SEMI-CONDUCTOR DEVICES AND COMMUTATION CIRCUITS (9)**

Thyristors – Silicon Controlled Rectifier (SCR) – BJT – Power MOSFET – Power IGBT- DIAC- TRIAC and their characteristics – Basic theory of operation of SCR – Static characteristics –Dynamic characteristics of SCR - Turn on and Turn off times - Two transistor analogy – Series and parallel connections of SCR's – Snubber circuit details – SCR turn on methods – R and RC Triggering - UJT firing circuit - Ratings of SCR's.

**UNIT -2: PHASE CONTROLLED RECTIFIERS (9)**

Phase control technique – Single phase Line commutated converters – Midpoint, Bridge, and Semi controlled converters with R and RL loads–Derivation of average load voltage and current -Active and Reactive power inputs to the converters without and with Freewheeling Diode- Effect of source inductance. Three phase converters – Three pulse and six pulse converters – Full bridge connections -Average load voltage With R and RL loads – Effect of Source inductance–Dual converters (both single phase and three phase) – Waveforms.

**UNIT-3: CHOPPERS (9)**

Choppers – Time ratio control and Current limit control strategies – Step down choppers Derivation of load voltage and currents with R - RL and motor loads- Step up Chopper – Step up down Chopper –Chopper configurations-Chopper commutation-Morgan's chopper and Jones chopper (Principle of operation only). AC chopper.

**UNIT-4: INVERTERS (9)**

Inverters – Single phase inverter – Basic series inverter – Basic parallel Capacitor inverter- Bridge inverter – Waveforms –Mc Murray and Mc Murray Bedford inverters - Voltage control techniques for inverters-Pulse width modulation techniques. Three phase bridge VSI -180° and 120° mode of operation. Current source inverter. UPS basic configurations.



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**UNIT-5: AC VOLTAGE CONTROLLERS AND CYCLO CONVERTERS (9)**

AC voltage controllers – Single phase two SCR’s in anti parallel – With R and RL loads – modes of operation of Triac – Triac with R and RL loads – Derivation of RMS load voltage-current and power factor wave forms –Firing circuits Cyclo converters – Single phase mid-point cyclo converters with Resistive and inductive load (Principle of operation only) – Bridge configuration of single phase cyclo converter (Principle of operation only) – Waveforms.

**Total Hours: 45**

**COURSE OUTCOMES:**

On successful completion of the course, students will be able to		Pos & PSOs
<b>CO1</b>	Understand the concepts on power semiconductor devices.	PO1,PO3,PO4
<b>CO2</b>	Analyze phase controlled converters and corresponding drives.	PO1,PO2,PO3,PO4
<b>CO3</b>	Analyze DC-DC converters and corresponding drives.	PO1,PO2,PO3,PO4
<b>CO4</b>	Analyze inverters and corresponding drives.	PO1,PO2,PO3,PO4,PO5
<b>CO5</b>	Choose the converters for real time applications.	PO1,PO2,PO3,PO4

**TEXT BOOKS:**

1. M.H. Rashid, 'Power Electronics: Circuits, Devices and Applications', Pearson Education, Third Edition, New Delhi, 2004.
2. P.S.Bimbira "Power Electronics" Khanna Publishers, third Edition, 2003.
3. Ashfaq Ahmed 'Power Electronics for Technology', Pearson Education, Indian reprint, 2003.

**REFERENCE BOOKS:**

1. Joseph Vithayathil, 'Power Electronics, Principles and Applications', McGraw Hill Series, 6th Reprint, 2013.
2. Philip T. Krein, "Elements of Power Electronics" Oxford University Press, 2004 Edition.
3. L. Umanand, "Power Electronics Essentials and Applications", Wiley, 2010.
4. Ned Mohan Tore. M. Undel and, William. P. Robbins, 'Power Electronics: Converters, Applications and Design', John Wiley and sons, third edition, 2003.
5. S.Rama Reddy, 'Fundamentals of Power Electronics', Narosa Publications, 2014.

**REFERENCE WEBSITE LINK:**

<https://nptel.ac.in/courses/108/102/108102145/>

**CO-PO MAPPING:**

CO-PO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02
<b>CO1</b>	3	-	2	1	-	-	-	-	-	-	-	-	2	-
<b>CO2</b>	3	3	2	2	-	-	-	-	-	-	-	-	2	-
<b>CO3</b>	3	2	2	1	-	-	-	-	-	-	-	-	2	-
<b>CO4</b>	3	2	2	1	1	-	-	-	-	-	-	-	2	-
<b>CO5</b>	3	3	1	1	-	-	-	-	-	-	-	-	2	-
<b>CO*</b>	<b>3</b>	<b>2.5</b>	<b>1.8</b>	<b>1.2</b>	<b>1</b>								<b>2</b>	<b>-</b>



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
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**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**III B.Tech-V Semester**

**20EEE354A**

**DIGITAL CONTROL SYSTEM**  
**(Professional Elective Course-1)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**PRE-REQUISITES: A Course on Linear Control system**

**COURSE EDUCATIONAL OBJECTIVES:**

1. Provide the knowledge on sampling and reconstruction.
2. Offer the knowledge on Discrete time control and state space analysis
3. Afford the knowledge on controllability and observability.
4. Offer knowledge on design of state feedback controllers and observers.
5. Provide the knowledge on stability analysis.

**UNIT -1: SAMPLING AND RECONSTRUCTION & Z-TRANSFORMS (9)**

Introduction - Examples of Data control systems – Digital to Analog conversion and Analog to Digital conversion - sample and hold operations. Linear difference equations - pulse response - Z – transforms - Theorems of Z – Transforms - the inverse Z – transforms - Modified Z-Transforms - Z-Transform method for solving difference equations.

**UNIT -2: STATE SPACE ANALYSIS OF DISCRETE TIME CONTROL SYSTEM (9)**

Pulse transforms function - block diagram analysis of sampled – data systems - mapping between s-plane and z-plane. State Space Representation of discrete time systems - Pulse Transfer Function Matrix solving discrete time state space equations - State transition matrix and its Properties - Methods for Computation of State Transition Matrix - Discretization of continuous time state space equations.

**UNIT -3: CONTROLLABILITY AND OBSERVABILITY (9)**

Concepts of Controllability and Observability - Tests for controllability and Observability. Duality between Controllability and Observability - Controllability and Observability conditions for Pulse Transfer function.

**UNIT -4: STATE FEEDBACK CONTROLLERS AND OBSERVERS (9)**

Design of state feedback controller through pole placement – Necessary and sufficient conditions - Ackerman's formula. State Observers – Full order and Reduced order observers

**UNIT -5: STABILITY ANALYSIS (9)**

Mapping between the S-Plane and the Z-Plane – Primary strips and Complementary Strips – Constant frequency loci - Constant damping ratio loci - Stability Analysis of closed loop systems in the Z-Plane. Jury and stability test – Stability Analysis by use of the Bilinear Transformation and Routh stability criterion.

**TOTAL HOURS: 45**



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**COURSE OUTCOMES:**

<b>On successful completion of the course, students will be</b>		<b>Pos &amp; PSOs</b>
<b>CO1</b>	Able to analyze sampling and reconstruction	PO1,PO2,PO3
<b>CO2</b>	Able to analyze Discrete time control and state space analysis.	PO1,PO2,PO3
<b>CO3</b>	Able to identify controllability and observability of systems.	PO1,PO2
<b>CO4</b>	Able to design state feedback controllers and observers.	PO1,PO2,PO3,PO4,PO12
<b>CO5</b>	Able to evaluate stability of different systems.	PO1,PO3,PO4

**TEXTBOOKS:**

1. K. Ogata "Discrete-Time Control systems" - - Pearson Education/PHI - 2nd Edition
2. M.Gopal "Digital Control and State Variable Methods"- TMH

**REFERENCE BOOKS:**

1. Kuo "Digital Control Systems", Oxford University Press - 2nd Editions - 2003.
2. Richard C. Dorf and Robert H. Bishop, "Modern Control Systems" Prentice Hall, 12th edition, 2010.
3. John J.D., Azzo Constantine, H. and Houpis Stuart, N Sheldon, "Linear Control System Analysis and Design with MATLAB", CRC Taylor& Francis Reprint 2009.
4. Rames C.Panda and T. Thyagarajan, "An Introduction to Process Modelling Identification and Control of Engineers", Narosa Publishing House, 2017.

**REFERENCE WEBSITE:**

1. NPTEL Video Lecture Notes on "Control Engineering "by Prof. S. D. Agashe, IIT Bombay.
2. <https://nptel.ac.in/courses/108/103/108103008/>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>	3	3	2	-	-	-	-	-	-	-	-	-	2	-
<b>CO2</b>	3	3	2	-	-	-	-	-	-	-	-	-	2	-
<b>CO3</b>	3	3	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO4</b>	3	3	2	2	-	-	-	-	-	-	-	3	2	-
<b>CO5</b>	3	-	2	2	-	-	-	-	-	-	-	-	2	-
<b>CO*</b>	2.4	<b>3</b>	<b>2</b>	<b>2</b>	-	-	-	-	-	-	-	3	<b>2</b>	-



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
**(AUTONOMOUS)**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**III B.Tech-V Semester**

**20EEE354B**

**SWITCHGEAR AND PROTECTION**  
**(Professional Elective Course-1)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**PRE-REQUISITES:** A Course on Electrical Power Generation and Transmission

**COURSE EDUCATIONAL OBJECTIVES:**

1. Provide the basic principles and operation of various types of circuit breakers.
2. Study the classification, operation of different types of Electromagnetic Protective Relays.
3. Instruct the ideas on protective schemes, for generator and transformers.
4. Impart knowledge of various protective schemes used for feeders and bus bars.
5. Instruct the ideas on the principle and operation of different types of static relays.

**UNIT -1: CIRCUIT BREAKERS**

**(9)**

Elementary principles of arc interruption –Restriking voltage & Recovery voltage – Rate of rise of recovery voltage –Numerical problems– Resistance switching– Current chopping - interruption of capacitive current’s Specifications and Ratings –Auto reclosures - Types of Circuit Breakers – Air blast– Air break– Minimum oil- SF6 and Vacuum circuit breakers – Comparative merits of different circuit breakers – Testing of circuit breakers.

**UNIT -2: RELAYS**

**(9)**

Basic Requirements of Relays – Primary and Backup protection – Construction details of attracted armature –Balanced beam –Induction type and differential relays – Universal Torque equation – Characteristics of over current, Direction and distance relays. Static Relays –Types – Comparators – Amplitude and Phase comparators - Microprocessor based relays – Block diagram for over current (Definite, Inverse and IDMT) and Distance Relays and their Flow Charts.

**UNIT -3: GENERATOR PROTECTION AND TRANSFORMER PROTECTION**

**(9)**

Protection of generators against Stator faults – Rotor faults and Abnormal Conditions - Restricted Earth fault and Inter-turn fault Protection - Numerical Problems on % Winding Unprotected - Protection of transformers –Percentage Differential Protection –Numerical Problem on Design of CT Ratios – Buchholtz relay Protection.

**UNIT -4: PROTECTION OF FEEDER AND TRANSMISSION LINES**

**(9)**

Principles and need for protective schemes –nature and causes of faults- Types of faults -Zones of protection and essential qualities of protection – Protection schemes-Protection of Feeder (Radial & Ring main) using over current Relays - Protection of Transmission line – 3 Zone protections are using Distance Relays. Carrier current protection-Protection of Bus bars.



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.  
(AUTONOMOUS)  
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**UNIT -5: PROTECTION AGAINST OVER VOLTAGES AND EARTHING (9)**

Protection Against Over Voltages -Generation of Over Voltages in Power Systems-  
Protection against Lightning Over Voltages -Valve type and Zinc- Oxide Lighting Arresters  
- Insulation Coordination -BIL. Power system Earthing -Method of Neutral Earthing.

**Total Hours: 45**

**COURSE OUTCOMES:**

<b>On successful completion of the course, students will be able to</b>		<b>Pos &amp; PSOs</b>
<b>CO1</b>	Understand the principles of arc interruption for application to high voltage circuit breakers of air, oil, vacuum, SF6 gas type.	<b>PO1</b>
<b>CO2</b>	Understand the working principle and operation of different types of electromagnetic protective relays.	<b>PO1</b>
<b>CO3</b>	Acquire knowledge of faults and protective schemes for high power generator and transformers.	<b>PO1</b>
<b>CO4</b>	Improves the ability to understand various types of protective schemes used for feeders and bus bar protection.	<b>PO1,PO2,PO3,P O4</b>
<b>CO5</b>	Understand different types of static relays and their applications.	<b>PO1</b>

**TEXT BOOKS:**

1. Sunil S Rao "Switchgear and Protection", Khanna Publishers - New Delhi, 10/e 2009
2. Badri Ram and D.N Viswakarma "Power System Protection and Switchgear", , Tata McGraw - Hill Education Pvt. Ltd. Noida, 1/e 2007 ,
3. J. B. Gupta "Switch Gear Protection", S. K. Kataria and Sons - New Delhi, 1/e 2009.

**REFERENCE BOOKS:**

1. M.L.Soni, P.V.Gupta, V.S.Bhatnagar and A. Chakrabarti "A Text Book on Power System Engineering", Dhanpat Rai and Co - New Delhi, 1/e 1998
2. Y. G. Paithankar and S. R. Bhide "Fundamentals of Power System Protection", PHI Learning Pvt Ltd - New Delhi, 2/e 2010,
3. B. Ravindranath, M. Chander "Power System Protection & Switch Gear" New Age International Pvt .Ltd - New Delhi, 1/e 1977 ( Reprint 2005)
4. U. A. Bakshi and M. V. Bakshi "Protection & Switch Gear" Technical Publications - Pune, 4/e 2009.

**REFERENCE WEBSITE LINK:**

<https://nptel.ac.in/courses/108/107/108107167/>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>	3	-	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO2</b>	2	-	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO3</b>	3	-	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO4</b>	1	1	3	3	-	-	-	-	-	-	-	-	2	-
<b>CO5</b>	2	-	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO*</b>	<b>2.2</b>	<b>1</b>	<b>3</b>	<b>3</b>	-								<b>2</b>	<b>-</b>



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
**(AUTONOMOUS)**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**III B.Tech-V Semester**

<b>20EEE354C</b>	<b>NONCONVENTIONAL ENERGY SOURCES</b> <b>(Professional Elective Course-1)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**PRE-REQUISITES: A Course on Generation of Electrical Power**

**COURSE EDUCATIONAL OBJECTIVES:**

1. Demonstrate knowledge on solar energy plants  
Study various Wind Energy Conversion System and location of site selection
2. for Wind Energy Conversion System
3. Evaluate the economic aspects and operation of Bio mass Energy systems.
4. Estimate potential and conversion techniques of Geothermal energy systems
5. Estimate potential and conversion techniques of Tidal energy and wave energy system.

**UNIT -1: SOLAR RADIATION AND ITS MEASUREMENTS (9)**

Introduction, solar constant ,solar radiation at the earth surface, solar radiation geometry, solar radiation measurements, solar radiation data, estimation of average solar radiation, solar radiation on titled surface, solar applications: solar thermal electric conversion, solar electric power generation

**UNIT -2: WIND ENERGY (9)**

Basic principles of wind energy conversion, Site Selection Considerations, Basic Components of a Wind Energy Conversion System, Schemes for Electric Generation using Synchronous Generator and Induction Generator, Wind energy Storage

**UNIT -3: BIO MASS ENERGY (9)**

Bio-mass Principles of Bio-Conversion Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C .Engineoperation and economic aspects

**UNIT -4: GEOTHERMAL ENERGY (9)**

Introduction, geothermal sources: hydro thermal convective resources,geo pressurized resources hot dry rock resources, magma resources ,potential in India.

**OCEAN ENERGY:** OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles

**UNIT -5: TIDAL ENERGY (9)**

Introduction ,basic principles of tidal power ,components of tidal power plant, operation methods of utilization of tidal energy ,estimation of energy and power in a single basin and double basin tidal system.

**Wave Energy:** Energy and power from the wave, wave energy conversion devices, mini-hydel power plants, and their economics.

**Total Hours:45**



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**COURSE OUTCOMES:**

<b>On successful completion of the course, students will be able to</b>		<b>Pos &amp; PSOs</b>
<b>CO1</b>	Demonstrate knowledge on solar energy plants	<b>PO1,PO2,PO3,PO12</b>
<b>CO2</b>	Study various Wind Energy Conversion System	<b>PO1,PO2,PO3,PO12</b>
<b>CO3</b>	Evaluate the economic aspects and operation of Bio mass Energy systems	<b>PO1,PO2,PO3,PO12</b>
<b>CO4</b>	Estimate potential and conversion techniques of Geothermal energy and ocean energy systems	<b>PO1,PO2,PO3,PO12</b>
<b>CO5</b>	Estimate potential and conversion techniques of Tidal energy and wave energy systems.	<b>PO1,PO2,PO3,PO12</b>

**TEXTBOOKS:**

1. G.D. Rai "Non-Conventional Energy Sources"Khanna Publishers
2. Twidell & Wier, Renewable Energy Resources –CRC Press( Taylor & Francis)

**REFERENCE BOOKS:**

1. Renewable energy resources by Tiwari and Ghosal, Narosa.
2. Renewable Energy Technologies by Ramesh & Kumar, Narosa.
3. Non-Conventional Energy Systems by K Mittal, Wheeler
4. Renewable energy sources and emerging technologies by D.P.Kothari,K.C.Singhal, PHI.

**REFERENCE WEBSITE LINK:**

<https://nptel.ac.in/courses/121/106/121106014/>

**CO-PO MAPPING:**

<b>CO-PO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>	<b>PS01</b>	<b>PS02</b>
<b>CO1</b>	3	3	2	-	-	-	-	-	-	-	-	2	2	-
<b>CO2</b>	3	3	2	-	-	-	-	-	-	-	-	2	2	-
<b>CO3</b>	3	3	2	-	-	-	-	-	-	-	-	2	2	-
<b>CO4</b>	3	3	2	-	-	-	-	-	-	-	-	2	2	-
<b>CO5</b>	3	3	2	-	-	-	-	-	-	-	-	2	2	-
<b>CO*</b>	3	3	2	-	-							2	2	-



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
**(AUTONOMOUS)**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**III B.TECH. - V SEMESTER**

**200CIV351**

**AIR POLLUTION AND CONTROL**  
(OPEN ELECTIVE – 1)

**L T P C**  
**3 - - 3**

**PRE-REQUISITES:** A Course on Environmental Studies and Engineering

**COURSE OUTCOMES:**

1. To provide knowledge about the various sources of Air pollution and its effects on human beings , Vegetation and Materials.
2. To Analyze The various air pollutant dispersion models
3. To provide knowledge about control methods and details of control equipments
4. To demonstrate Various sources of Noise pollution and control measures
5. To Identify the major sources of noise pollution, effects and control measures

**UNIT -1: SOURCES AND EFFECTS OF AIR POLLUTANTS (9)**

Air Pollution – Definitions, Scope- Significance and Episodes- Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary- point and Nonpoint- Line and Areal Sources of air pollution- stationary and mobile sources. Effects of Air pollutants on man-material and vegetation- Global effects of air pollution – Green House effect- Heat Islands- Acid Rains- Ozone Holes etc. Lapse Rates- Pressure Systems- Winds and moisture plume behavior and plume Rise Models- Gaussian Model for Plume Dispersion

**UNIT -2: DISPERSION OF POLLUTANTS (9)**

Thermodynamics and Kinetics of Air-pollution – Applications in the removal of gases like SO<sub>x</sub>; NO<sub>x</sub>; CO; HC etc., air-fuel ratio- Computation and Control of products of combustion- Meteorology and plume Dispersion- properties of atmosphere- Heat- Pressure- Wind forces- Moisture and relative Humidity- Influence of Meteorological phenomena on Air Quality wind rose diagrams.

**UNIT -3: AIR POLLUTION CONTROL (9)**

Concepts of control – Principles and design of control measures – Particulates control by gravitational, centrifugal, filtration, scrubbing, electrostatic precipitation – Selection criteria for equipment – gaseous pollutant control by adsorption, absorption, condensation, combustion – Pollution control for specific major industries.

**UNIT -4 : AIR QUALITY MANAGEMENT (9)**

Air quality standards – Air quality monitoring – Preventive measures – Air pollution control efforts – Zoning – Town planning regulation of new industries – Legislation and enforcement

**UNIT -5: NOISE POLLUTION (9)**

Introduction -Sources of noise pollution – Effects – Assessment – Standards – Control methods – Prevention- Environmental Impact Assessment and Air quality.

**TOTAL HOURS: 45**



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
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**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE OUTCOMES:**

<b>On successful completion of the course the student will be able to,</b>		<b>Pos &amp; PSOs</b>
<b>CO 1</b>	Identify the major sources of air pollution and understand their effects on health and environment.	<b>PO1, PO7</b>
<b>CO 2</b>	Evaluate the dispersion of air pollutants in the atmosphere and to develop air quality models	<b>PO2, PO3</b>
<b>CO 3</b>	Design the control techniques for particulate and gaseous emissions	<b>PO3, PO1</b>
<b>CO 4</b>	Understand the standards of air quality and legal framework	<b>PO1, PO6</b>
<b>CO 5</b>	Identify the major sources of noise pollution, effects and control measures	<b>PO1, PO7</b>

**TEXTBOOKS:**

1. M. N. Rao and H. V. N. Rao, "Air pollution", - Tata McGraw Hill Company.
2. K.V.S.G. Murali Krishna, "Air pollution and control", Kaushal Publishers.

**REFERENCE BOOKS:**

1. S.Padmanabha Murthy, "Environmental meteorology", I.K.International Pvt Ltd, New Delhi.
2. BSN.Raju, Fundamentals of air pollution, Oxford and IBH Publishers, India.

**REFERENCE WEBSITES:**

<https://nptel.ac.in/courses/105/102/105102089>/<https://nptel.ac.in/courses/105/104/105104099/>

**CO-PO MAPPING:**

<b>CO-PO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO1</b>	<b>PSO2</b>
<b>C01</b>	2			-	-	-	2	-	-	-	-	-	2	-
<b>C02</b>	-	2	2	-	-	-	-	-	-	-	-	-	2	-
<b>C03</b>	2		2	-	-	-	-	-	-	-	-	-	2	-
<b>C04</b>	1			-	-	3	-	-	-	-	-	-	2	-
<b>C05</b>	2			-	-	-	2	-	-	-	-	-	2	-
<b>CO*</b>	<b>1.75</b>	<b>2</b>	<b>2</b>	-	-	3	2	-	-	-	-	-	<b>2</b>	<b>-</b>



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
**(AUTONOMOUS)**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

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

**200MEC351**

**INDUSTRIAL ROBOTICS**  
(OPEN ELECTIVE - 1)

**L T P C**  
**3 - - 3**

**PRE-REQUISITES:**NIL

**COURSE EDUCATIONAL OBJECTIVES:**

1. To know the robot drive systems and internal grippers and external grippers
2. To understand the image processing and analysis of image data
3. 3. To learn Robot motion analysis and control.
4. 4. To study the robot language structure and programming
5. 5. To explain the various applications of robots in industry

**UNIT-1: FUNDAMENTALS OF ROBOTIC TECHNOLOGY AND DRIVE SYSTEM (9)**

Robot anatomy, configuration and motions – Robot specifications – Pitch, yaw, roll, joint notations, speed of motion, pay load – Work volume. Robot Drive System: Pneumatic, hydraulic drives, mechanical and electrical drives – Servo motors and stepper motor. Grippers: Mechanical, pneumatic and hydraulic grippers, magnetic grippers and vacuum grippers – Two fingered and three fingered grippers – Internal and external grippers.

**UNIT-2: ROBOT SENSORS AND MACHINE VISION (9)**

**Robot Sensors:** Position of sensors – Range sensors – Proximity sensors – Touch sensors – Wrist sensors – Compliance sensors – Slip sensors. **Machine Vision:** Camera – Frame grabber – Sensing and digitizing image data – Signal conversion – Image storage and lighting techniques – Image processing and analysis – Data reduction – Edge detection – Segmentation feature extraction – Object recognition.

**UNIT-3: ROBOT MOTION ANALYSIS AND CONTROL (9)**

**Robot Kinematics:** Manipulator kinematics –Position representation – Forward and reverse transformation – Adding orientation – Homogeneous transformations – D-H notation – Forward and inverse kinematics. **Robot Dynamics:** Differential transformation – Compensating for gravity – Robot arm dynamics. **Trajectory Planning:** Trajectory planning and avoidance of obstacles – Path planning – Skew motion – Joint integrated motion – Straight line motion.

**UNIT-4: ROBOT PROGRAMMING (9)**

**Robot Programming:** Lead through programming – Robot language structure – Motion commands of move, speed control, workplace, path, frames, end effector operation, sensor operation and react statement – Program sequence and subroutine – Teach pendant programming – VAL II programming.

**UNIT-5: ROBOT APPLICATIONS AND IMPLEMENTATION PRINCIPLES (9)**

**Robot Applications:** Material transfer and machine loading / unloading – Processing applications in spray coating – Assembly and inspection automation – Future applications of robot in mines, under water and space. **Implementation Principles:** Selection of robots in industry applications – Economic analysis of the robot.

**Total Hours:45**



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**COURSE OUTCOMES:**

On successful completion of the course, students will be able to		Pos & PSOs
<b>CO1</b>	Understand the robot drive systems and internal grippers and external grippers.	<b>PO1,PO2</b>
<b>CO2</b>	Recognize the image data and analysis the image processing	<b>PO1,PO2</b>
<b>CO3</b>	Understand the basic concepts of robot motion and analysis	<b>PO1,PO2, PO3,PO4</b>
<b>CO4</b>	Know the robot language structure and robot programming.	<b>PO1,PO2,PO4, PO3, PO5</b>
<b>CO5</b>	Explain the applications of robots in industries and Safety considerations in workplace	<b>PO1,PO2,PO3,PO 4,PO5,PO6</b>

**TEXT BOOKS:**

1. Mikell P Groover, Mitchell Weiss, Roger N. Nagel, Nicholas G Odrey and Ashish Dutta, "Industrial Robotics: Technology, Programming and Applications", Tata McGraw-Hill Education Pvt. Ltd, 2/e, 2012.
2. K.S. Fu, R.C.Gonzales and C.S.G.Lee, "Robotics: Control, Sensing, Vision and Intelligence", Tata McGraw-Hill Education Pvt. Ltd., Noida ,1/e, 2008,.

**REFERENCE BOOKS:**

1. Introduction to Robotics: Analysis, Control, Applications, 3/e, 2020, Saeed B.Niku, Wiley India Pvt, Ltd., New Delhi.
2. Introduction to Robotics: Mechanics and Control, John J. Craig, 3/e, 2008, Pearson Education, New Delhi.
3. Robotics: Fundamental Concepts and Analysis, Ashitava Ghosal, 1/e, 2006, Oxford University Press, New Delhi.
4. Robotics Technology and Flexible Automation, S.R.Deb and Sankha Deb, 2/e, 2010, Tata McGraw-Hill Education Pvt. Ltd., Noida.

**REFERENCE WEBSITE:**

1. <https://nptel.ac.in/courses/107106090>
2. <https://nptel.ac.in/courses/112107289>
3. <https://nptel.ac.in/courses/112108093>
4. <https://nptel.ac.in/courses/112104298>
5. <https://nptel.ac.in/courses/112101099>

**CO – PO MAPPING:**

CO-PO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02
<b>CO1</b>	3	1	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO2</b>	3	1	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO3</b>	3	1	1	1	-	-	-	-	-	-	-	-	2	-
<b>CO4</b>	3	1	1	1	1	-	-	-	-	-	-	-	2	-
<b>CO5</b>	3	1	1	1	1	1	-	-	-	-	-	-	2	-
<b>CO*</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	-	-	-	-	-	-	<b>2</b>	<b>-</b>



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**

**(AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

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

**200ECE351**

**AUTOMOTIVE ELECTRONICS**  
(Open Elective – 1)

**L T P C**  
**3 - - 3**

**PRE-REQUISITES:** NIL

**COURSE EDUCATIONAL OBJECTIVES:**

1. To provide knowledge on basics of automotive electronics in vehicle system
2. To comprehend the working principles of sensors and actuators in automobiles
3. To develop skills on engine control and management systems
4. To study various automotive vehicle management systems in automobiles.
5. To gain knowledge on various communication protocols in vehicles.

**UNIT –1: INTRODUCTION TO VEHICLE SYSTEM & AUTOMOTIVE ELECTRONICS (9)**

Evolution and Need of Automotive electronics, Need of electronics in engine and chassis systems, Fuel Injection system engine, braking and steering systems, Need of Electronic Control Unit (ECU) in vehicle system, Components of ECU, Inputs and Outputs of ECU, Control of Vehicle systems using ECU.

**UNIT –2: AUTOMOTIVE SENSORS AND ACTUATORS (9)**

Speed sensors, Pressure sensors: Manifold Absolute Pressure sensor, Temperature sensors: Coolant and Exhaust gas temperature, Position sensors: Throttle Position sensor, accelerator pedal Position sensor and crankshaft Position sensor, Air mass flow sensor. Solenoids, stepper motors and relays

**UNIT –3: ELECTRONIC ENGINE MANAGEMENT SYSTEM (9)**

Electronic engine control: Input, output and control strategies, electronic fuel control system, fuel control modes: open loop and closed loop control at various modes, EGR control, Electronic ignition systems. Starting and charging system.

**UNIT –4: ELECTRONIC VEHICLE MANAGEMENT SYSTEM (9)**

Antilock braking system, electronic suspension system, electronic steering control, traction, Transmission control, Safety: Airbags, collision avoiding system, low tire pressure warning system

**UNIT –5: EMBEDDED SYSTEM COMMUNICATION PROTOCOLS (9)**

Introduction to control networking – Communication protocols in embedded systems – SPI, I2C, USB – Vehicle communication protocols – Introduction to CAN, LIN, FLEXRAY, MOST, KWP2000.

**Total Hours: 45**







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**COURSE OUTCOME:**

<b>On successful completion of the course, students will be able to</b>		<b>Pos &amp; PSOs</b>
<b>CO1</b>	Demonstrate knowledge on Data models and Data base Languages and Design Entity Relationship model for a database	PO1,PO3
<b>CO2</b>	Analyze the relational database theory, and be able to write relational algebra and relational calculus expressions for queries.	PO1,PO2
<b>CO3</b>	Analyze and evaluate the databases using SQL DML/DDL Commands	PO1, PO2, PO3, PO5
<b>CO4</b>	Analyze databases using normal forms to provide solutions for real time applications.	PO1,PO2
<b>CO5</b>	Understand the properties of transactions in a database system, Analyze concurrency control techniques for handling concurrent transactions and understand recovery of data from failures	PO1,PO3,PO4

**TEXTBOOKS:**

1. Henry F.Korth, Silberchatz, Sudarshan, Tata McGraw-Hill, "Database System Concepts", 5/e, NewYork, 2006.
2. Raghu Rama Krishnan, " Database Management System", Tata McGraw Hill, 2/e, NewYork, 2000.

**REFERENCEBOOKS:**

1. Fundamentals of Database Systems, Elmasri, Navathe, Pearson Education, USA, 5/e, 2008.
2. Database Management Systems, Peter Rob, A.Ananda Rao and Carlos Coronel, Cengage Learning, USA, 5/e,2003.
3. SQL, PL/SQL Programming, Ivan Bayross, BPB Publications, New Delhi, India, 2/e,2011.
4. Introduction to Database Systems, C.J.Date, Pearson Education, USA, 8/e, 2004.
5. Fundamentals of Database Management Systems, M.L.Gillenson, Wiley, New Delhi, India, 1/e,2006.

**CO-POMAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>C01</b>	3	2	-	-	-	-	-	-	-	-	-	-	2	-
<b>C02</b>	2	-	3	3	-	-	-	-	-	-	-	-	2	-
<b>C03</b>	2	2	3	-	-	-	-	-	-	-	-	-	2	-
<b>C04</b>	2	2	-	3	-	-	-	-	-	-	-	-	2	-
<b>C05</b>	3	-	-	2	-	-	-	-	-	-	-	-	2	-
<b>CO*</b>	<b>2.4</b>	<b>2</b>	<b>3</b>	<b>2.5</b>	-	-	-	-	-	-	-	-	<b>2</b>	<b>-</b>



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
**(AUTONOMOUS)**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

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

**200HSM351**

**GRAPH THEORY WITH APPLICATIONS**  
**(OPEN ELECTIVE - 1)**

**L T P C**  
**3 - - 3**

**PRE-REQUIEST:** NIL

**COURSE EDUCATIONAL OBJECTIVES:**

1. To learn the representation of graphs and understanding the Graph Isomorphism, Sub graph-Vertex degrees, Walk, Paths, Cycles-graph connection, Bipartite graphs.
2. To understand the Trees concepts, digraphs, binary relations, Shortest path algorithms and to familiarize the knowledge of graph theory
3. To understand the matrix representation of graphs, designing incidence matrix, Adjacency matrix and circuit matrix
4. To explore the use of graphs in various applications in Switching and Coding Theory
5. To identify the important graph based real time applications of electrical networks such as RLC Networks with Independent sources, LOOP circuits

**UNIT – 1: GRAPH THEORY INTRODUCTION**

**(9)**

Graph and simple graphs (Complete graphs, Complement of graph)- Graph isomorphism-Sub graph- Vertex degrees, walk, paths, cycles-graph connection and components-Bipartite graphs.

**UNIT – 2: DIRECTED GRAPHS AND SHORTEST PATH ALGORITHMS**

**(9)**

Trees – Cut edges- Cut vertices-Blocks , Directed graphs types of directed graphs - digraphs and binary relations – directed paths and connectedness - Dijkstra’s shortest path algorithm, Floyd-Wars hall shortest path algorithm

**UNIT – 3: MATRIX REPRESENTATION OF GRAPHS**

**(9)**

Introduction - Adjacency matrix -Applications of Adjacency matrix-sufficient condition for isomorphism of graphs-power of an adjacency matrix-Adjacency matrix of a digraph-incidence matrix-circuit matrix-cut set matrix.

**UNIT - 4: GRAPHS IN SWITCHING AND CODING THEORY**

**(9)**

Contact Networks – Analysis of Contact Networks – Synthesis of Contact Networks – Sequential Switching Networks – Unit Cube and its Graph – Graphs in Coding Theory.

**UNIT – 5: ELECTRICAL NETWORK ANALYSIS BY GRAPH THEORY**

**(9)**

Introduction - Kirchhoff’s current and Voltage laws-Loop currents and Node Voltages- RLC Networks with Independent sources: Nodal analysis, Loop analysis.

**TOTAL HOURS: 45**



**COURSE OUTCOMES:**

<b>On successful completion of the course, students will be able to</b>		<b>Pos &amp; PSOs</b>
<b>CO1</b>	Demonstrate knowledge in reading and writing rigorous mathematical proofs involving introductory aspects of graphs and develop analytical skills in solving graph theoretic problems	PO1,PO2,PO3 PO4
<b>CO2</b>	Demonstrate knowledge in Trees concepts, digraphs, binary relations, and Develop analytical skills in solving problems involving directed graphs and shortest path algorithm	PO1,PO2,PO3 PO4
<b>CO3</b>	Demonstrate knowledge in matrix representation of graphs, designing incidence matrix, Adjacency matrix and circuit matrix and explore analytical skills in solving problems involving adjacency matrix and incidence matrix	PO1,PO2,PO3 PO4
<b>CO4</b>	Demonstrate knowledge in significant practical applications of graphs in Switching and Coding Theory; explore analytical skills in solving practical problems using graph theory concepts and Develop skills in designing Mathematical models for real time applications in coding theory.	PO1,PO2,PO3 PO4
<b>CO5</b>	Demonstrate knowledge in significant real time applications of electrical networks such as RLC Networks Independent sources; explore analytical skills in solving practical problems involving using graph theory concepts and Develop skills in designing Mathematical models for real time electrical networks.	PO1,PO2,PO3 PO4

**TEXT BOOKS:**

1. J.P.Trimblay and R.Manohar ,“Discrete mathematical structures with applications to computer science”, 27/e, Tata Mc Graw Hill Publications , 2006, New Delhi.
2. NarasinghDeo,“Graph Theory with applications to engineering and computer Science”, 25/e, Printice – Hall of India Private Limited, 2003, New Delhi

**REFERENCES:**

1. Clark J. And Holton D.A., “ A first look at Graph theory”, Allied Publishers, 199
2. R.B.Bapat , Graphs and Matrices, Springer, London Dordrecht Heidelberg, New York, 2010 .
3. Gary Haggard John Schlipf, Sue Whitesides, “Discrete Mathematics for Computer Science”, 4/e, 2007, Thomson Publication, 2008, New Delhi.
4. S.D Sharma , “Operation Research”, KedarNath Ram Nath & Co, Meerut . 2007.
5. J.A.Bonday and U.S.R. Murthy, “Graph Theory with application” , North Holland, 1976 .

**REFERENCE WEBSITE:**

1. [https://onlinecourses.nptel.ac.in/noc21\\_cs48/preview](https://onlinecourses.nptel.ac.in/noc21_cs48/preview)

**CO-PO MAPPING:**

<b>CO-PO</b>	<b>P01</b>	<b>P02</b>	<b>P03</b>	<b>P04</b>	<b>P05</b>	<b>P06</b>	<b>P07</b>	<b>P08</b>	<b>P09</b>	<b>P010</b>	<b>P011</b>	<b>P012</b>	<b>PS01</b>	<b>PS02</b>
<b>C01</b>	3	3	3	2	-	-	-	-	-	-	-	-	2	-
<b>C02</b>	3	3	3	2	-	-	-	-	-	-	-	-	2	-
<b>C03</b>	3	3	3	2	-	-	-	-	-	-	-	-	2	-
<b>C04</b>	3	3	3	2	-	-	-	-	-	-	-	-	2	-
<b>C05</b>	3	3	3	2	-	-	-	-	-	-	-	-	2	-
<b>CO*</b>	<b>3</b>	<b>3</b>	<b>3</b>	2	-	-	-	-	-	-	-	-	<b>2</b>	<b>-</b>



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
**(AUTONOMOUS)**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**III B.Tech-V Semester**

**20ECE359**

**CIRCUIT DESIGN AND APPLICATIONS**  
**(Skill oriented Course)**

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

**COURSE EDUCATIONAL OBJECTIVES:**

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

- 1 Introduce the basic building blocks of linear integrated circuits
- 2 Teach the linear and non - linear applications of operational amplifiers.
- 3 Teach the theory of ADC and DAC
- 4 Introduce the theory and applications of analog multipliers and PLL
- 5 Introduce the concepts of waveform generation and introduce some special function ICs

**Tutorial:**

Detail Circuit Discussion about Types of Amplifier circuits- Inverting and Non-inverting amplifier- OP AMP Applications- Integrator and Differentiator Circuits- Clippers- clampers- IC 555 Timer - Monostable Operation Circuit - IC 555 Timer - Astable Operation Circuit- voltage Regulators.

**List of Demo/ Experiments**

1. Study of IC classifications
2. OP AMP Applications - Adder, Subtractor, Comparator Circuits.
3. Design of Inverting and Noninverting amplifier
4. Integrator and Differentiator Circuits using IC 741.
5. Non Linear Wave Shaping – Clippers
6. Non linear wave shaping- clampers
7. 4 bit DAC using OP AMP(R-2R ladder type DAC)
8. IC 555 Timer - Monostable Operation Circuit.
9. IC 555 Timer - Astable Operation Circuit
10. Three Terminal Voltage Regulators - 7805, 7809, 7912.

**Total Hours: 30**

**COURSE OUTCOMES:**

<b>On successful completion of the course, students will be able to</b>		<b>Pos &amp; PSOs</b>
<b>CO1</b>	Understand introduce the basic building blocks of linear integrated circuits.	PO1,PO2, PO3
<b>CO2</b>	Remember the linear and non - linear applications of operational amplifiers.	PO1,PO2, PO3, PO4
<b>CO3</b>	Remember the theory of ADC and DAC.	PO1,PO2, PO3, PO4
<b>CO4</b>	Remember the theory of analog multipliers and PLL and analyze its applications.	PO1,PO2, PO3, PO4
<b>CO5</b>	Understand the concepts of waveform generation and introduce some special function ICs	PO1,PO2, PO3, PO4

**TEXT BOOKS:**

1. Op-Amps & Linear ICs, 4th Edition, 1987,Ramakanth A. Gayakwad, PHI, New Delhi.
2. Linear Integrated Circuits, 2<sup>nd</sup> Edition, 2003, D. Roy Chowdhury, New Age International (P) Ltd, Mumbai.



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**REFERENCES BOOKS:**

1. Design with Operational Amplifiers & Analog Integrated Circuits, 3rd Edition.- 2002, Sergio Franco, McGraw Hill, New Delhi.
2. Linear IC and Applications, 1st Edition, 2005, U.A. Bakshi and A.P. Godse, Technical Publications, Pune.

**REFERENCES WEBSITE:**

<https://nptel.ac.in/courses/108/108/108108111/>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
C01	3	2	3	-	-	-	-	-	-	-	-	-	2	-
C02	2	3	3	3	-	-	-	-	-	-	-	-	2	-
C03	3	2	3	3	-	-	-	-	-	-	-	-	2	-
C04	3	2	3	3	-	-	-	-	-	-	-	-	2	-
C05	3	2	3	3	-	-	-	-	-	-	-	-	2	-
C0*	<b>3</b>	<b>2.2</b>	<b>3</b>	<b>3</b>	-	-	-	-	-	-	-	-	<b>2</b>	<b>-</b>



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**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**III B.Tech-V Semester**

**20EEE355**

**ELECTRICAL MACHINES-II LAB**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**COURSE EDUCATIONAL OBJECTIVES:**

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

- 1** Provide practical experience for the determination of efficiency of transformers.
- 2** Evaluate the regulation of alternators by conducting suitable tests.
- 3** Analyze the performance characteristics of induction motors
- 4** Obtain the equivalent circuit parameters of transformers and induction motors.
- 5** Determine various losses of AC machines by conducting suitable tests.

**Any Ten of the following experiments are required to be conducted**

1. Open circuit and short circuit tests on single phase transformer
2. Sumpner's test on transformers
3. Regulation of three phase alternator by EMF and MMF methods
4. Determination of Sub-Transient Reactance of Salient Pole Synchronous Machine
5. V and inverted v curves of three phase synchronous motor.
6. No load and blocked rotor test on single-phase induction motor.
7. Brake test on three-phase induction motor.
8. No load and blocked rotor test on three-phase induction motor.
9. Parallel operation of single-phase transformer
10. Scott Connection of transformer
11. Separation of no-load losses in single phase transformer
12. Regulation of three phase alternator by ZPF and ASA methods
13. Load test on single-phase transformer and three phase transformer connections



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**COURSE OUTCOMES:**

<b>On successful completion of the course, students will be able to</b>		<b>Pos &amp; PSOs</b>
<b>C01</b>	Demonstrate knowledge on various parts of AC machine.	<b>PO1</b>
<b>C02</b>	Analyze the performance of various AC machines.	<b>PO2</b>
<b>C03</b>	Determine various losses of AC machines by conducting suitable test	<b>PO4</b>
<b>C04</b>	Select appropriate design tools and procedure to evaluate performance of AC machines	<b>PO5</b>
<b>C05</b>	Follow ethical principles to evaluate performance of AC machines.	<b>PO8</b>
<b>C06</b>	Do experiments effectively as an individual and as a member in a Group.	<b>PO9</b>
<b>C07</b>	Communicate verbally and in written form, the understandings about the experiments.	<b>PO10</b>
<b>C08</b>	Continue updating their skill related to electronic devices and their applications during their life time	<b>PO12</b>

**REFERENCES:**

1. P.S. Bimbhra, 'Electrical Machinery', Khanna Publishers, 2003.
2. D.P. Kothari and I.J. Nagrath, 'Electric Machines', Tata McGraw Hill Publishing Company Ltd, 2002.

**REFERENCE WEBSITE LINK:**

<https://nptel.ac.in/courses/108/105/108105017/>

**CO-PO MAPPING:**

<b>CO-PO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO1</b>	<b>PSO2</b>
<b>C01</b>	3	-	-	-	-	-	-	-	-	-	-	-	2	-
<b>C02</b>	-	3	-	-	-	-	-	-	-	-	-	-	2	-
<b>C03</b>	-	-	-	3	-	-	-	-	-	-	-	-	2	-
<b>C04</b>	-	-	-	-	3	-	-	-	-	-	-	-	2	-
<b>C05</b>	-	-	-	-	-	-	-	3	-	-	-	-	2	-
<b>C06</b>	-	-	-	-	-	-	-	-	3	-	-	-	2	-
<b>C07</b>	-	-	-	-	-	-	-	-	-	3	-	-	2	-
<b>C08</b>	-	-	-	-	-	-	-	-	-	-	-	3	2	-
<b>CO*</b>	<b>3</b>	<b>3</b>		<b>3</b>	<b>3</b>			<b>3</b>	<b>3</b>	<b>3</b>		<b>3</b>	<b>2</b>	



**COURSE EDUCATIONAL OBJECTIVES:**

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

1. Demonstrate knowledge on operation and characteristics of power semiconductor Devices.
2. Design different triggering and commutation circuits for SCR.
3. Analyze physical variations of various power electronic converters
4. Evaluate and compare various parameters from the operation of converters
5. Design and simulate different power electronic circuits using MATLAB

**Any Ten of the following experiments are required to be conducted**

1. Study of Characteristics of SCR- MOSFET& IGBT
2. Gate Firing Circuits For SCR's
3. Single Phase AC Voltage Controller with R and RL Loads
4. Single Phase Fully Controlled Bridge Converter with R and RL Loads
5. Forced Commutation Circuits (Class A- Class B - Class C - And Class D & Class E)
6. DC Jones Chopper With R And RL Loads
7. Single Phase Series Inverter With R And RL Loads
8. Single Phase Parallel- Inverter With R And RL Loads
9. Single Phase Half Controlled Converter With R Load
10. Three Phase Half Controlled Bridge Converter With R-Load
11. Single Phase Cyclo converter Controller With R And RL Loads
12. Single Phase Dual Converter Controller With R And RL Loads
13. Pspice Simulation of Single-Phase Half and Full Bridge Inverter Using RLE Loads.

**COURSE OUTCOMES:**

<b>On successful completion of course, student will be able to</b>		<b>Pos &amp; PSOs</b>
<b>CO1</b>	Demonstrate knowledge on operation and characteristics of powerSemiconductor devices.	<b>PO1</b>
<b>CO2</b>	Analyze the physical variations of various power electronic converters.	<b>PO2</b>
<b>CO3</b>	Design different triggering and commutation circuits for SCR.	<b>PO3</b>
<b>CO4</b>	Select appropriate design tools and procedure to evaluateperformance of various power electronic converters.	<b>PO5</b>
<b>CO5</b>	Follow ethical principles to evaluate performance of AC machines.	<b>PO8</b>
<b>CO6</b>	Do experiments effectively as an individual and as a member in agroup.	<b>PO9</b>



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<b>CO7</b>	Communicate verbally and in written form, the understandings about the experiments.	<b>PO10</b>
<b>CO8</b>	Continue updating their skill related to electronic devices and their applications during their life time	<b>PO12</b>

**TEXT BOOKS**

1. M.H. Rashid, 'Power Electronics: Circuits, Devices and Applications', Pearson Education, Third Edition, New Delhi, 2004.
2. P.S.Bimbira "Power Electronics" Khanna Publishers, third Edition, 2003.
3. Ashfaq Ahmed 'Power Electronics for Technology', Pearson Education, Indian reprint, 2003.

**REFERENCE WEBSITE LINK:**

<https://nptel.ac.in/courses/108/102/108102145/>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
<b>CO1</b>	3	-	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO2</b>	-	3	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO3</b>	-	-	3	-	-	-	-	-	-	-	-	-	2	-
<b>CO4</b>	-	-	-	-	3	-	-	-	-	-	-	-	2	-
<b>CO5</b>	-	-	-	-	-	-	-	3	-	-	-	-	2	-
<b>CO6</b>	-	-	-	-	-	-	-	-	3	-	-	-	2	-
<b>CO7</b>	-	-	-	-	-	-	-	-	-	3	-	-	2	-
<b>CO8</b>	-	-	-	-	-	-	-	-	-	-	-	3	2	-
<b>CO*</b>	<b>3</b>	<b>3</b>	<b>3</b>		<b>3</b>			<b>3</b>	<b>3</b>	<b>3</b>		<b>3</b>	<b>2</b>	



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.  
(AUTONOMOUS)  
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

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

**20MAC351**

**CONSTITUTION OF INDIA**

**L T P C**  
**2 - - -**

**PRE-REQUISITES: NIL**

**COURSE EDUCATIONA OBJECTIVES:**

1. To know about Indian constitution and functionalities of state and central government of India.
2. To realize the functions of Indian administration and Relationship.
3. To realize the functions of state administration.
4. To realize the functions of local administration in rural and urban areas.
5. To understand the functions of Chief election and state election commissions.

**UNIT-1: INTRODUCTION**

**(6)**

Introduction to Indian Constitution – Constitution -Meaning of the term - Indian Constitution – Sources and constitutional history - Features– Citizenship – Preamble - Fundamental Rights and Duties - Directive Principles of State Policy.

**UNIT-2: UNION GOVERNMENT AND ITS ADMINISTRATION**

**(6)**

Union Government and its Administration Structure of the Indian Union - Federalism – Centre – State relationship – President’s Role, power and Position - PM and Council of ministers - Cabinet and Central Secretariat –Lok Sabha - Rajya Sabha - The Supreme Court and High Court - Powers and Functions

**UNIT-3: STATE GOVERNMENT AND ITS ADMINISTRATION**

**(6)**

Governor Role and Position, CM and Council of ministers. State Secretariat: Organization, Structure and Functions

**UNIT-4: LOCAL ADMINISTRATION**

**(6)**

District’s Administration Head - Role and Importance - Municipalities - Mayor and role of Elected Representatives -CEO of Municipal Corporation Pachayati Raj - Functions– PRI – Zilla Parishath - Elected officials and their roles – CEO, Zilla Parishath - Block level Organizational Hierarchy - (Different departments) - Village level - Role of Elected and Appointed officials - Importance of grass root democracy.

**UNIT-5: ELECTION COMMISSION**

**(6)**

Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women.

**TotalHours:30**



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**COURSEOUTCOMES:**

<b>On successful completion of the course, students will be able to</b>		<b>Pos &amp; PSOs</b>
<b>CO1</b>	Understand historical background of the constitution making and its importance for building a democratic India.	<b>PO6, PO8,PO12</b>
<b>CO2</b>	Understand the functioning of three wings of the government ie., executive, legislative and judiciary.	<b>PO6, PO8,PO12</b>
<b>CO3</b>	Understand the value of the fundamental rights and duties for becoming good citizen of India.	<b>PO6, PO8,PO12</b>
<b>CO4</b>	Analyze the decentralization of power between central, state and local self-government	<b>PO6, PO8,PO12</b>
<b>CO5</b>	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.	<b>PO6, PO8,PO12</b>

**TEXTBOOKS:**

1. Durga Das Basu, "Introduction to the Constitution of India", Prentice – Hall of India Pvt. Ltd.. New Delhi
2. Subash Kashyap, "Indian Constitution", National Book Trust

**REFERENCEBOOKS:**

1. J.A. Siwach, "Dynamics of Indian Government & Politics".
2. H.M.Sreevai, " Constitutional Law of India", 4th edition in 3 volumes (Universal Law Publication)
3. J.C. Johari, " Indian Government and Politics", Hans India
4. M.V. Pylee, "Indian Constitution", Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi

**REFERENCEWEBSITE:**

1. [nptel.ac.in/courses/109104074/8](http://nptel.ac.in/courses/109104074/8)
2. [nptel.ac.in/courses/109104045/](http://nptel.ac.in/courses/109104045/)
3. [nptel.ac.in/courses/101104065/](http://nptel.ac.in/courses/101104065/)
4. [www.hss.iitb.ac.in/en/lecture-details](http://www.hss.iitb.ac.in/en/lecture-details)
5. [www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution](http://www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution)

**CO-PO MAPPING:**

<b>CO-PO</b>	<b>P01</b>	<b>P02</b>	<b>P03</b>	<b>P04</b>	<b>P05</b>	<b>P06</b>	<b>P07</b>	<b>P08</b>	<b>P09</b>	<b>P010</b>	<b>P011</b>	<b>P012</b>	<b>PS01</b>	<b>PS02</b>
<b>C01</b>	-	-	-	-	-	3	-	3	-	-	-	3	2	-
<b>C02</b>	-	-	-	-	-	3	-	3	-	-	-	3	2	-
<b>C03</b>	-	-	-	-	-	3	-	3	-	-	-	3	2	-
<b>C04</b>	-	-	-	-	-	3	-	3	-	-	-	3	2	-
<b>C05</b>	-	-	-	-	-	3	-	3	-	-	-	3	2	-
<b>CO*</b>	-	-	-	-	-	<b>3</b>	-	<b>3</b>	-	-	-	<b>3</b>	<b>2</b>	-



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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**III B.Tech-VI Semester**

<b>20ECE369</b>	<b>MICROPROCESSORS AND INTERFACING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**COURSE EDUCATIONAL OBJECTIVES:**

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

- 1** Demonstrate knowledge on the architecture of 8086 Microprocessor
- 2** Apply the skill on various 8086 Instruction set and Assembler Directives.
- 3** Study the different interfacing methods to 8086 Microprocessor
- 4** Understand programmable peripheral devices and their Interfacing
- 5** Develop application skills on different programming techniques of 8086 Microprocessor

**UNIT-1: INTRODUCTION TO 8085 MICROPROCESSOR (9)**

Architecture of 8085 Microprocessor- The 8085 Programming Model- Pin diagram of 8085- Machine Cycle Status and Control Signals- Addressing Modes- Instruction Classification- Instruction Format- Simple Programs Involving Logical- Branch and Call Instructions.

**UNIT-2: INTRODUCTION TO 8086 MICROPROCESSOR (9)**

Architecture of 8086 Microprocessor- Special functions of General Purpose register- 8086 flag register and function of 8086 Flags- Addressing modes of 8086- Instruction set of 8086- Assembler directives- simple programs- procedures- and macros

**UNIT-3: ASSEMBLY LANGUAGE PROGRAMMING & TIMING DIAGRAM (9)**

Assembly Language Programs Involving Logical- Branch & Call Instructions, Pin Diagram Of 8086- Minimum Mode And Maximum Mode Of Operation- Timing Diagram- Memory interfacing To 8086 (Static RAM&EPROM)- Need For DMA- Interfacing With 8257.

**UNIT-4: PROGRAMMABLE INTERFACING DEVICES & INTERRUPT STRUCTURE (9)**

8255 PPI – Various Modes Of Operation And Interfacing To 8086- Interfacing Keyboard and Displays (8279)- Stepper Motor interfacing - D/A And A/D Converter Interfacing, Interrupt Structure Of 8086- Interrupt vector table.

**UNIT 5: SERIAL DATA TRANSFER SCHEMES (9)**

Programmable Communication Interface (8251) USART, Architecture and Description of Operating Modes, Features of 80386 and 80486 processors.

**Total Hours:45**



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**COURSE OUTCOMES:**

On successful completion of the course, students will be able to		Pos & PSOs
<b>CO1</b>	Demonstrate knowledge on the architecture of 8086 Microprocessor.	<b>PO1</b>
<b>CO2</b>	Apply the skill on various 8086 Instruction set and Assembler Directives	<b>PO1</b>
<b>CO3</b>	Study the different interfacing methods to 8086 Microprocessor	<b>PO1</b>
<b>CO4</b>	Understand programmable peripheral devices and their Interfacing	<b>PO1, PO2</b>
<b>CO5</b>	Develop application skills on different programming techniques of 8086 Microprocessor	<b>PO1, PO2, PO3</b>

**TEXT BOOKS:**

1. A,K,Ray and K, M, Bhurchandi "Advanced microprocessor and Peripherals", 2nd edition, 2000, A, K, Ray and K, M, Bhurchandi, TMH, New Delhi.
2. Microprocessor architecture, programming and applications with 8085/8080A 2<sup>nd</sup> edition, 1996, Ramesh S, Goankar, New age international Publishers, New Delhi.

**REFERENCES BOOKS:**

1. Douglas U, Hall, TMH, "Micro Processors & Interfacing revised" 2<sup>nd</sup> edition, 2007, New Delhi.
2. Walter A, Triebel, Avtar Singh "The 8088 and 8086 microprocessors", 1<sup>st</sup> edition, 2003, PHI, New Delhi.
3. Liu and GA Gibson "Micro Computer System" 8086/8088 Family Architecture, Programming and Design, 2nd Ed, 2000, PHI, New Delhi.
4. The X8086 microprocessor architecture, programming and interfacing, 1<sup>st</sup> edition, 2010, I, das, Pearson education India limited, New Delhi.
5. J, Ayala, "The 8086 microprocessor programming and interfacing", 1/e, 2007, Kenneth Cengage learning private limited, New Delhi.

**REFERENCES WEBSITE:**

<https://nptel.ac.in/courses/108/107/108107029/>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>	3	3	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO2</b>	3	3	2	-	-	-	-	-	-	-	-	-	2	-
<b>CO3</b>	3	3	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO4</b>	3	-	-	3	-	-	-	-	-	-	-	-	2	-
<b>CO5</b>	3	3	2	3	-	-	-	-	-	-	-	-	2	-
<b>CO*</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>									<b>2</b>	<b>-</b>



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.  
(AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**III B.Tech-VI Semester**

**20EEE361**

**POWER SYSTEM ANALYSIS**

**L T P C  
2 1 0 3**

**Pre-requisite:** A course on power system engineering

**COURSE EDUCATIONAL OBJECTIVES:**

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

1. Demonstrate knowledge on Per unit representation, symmetrical component theory
2. Analyse the power system networks for the formation of bus impedance and admittance matrices.
3. Evaluate the power system network for various planning strategies and provide a feasible solution.
4. Apply appropriate techniques/methods to analyse power system network operating under various conditions.
5. Apply the conceptual knowledge on power system stability.

**UNIT- 1: PER UNIT SYSTEMS AND SYMMETRICAL COMPONENT THEORY (9)**

Per unit system representation, advantages, per unit equivalent reactance representation of power system components. Symmetrical component theory - voltages, currents and impedances. Sequence representation of power system components- Generators, transformers, transmission line, load and networks.

**UNIT-2: POWER SYSTEM NETWORK MATRICES (9)**

Bus admittance matrix - Direct inspection method. Bus impedance matrix- Formation of Z bus matrix for partial network, algorithm for the modification of bus impedance matrix – addition of element from a new bus to reference, new bus to an old bus, between an old bus& reference and between two old buses.

**UNIT-3: POWER FLOW STUDIES (9)**

Introduction, derivation of static load flow equations. Load flow solution using Gauss-Seidel method, Newton-Raphson method- with and without PV bus, Decoupled and Fast decoupled methods (maximum of 3-buses for one iteration only). Algorithm and flowcharts, Comparison of different load flow methods.

**UNIT-4: FAULT ANALYSIS (9)**

Introduction, Unsymmetrical faults - LG, LL, and LLG - with and without fault impedance. Symmetrical fault - LLL & LLLG faults. Symmetrical fault analysis using Z bus, short circuit current and MVA calculations.

**UNIT-5: POWER SYSTEM STABILITY (9)**

Elementary concepts of stability. Steady state stability – power limit, transfer reactance, power angle curve, derivation of swing equation. Transient stability - equal area criterion, applications- critical clearing angle, critical clearing time. Methods to improve stability - auto re-closure and fast operating circuit breakers.

**TOTAL: 45 Hours**



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.  
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**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE OUTCOMES:**

<b>On successful completion of the course, students will be able to</b>		<b>Pos &amp; PSOs</b>
<b>CO1</b>	Demonstrate knowledge on Per unit representation, symmetrical component theory and sequence network representation of power system networks.	<b>PO1,PO2,PO3,PO4</b>
<b>CO2</b>	Analyse The power system network for sequence network representation.	<b>PO1,PO2,PO3,PO4</b>
<b>CO3</b>	Evaluate Per unit quantities for various power system components and networks.	<b>PO1,PO2</b>
<b>CO4</b>	Apply appropriate techniques/methods to analyse power system network operating under various conditions.	<b>PO1,PO2</b>
<b>CO5</b>	Apply the conceptual knowledge of power system analysis to assess and analyse a power system for various scenarios.	<b>PO1,PO2</b>

**TEXT BOOKS:**

1. C. L. Wadhwa, "Electrical Power Systems", New Age International(P) Limited publishers, New Delhi, 6th edition, 2010
2. P. Venkatesh, B.V. Manikandan, S. Charles Raja and A. Srinivasan," Electrical power systems analysis", Security and deregulation, PHI learning private limited, Delhi, 2014.

**REFERENCE BOOKS:**

1. G. W. Stagg and A.H. El-Abiad, Computer Methods in PowerSystem Analysis, Mc Graw-Hill, New Delhi, International studentedition, 1968.
2. John J. Grainger and William D. Stevenson, JR, Power SystemAnalysis, Mc Graw-Hill Education (India) Pvt. Limited, 1994.
3. HadiSaadat, Power System Analysis, Tata Mc Graw-Hill Publishing Company Limited, New Delhi, 2nd edition, 2002.
4. S.A.Nasar "electrical power systems" revised 1<sup>st</sup> edition

**REFERENCE WEBSITE LINK:**

<https://www.edx.org/search?q=POWER%20SYSTEM>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>C01</b>	3	2	2	2	-	-	-	-	-	-	-	-	2	-
<b>C02</b>	3	2	2	2	-	-	-	-	-	-	-	-	2	-
<b>C03</b>	3	2	-	-	-	-	-	-	-	-	-	-	2	-
<b>C04</b>	3	2	-	-	-	-	-	-	-	-	-	-	2	-
<b>C05</b>	3	2	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO*</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>2</b>									<b>2</b>	<b>-</b>



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**

**(AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**III B.Tech. – VI Semester**

**20HSM241**

**PRINCIPLES OF MANAGEMENT**

**L T P C**

**3 0 0 3**

**PRE-REQUISITES:** Nil

**COURSE EDUCATIONAL OBJECTIVES:**

1. To understand the concepts of total quality management, and Contributions of TQM
2. To learn TQM principles and impact of 5s, Kaizen, PDCA cycles in continuous process improvement.
3. To study the basic need of quality control and process control in an organization
4. To learn the traditional and modern TQM tools and techniques
5. To study the quality standard, requirements and elements in Quality management system

**UNIT –1: INTRODUCTION TO MANAGEMENT**

**(9)**

Definition of management – Science or Art – Manager Vs Entrepreneur – Types of managers – Managerial roles and skills – Levels of management – Functions of management – Principles of management and Scientific Management and its approaches – Corporate Social Responsibilities – Organization culture and Environment.

**UNIT –2: PLANNING AND DECISION MAKING**

**(9)**

**Planning:** Nature and purpose of planning – Planning process – Types of planning – Objectives – Setting objectives – Policies – Planning premises – Strategic Management – Planning Tools and Techniques **Decision Making:** Importance of decision making – Decision making steps and process.

**UNIT –3: ORGANIZING AND DIRECTING**

**(9)**

**Organizing:** Nature and purpose – Formal and informal organization – Organization chart and structure – Line and staff authority – Departmentalization – Delegation of authority – Centralization and decentralization – Job Design – HR planning, recruitment, selection, training and development, performance management, career planning and management. **Directing:** Principles of directing – Process of communication – Barrier in communication – Effective communication.

**UNIT –4: CONTROLLING AND CO-ORDINATING**

**(9)**

System and process of controlling – Budgetary and non-budgetary control techniques – Use of computers and IT in Management control – Productivity problems and management – Control and performance – Direct and preventive control – Reporting.

**UNIT –5: MODERN CONCEPTS OF MANAGEMENT**

**(9)**

Concept, features, merits and demerits of SWOT Analysis, Business Process Re-engineering, Supply Chain Management – Concepts, functions importance of marketing – Competitive analysis and advantages of E-marketing.

**Total Hours: 45**



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
**(AUTONOMOUS)**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE OUTCOMES:**

On successful completion of the course the student will be		Pos & PSOs
<b>CO1</b>	Understand the concepts of management, roles to be adopted by manager, functions of manager and inculcating the social responsibility towards different stake holders.	<b>PO1, PO11</b>
<b>CO2</b>	Demonstrate knowledge with regard to planning, planning process and the process of making effective decisions.	<b>PO1, PO11</b>
<b>CO3</b>	Demonstrate knowledge about organizational environment, the process of staffing and the application of directive principles.	<b>PO1, PO11</b>
<b>CO4</b>	Demonstrate knowledge about controlling and Co-ordinating	<b>PO1, PO11</b>
<b>CO5</b>	Demonstrate knowledge about modern concepts in management.	<b>PO1, PO11</b>

**TEXT BOOKS:**

1. Besterfield Dale H, Besterfield Carol, Besterfield Glen H, Besterfield Mary, Urdhwareshe Hemantand Urdhwareshe Rashmi, "Total Quality Management", 5/e, Pearson Education, New Delhi, 2018.
2. M. Govindarajan and S. Natarajan, "Principles of Management", Prentice Hall of India Pvt. Ltd.

**REFERENCE BOOKS:**

1. Stephen P. Robbins and Mary Coulter, "Management", 8/e, Prentice Hall of India.
2. Charles W.L Hill, Steven L McShane, "Principles of Management", McGraw Hill Education, Special Indian Edition, 2007.
3. Hellriegel, Slocum and Jackson, "Management-A Competency Based Approach", 10/e, Thomson South Western, 2007.
4. Harold Koontz, Heinz Weihrich and mark V Cannice, "Management - A global and Entrepreneurial Perspective", 12/e, Tata McGraw Hill, 2007.
5. Andrew J. Dubrin, "Essentials of Management", Thomson South western. 7/e, 2007.

**REFERENCE WEBSITE:**

1. <https://nptel.ac.in/courses/110/105/110105146/>

**CO-PO MAPPING:**

CO-PO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02
<b>C01</b>	3	-	-	-	-	-	-	-	-	-	2	-	2	-
<b>C02</b>	3	-	-	-	-	-	-	-	-	-	2	-	2	-
<b>C03</b>	3	-	-	-	-	-	-	-	-	-	2	-	2	-
<b>C04</b>	3	-	-	-	-	-	-	-	-	-	2	-	2	-
<b>C05</b>	3	-	-	-	-	-	-	-	-	-	2	-	2	-
<b>CO*</b>	<b>3</b>	-	-	-	-	-	-	-	-	-	<b>2</b>	-	<b>2</b>	-



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.  
(AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**III B.Tech-VI Semester**

**20EEE362A**

**SYSTEM THEORY  
(Core Elective -2)**

L	T	P	C
3	0	0	3

**Pre-requisite:** A course on control system engineering

**COURSE EDUCATIONAL OBJECTIVES:**

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

- 1 Understand the fundamentals of physical systems in terms of its linear and nonlinear models.
- 2 Educate on representing systems in state variable form
- 3 Educate on solving linear and non-linear state equations
- 4 Exploit the properties of linear systems such as controllability and observability
- 5 Educate on stability analysis of systems using Lyapunov's theory

**UNIT - 1: STATE VARIABLE REPRESENTATION: (9)**

Introduction-Concept of State-State equations for Dynamic Systems -Time invariance and linearity- Non uniqueness of state model- Physical Systems and State Assignment – free and forced responses- State Diagrams.

**UNIT –2: SOLUTION OF STATE EQUATIONS: (9)**

Existence and uniqueness of solutions to Continuous-time state equations – Solution of Nonlinear and Linear Time Varying State equations – State transition matrix and its properties – Evaluation of matrix exponential- System modes- Role of Eigen values and Eigen vectors.

**UNIT-3: STABILITY ANALYSIS OF LINEAR SYSTEMS: (9)**

Controllability and Observability definitions and Kalman rank conditions -Stabilizability and Detectability-Test for Continuous time Systems- Time varying and Time invariant case- Output Controllability-Reducibility- System Realizations.

**UNIT-4: STATE FEEDBACK CONTROL AND STATE ESTIMATOR: (9)**

Introduction-Controllable and Observable Companion Forms-SISO and MIMO Systems- The Effect of State Feedback on Controllability and Observability-Pole Placement by State Feedback for both SISO and MIMO Systems-Full Order and Reduced Order Observers.

**UNIT-5: LYAPUNOV STABILITY ANALYSIS: (9)**

Introduction-Equilibrium Points- BIBO Stability-Stability of LTI Systems- Stability in the sense of Lyapunov – Equilibrium Stability of Nonlinear Continuous-Time Autonomous Systems-The Direct Method of Lyapunov and the Linear Continuous-Time Autonomous Systems-Finding Lyapunov Functions for Nonlinear Continuous-Time Autonomous Systems – Krasovskil's and Variable-Gradient Method.

**TOTAL: 45 Hours**



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.  
(AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE OUTCOMES:**

<b>On successful completion of the course, students will be able to</b>		<b>Pos &amp; PSOs</b>
<b>CO1</b>	Represent the time-invariant systems in state space form as well as analyze the system is stabilizable.	PO1,PO2,PO3,PO4
<b>CO2</b>	Design state feedback controller and state observers	PO1,PO2,PO3,PO4
<b>CO3</b>	Classify the linear and non-linear state equations	PO1,PO2
<b>CO4</b>	Analyze the stability of certain class of non-linear system.	PO1,PO2
<b>CO5</b>	Describe non-linear behaviors such as Limit cycles, input multiplicity and output multiplicity, Bifurcation and Chaos.	PO1,PO2,PO3

**TEXT BOOKS:**

1. M. Gopal, "Modern Control System Theory", New Age International, 2005.
2. K. Ogatta, "Modern Control Engineering", PHI, 2002.
3. John S. Bay, "Fundamentals of Linear State Space Systems", McGraw-Hill, 1999.

**REFERENCE BOOKS:**

1. D. Roy Choudhury, "Modern Control Systems", New Age International, 2005.
2. John J. D'Azzo, C. H. Houpis and S. N. Sheldon, "Linear Control System Analysis and Design with MATLAB", Taylor Francis, 2003.
3. Z. Bubnicki, "Modern Control Theory", Springer, 2005.
4. C.T. Chen, "Linear Systems Theory and Design" Oxford University Press, 3rd Edition, 1999.
5. M. Vidyasagar, "Nonlinear Systems Analysis", 2nd edition, Prentice Hall, Englewood Cliffs, New Jersey.

**REFERENCE WEBSITE LINK:**

<https://www.edx.org/search?q=CONTROL%20SYSTEM%20ENGINEERING>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
<b>CO1</b>	3	2	2	2	-	-	-	-	-	-	-	-	2	-
<b>CO2</b>	3	2	2	2	-	-	-	-	-	-	-	-	2	-
<b>CO3</b>	3	2	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO4</b>	3	2	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO5</b>	3	2	<b>2</b>	-	-	-	-	-	-	-	-	-	2	-
<b>CO*</b>	3	<b>2</b>	<b>2</b>	<b>2</b>									<b>2</b>	-



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.  
(AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**III B.Tech-VI Semester**

**20EEE363B**

**POWER SYSTEMS ECONOMICS  
(Core Elective -2)**

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

**Pre-requisite:** A course on power system engineering

**COURSE EDUCATIONAL OBJECTIVES:**

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

- 1 Understand the importance of cost, PF improvement, size of generating units and Tariff.
- 2 Acquire knowledge on economic load dispatch problems.
- 3 Understand Artificial Intelligence Techniques for solving ELD problems.
- 4 Afford knowledge on interconnected systems
- 5 Provide knowledge on optimal power flow problem

**UNIT -1: ECONOMIC CONSIDERATIONS (9)**

Cost of electrical energy - Expressions for cost of electrical energy – Capital-interest – Depreciation - Different methods - Factors affecting cost of operation - Number and size of generating units - Importance of high load factor - Importance of power factor improvement - Most economical power factor - Meeting the KW demand on power stations –Power system tariffs – Regions and structure of Indian Power System.

**UNIT -2: ECONOMIC DISPATCH (9)**

Modeling of Cost Rate Curves – Economic Dispatch Calculation - Losses neglected - with generator Real and Reactive power limits; Losses included - Losses of economy in incremental cost data - Problems - Generator Capability Curve – Effect of Ramping rates – Prohibited Operating Zones - Automatic Load dispatch in Power Systems.

**UNIT -3: ECONOMIC OPERATION (9)**

General loss formula - Evolution of incremental transmission loss rate - Method of calculation of loss coefficients – Systematic development of transmission loss formula - Transmission loss as a function of plant generation – Participation Factor - Non – Smooth Fuel Functions (Quadratic - Valve point loading - CCCP - Multiple Fuel) – Problems - Introduction to Artificial Intelligence Techniques for solving ELD problems.

**UNIT -4: INTERCONNECTED SYSTEMS (9)**

Interconnected operation - Economic operation of hydro thermal power plants – Iteration scheme- Gradient approach – Newton’s method - Modeling and solution approach to short term and long term Hydro-Thermal scheduling problem using Dynamic Programming.

**UNIT -5 OPTIMAL POWER FLOW AND FUNDAMENTALS OF MARKETS (9)**

Problem formulation - Cost minimization - Loss minimization - Solution using NLP and successive LP methods – Constraints - DC and AC OPF (Real and Reactive Power Dispatch) – Effect of Contingencies - Voltage and Phase angle - Transient Voltage Dip/Sag Criteria.



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.  
(AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

Fundamentals of Markets – Introduction to Efficiency and Equilibrium - Modeling of consumers and producers – Single and Double Auction mechanism - Global welfare – Dead Loss – Spot and Forward Markets.

**Total Hours:45**

**COURSE OUTCOMES:**

<b>On successful completion of the course, students will be able to</b>		<b>Pos &amp; PSOs</b>
<b>CO1</b>	To understand the importance of cost, PF improvement, size of generating units and Tariff.	<b>PO1,PO2,PO3,PO4, PO12</b>
<b>CO2</b>	To acquire knowledge on economic load dispatch problems.	<b>PO1,PO2,PO3,PO4, PO12</b>
<b>CO3</b>	To understand Artificial Intelligence Techniques for solving ELD problems.	<b>PO1,PO2</b>
<b>CO4</b>	To afford knowledge on interconnected systems	<b>PO1,PO2,PO3,PO4</b>
<b>CO5</b>	To provide knowledge on optimal power flow problem	<b>PO1,PO2,PO3,PO4</b>

**TEXT BOOKS:**

1. Allen J Wood and B F Wollenberg- "Power Generation - Operation and Control" - John Wiley & Sons - New York - 2004.
2. Steven Stoft, Wiley "Power System Economics"- Designing Markets for Electricity, 2003, by - Interscience, USA.

**REFERENCE BOOKS:**

1. Kirchmayer. L.K - "Economic operation of power system" - John Wiley & Sons - 1953.
2. Fundamentals of Power System Economics, 2 e/d, 2010, by Daniel S Kirschen, John Wiley & Sons, New Jersey.
3. Market Operations in Electric Power Systems: Forecasting, Scheduling, and Risk Management, 1<sup>st</sup> e/d, 2002, by M. Shahidehpour, John Wiley & Sons, New York.

**REFERENCE WEBSITE LINK:**

<https://www.edx.org/search?q=POWER%20SYSTEM>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
<b>CO1</b>	3	2	2	2	-	-	-	-	-	-	-	3	2	-
<b>CO2</b>	3	2	2	2	-	-	-	-	-	-	-	3	2	-
<b>CO3</b>	3	2	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO4</b>	3	2	2	2	-	-	-	-	-	-	-	-	2	-
<b>CO5</b>	3	2	2	2	-	-	-	-	-	-	-	-	2	-
<b>CO*</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>2</b>								<b>3</b>	<b>2</b>	<b>-</b>



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.  
(AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**III B.Tech-VI Semester**

**20EEE362C**

**UTILIZATION OF ELECTRICAL ENERGY  
(core Elective-2)**

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

**Pre-requisite:** A course on power system engineering

**COURSE EDUCATIONAL OBJECTIVES:**

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

- 1** Understand the principle, design of illumination systems and energy efficiency lamps.
- 2** Study the different methods of Electric heating and welding
- 3** Understand the electric traction systems and Electric Braking.
- 4** To study about the Calculations of tractive effort and Specific energy consumption.
- 5** To Study about the Power Factor Improvement and Economic Aspects in Utilizing Electrical energy

**UNIT -1: ILLUMINATION**

**(9)**

Introduction - Terms used in illumination -Laws of illumination - Polar curves - Photometry - Sources of light - Lamps: Incandescent lamps - Discharge lamps - SV and MV lamps - Lighting schemes- Requirement of good lighting scheme -Types and design of lighting schemes - calculation of illumination-Numerical problems.

**Unit -2: Electric Heating and Welding**

**(9)**

**Electric Heating-** Advantages and methods of electric heating - Resistance heating - Arc heating - Induction heating and dielectric heating - Infrared or radiant heating - power factor correction on utility.

**Electric Welding- Electric Welding-** Definition of welding - Welding process - Resistance and arc welding – electric welding equipment, comparison between AC and DC welding

**UNIT -3: ELECTRIC TRACTION-I**

**(9)**

Introduction- Systems of electric traction - Comparison between A.C. and D.C. traction - Special features of traction motor- Methods of electric braking- Rheostat braking and regenerative braking - Speed-time curves for different services – Trapezoidal and quadrilateral speed time curves - Numerical problems.

**UNIT -4: ELECTRIC TRACTION-II**

**(9)**

Mechanics of train movement- Adhesive weight and coefficient of adhesion – Problems - Calculations of tractive effort - Power - Specific energy consumption - Factors affecting specific energy consumption of an electric train operating on a given schedule - Control of traction motors.

**UNIT -5: ECONOMIC ASPECTS OF UTILIZING ELECTRICAL ENERGY**

**(9)**

Power Factor Improvement, Load Factor improvement, Off Peak Loads- Use of Exhaust Steam, Waste Heat recovery, Pit Head Generation, Diesel Plant, General Comparison of Private Plant and Public Supply- Initial Cost and Efficiency, Capitalization of Losses, Choice of Voltage.

**TOTAL: 45 Hours**



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.  
(AUTONOMOUS)  
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE OUTCOMES:**

<b>On successful completion of the course, students will be able to</b>		<b>Pos &amp; PSOs</b>
<b>CO1</b>	Acquire knowledge on Laws of illumination and Lighting schemes	PO1,PO3,PO7
<b>CO2</b>	Identify most appropriate heating or welding techniques for suitable applications.	PO1,PO3, PO4, PO7
<b>CO3</b>	understand the concepts Electric traction systems and Electric braking	PO1,PO3, PO4, PO7
<b>CO4</b>	Analyze the Mechanics of train movement and Specific Energy Consumption	PO1,PO3, PO4, PO7,
<b>CO5</b>	Understand the Economic Aspects Of Utilizing Electrical energy	PO1,PO3, PO7

**TEXT BOOKS:**

1. Shaw Taylor "Utilization of Electrical Energy", 1/e 2007 ,Open, Orient Longman-Hyderabad.
2. ,R K Rajput , Lakshmi Publications "Utilization of Electric power", 1/e 2006– New Delhi.
3. S. L. Uppal, Khanna pulishers "Electrical Power", , 1988.

**REFERENCE BOOKS:**

1. Utilization of Electric power and Electric traction , 10 /e 2009 J B Gupta , S K kataria andsons Publications – New Delhi.
2. Utilization of Electrical Energy ,1/e 2010,Tarlok Singh, S. K. Kataria and Sons - New Delhi.
3. Generation & Utilization of Electrical Energy , 1/e 2010,S. Sivanagaraju, M. Balasubba Reddy and D. Srilatha , Dorling Kindersly.Pvt Ltd – UP, INDIA.
4. Utilization of Electrical Power Including Electrical Power &Electric Traction ,1/e 1994, N. V. Suryanarayana ,New Age Publications – New Delhi

**REFERENCE WEBSITE LINK:**

<https://www.edx.org/search?q=POWER%20SYSTEM>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
<b>CO1</b>	3	-	2	-	-	-	2	-	-	-	-	-	2	-
<b>CO2</b>	3	-	3	3	-	-	2	-	-	-	-	-	2	-
<b>CO3</b>	3	-	3	2	-	-	2	-	-	-	-	-	2	-
<b>CO4</b>	3	-	3	2	-	-	2	-	-	-	-	-	2	-
<b>CO5</b>	3	-	2	2	-	-	2	-	-	-	-	-	2	-
<b>CO*</b>	<b>2</b>		<b>2.6</b>	<b>2.25</b>			<b>2</b>						<b>2</b>	<b>-</b>



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.  
(AUTONOMOUS)  
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**III B.Tech. - VI Semester**

**200CIV361**

**BUILDING TECHNOLOGY  
(OPEN ELECTIVE - 2)**

**L T P C  
3 - - 3**

**PRE-REQUISITES:** A course on building materials their manufacturing process and utilization in low-cost housing techniques

**COURSE OUTCOMES:**

1. To teach various types of building materials their manufacturing process and utilization in low-cost housing techniques
2. To teach the functions and manufacturing process of glass and plastic materials that are commonly used in building construction
3. To teach various types of thermal and acoustic insulation materials used in building construction
4. To teach the functions and importance of various structural components
5. To teach in detail about the materials like paints and floor finishes meant for interior works

**UNIT-1 : BASICS TERMINOLOGY**

**(9)**

Overview of the course, basic definitions, buildings-types-components-economy, and design-principles of planning of buildings and their importance. Definitions and importance of grouping and circulation-lighting and ventilation-consideration of the above aspects during planning of building.

**UNIT-2: TERMITE PROOFING**

**(9)**

Termite proofing: Inspection-control measures and precautions-lighting protection of buildings-general principles of design of openings-various types of fire protection measures to be considered while planning a building.

**UNIT-3: VERTICAL TRANSPORTATION IN A BUILDING**

**(9)**

Vertical transportation in a building: Types of vertical transportation-stairs-different forms of stairs-planning of stairs-other modes of vertical transportation –lifts-ramps- escalators.

**UNIT-4: PREFABRICATION SYSTEMS IN RESIDENTIAL BUILDINGS**

**(9)**

Prefabrication systems in residential buildings-walls-openings-cupboards-shelves etc., planning and modules and sizes of components in prefabrication. Planning and designing of residential buildings against the earthquake forces, principles, seismic forces and their effect on buildings.

**UNIT-5: ACOUSTICS**

**(9)**

Acoustics –effect of noise –properties of noise and its measurements, principles of acoustics of building. Sound insulation-importance and measures

**TOTAL HOURS: 45**





**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
**(AUTONOMOUS)**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**III B.Tech.-VI Semester**

**200MEC361**

**3D PRINTING CONCEPTS**  
(OPEN ELECTIVE - 2)

**L T P C**  
**3 - - 3**

**PRE-REQUISITES: NIL**

**COURSE EDUCATIONAL OBJECTIVES:**

1. To understand the need for additive manufacturing technology.
2. To learn the design for additive manufacturing, CAD modeling and printing process.
3. To know the parameters and process of liquid and solid based additive manufacturing processes.
4. To explain the powder based additive manufacturing process and material jetting.
5. To demonstrate the post processing techniques and applications of AM process

**UNIT-1: OVERVIEW OF ADDITIVE MANUFACTURING(AM) (9)**

Additive V/s Conventional Manufacturing / CNC – Rapid prototyping – Rapid Tooling – Rapid manufacturing – Generic AM process – Development of AM technology –Use of layers – Classification of AM process – Basic steps for AM process – Differentiation between photopolymer, powder based, molten material, solid sheets and metal system.

**UNIT-2: CAD MODELING AND DESIGN FOR ADDITIVE MANUFACTURING (9)**

**CAD Modeling:** Preparation of CAD models – Data processing – STL format. **DFAM:** Part orientation and structure generation – Removal supports – Hollowing out parts – Undercuts – Inter locking features – Reduction of part and identification – Model slicing – Tool path generation. **Printing Processes:** Droplet formation technologies – Continuous mode–Drop on demand mode– Bio-plotter.

**UNIT-3: LIQUID AND SOLIDBASED ADDITIVE MANUFACTURING PROCESSES (9)**

Principle, materials, properties, process and applications of Stereo lithography (SLA), Poly Jet, Fused Deposition Modeling (FDM), Laminated Object Manufacturing (LOM) and Ultrasonic Consolidation.

**UNIT-4: POWDERBASED ADDITIVE MANUFACTURING PROCESSES (9)**

Principle, materials, properties, process and applications of Selective Laser Sintering (SLS), Selective Laser Melting (SLM), Electron Beam Melting (EBM), Laser Engineered Net Shaping (LENS)and Binder Jetting.

**UNIT-5: POSTPROCESSING TECHNIQUES AND APPLICATIONS (9)**

**Product Quality:** Support material removal – Surface texture improvements – Accuracy improvements – Aesthetic improvements – Preparation for use of pattern –Property enhancement using thermal and non-thermal techniques– Inspection and testing– Defects and their causes. **Applications:** Additive Manufacturing application of aerospace, electronics, healthcare, defense, automotive, construction, food processing, machine tool Business opportunities and future directions of AM.

**Total Hours: 45**





**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**

**(AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**III B.Tech. - VI Semester**

**200ECE361**

**COMMUNICATION NETWORKS**

(Open Elective - 2)

**L T P C**

**3 - - 3**

**PRE-REQUISITES: NIL**

**COURSE EDUCATIONAL OBJECTIVES:**

1. Build an understanding of the fundamental concepts of computer networking.
2. Familiarize the student with the basic taxonomy and terminology of the computer networking area.
3. Introduce the student to advanced networking concepts.
4. Preparing the student for entry Advanced courses in computer networking.
5. Allow the student to gain expertise in some specific areas of networking.

**UNIT –1: INTRODUCTION TO DATA COMMUNICATION (9)**

Introduction: Network Topologies, Protocols & Standards, Layered Architecture LAN, WAN, MAN. OSI Reference Model, TCP/IP Reference Model, Guided and Unguided Media

**UNIT –2: DATA LINK LAYER (9)**

Data Link Layer: Design Issues, Framing – Error Control – Flow Control, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols, ARQ schemes, HDLC-PPP-Ethernet- IEEE 802.3,4,5 Protocols, Wireless LAN- the 802.11 Architecture and ProtocolStack-The802.11 Physical Layer- The802.11 MAC Sub layer Protocol-The 805.11 Frame Structure-Services.

**UNIT –3: MAC LAYER AND ROUTING ALGORITHM (9)**

The Medium Access Control Sub layer - The Channel Allocation Problem - Static Channel Allocation Assumptions for Dynamic Channel Allocation, Multiple Access Protocols-Aloha-CSMA Protocols Collision - Free Protocols, Need for Internetworking, Design Issues, Addressing, Internet Protocol (IPv4/IPv6), Virtual Circuit and Datagram Networks, Routing Algorithms, Congestion Control Algorithms.

**UNIT –4: TRANSPORT LAYER (9)**

Transport layer: UDP, TCP, Congestion Control mechanisms, QOS, Techniques to improve QOS.

**UNIT –5: COMMUNICATION INTERFACE AND COMMUNICATION BUSES (9)**

Application Layer: Cryptography and network security, DNS, Electronic Mail, FTP, HTTP, SNMP,DHCP.

**Total Hours: 45**



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
**(AUTONOMOUS)**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE OUTCOMES:**

On successful completion of the course, Students will be able to		Pos & PSOs
<b>CO1</b>	Independently understand basic computer network technology.	<b>PO1, PO2, PO3</b>
<b>CO2</b>	Understand and explain Data Communications System and its components.	<b>PO1, PO2, PO3, PO4</b>
<b>CO3</b>	Analysis the different types of network topologies and protocols and Enumerate the layers of the OSI model and TCP/IP.	<b>PO1, PO2, PO3,</b>
<b>CO4</b>	Identify the different types of network devices and their functions within a network.	<b>PO1, PO2, PO4</b>
<b>CO5</b>	Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.	<b>PO1, PO2, PO4</b>

**TEXT BOOKS:**

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

**REFERENCE BOOKS:**

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

**REFERENCE WEBSITE:**

1. <https://www.javatpoint.com/computer-network-tutorial>
2. [https://www.sciencedirect.com/topics/computer-science/data communication - network](https://www.sciencedirect.com/topics/computer-science/data-communication-network)

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
<b>C01</b>	3	3	3	-	-	-	-	-	-	-	-	-	2	-
<b>C02</b>	2	3	2	3	-	-	-	-	-	-	-	-	2	-
<b>C03</b>	3	3	2	-	-	-	-	-	-	-	-	-	2	-
<b>C04</b>	3	2	-	3	-	-	-	-	-	-	-	-	2	-
<b>C05</b>	3	2	-	3	-	-	-	-	-	-	-	-	2	-
<b>CO*</b>	<b>2.8</b>	<b>2.6</b>	<b>2.3</b>	<b>3</b>	-	-	-	-	-	-	-	-	<b>2</b>	<b>-</b>



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.  
(AUTONOMOUS)  
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**III**

**B.Tech. - VI Semester**

**200CSE361**

**DATA COMMUNICATIONS AND COMPUTER NETWORKS  
(OPEN ELECTIVE - 2)**

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

**PRE-REQUISITES: NIL**

**COURSE EDUCATIONAL OBJECTIVES:**

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

**UNIT- 1: PHYSICAL LAYER**

**(9)**

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

**UNIT- 2: DATA LINK LAYER**

**(10)**

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

**MACSUBLAYER:** The Channel Allocation Problem - Multiple Access Protocols -IEEE803, 4,5 Protocols - wireless LANS - Bridges - Internet Protocols.

**UNIT-3: NETWORK LAYER**

**(8)**

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

**UNIT- 4: TRANSPORT LAYER**

**(9)**

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

**UNIT- 5: APPLICATION LAYER**

**(9)**

Domain Name System - Electronic Mail - File Transfer Protocol - WWW - FTP - HTTP - SNMP - Multi - Media.

**Network Security:** Cryptography - Secret and Public Key Algorithm.

**Total Hours: 45**



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**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE OUTCOMES:**

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

**TEXTBOOKS:**

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

**REFERENCE BOOKS:**

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

**REFERENCE WEBSITE:**

1. [https://www.tutorialspoint.com/data\\_communication\\_computer\\_network/index.htm](https://www.tutorialspoint.com/data_communication_computer_network/index.htm)
2. <https://www.slideshare.net/pawan1809/computer-networks-a-tanenbaum-5th-edition>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>	3	-	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO2</b>	3	-	-	2	-	-	-	-	-	-	-	-	2	-
<b>CO3</b>	3	2	-	2	-	-	-	-	-	-	-	-	2	-
<b>CO4</b>	3	-	-	2	-	-	-	-	-	-	-	-	2	-
<b>CO5</b>	3	-	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO*</b>	<b>3</b>	<b>2</b>	-	<b>2</b>	-	-	-	-	-	-	-	-	<b>2</b>	-



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
**(AUTONOMOUS)**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**  
**IV B.Tech.-VI SEMESTER**

**200HSM361**

**LASERS AND FIBER OPTICS**  
(OPEN ELECTIVE - 2)

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

**PRE-REQUISITES: NIL**

**COURSE EDUCATIONAL OBJECTIVES:**

1. To acquire knowledge on fundamentals of LASERS
2. To study the working of different types of LASERS
3. To develop knowledge on applications of LASERS in various fields
4. To gain knowledge in fundamentals of Optical fiber, construction, types, and attenuations
5. To develop knowledge on applications of Optical fibers in various fields

**UNIT-1: LASER INTRODUCTION**

**(10)**

Introduction- Spontaneous and stimulated emission of radiation- Properties of lasers (mono chromacity, directionality, coherence and brightness) - Conditions for laser action: population inversion- Pumping and different pumping mechanisms- Einstein coefficients and relation among the coefficients.

**UNIT-2: TYPES OF LASERS**

**(8)**

Nd-YAG laser- He: Ne laser- Semiconductor laser (GaAs)- Argon Ion Laser-CO<sub>2</sub> Laser

**UNIT-3: APPLICATIONS OF LASERS**

**(9)**

Lasers in Holography- Laser in fusion reaction- Lasers in Raman spectroscopy- Lasers in industry -Lasers in isotope separation- Lasers in medicine.

**UNIT-4: OPTICAL FIBERS**

**(9)**

Introduction- Construction of fiber – Working principle of optical fiber (total internal reflection)- Propagation of light through the fibers- Numerical aperture , Acceptance angle and Acceptance cone -Fiber types: Refractive index profile and ray propagation-Step and graded index fibers -Attenuation in fibers: Attenuation coefficient and different loss mechanisms.

**UNIT-5: APPLICATIONS OF FIBERS**

**(9)**

Fiber optic communication system(block diagram)- Sensing applications of fibers: Pressure sensor, Liquid level sensor, Displacement sensor, Chemical sensor – Optical fibers in medicine (endoscopes) - Optical fibers in computer networks (block diagram).

**TOTAL HOURS: 45**



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**

**(AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE OUTCOMES**

<b>On successful completion of the course the student will be able to,</b>		<b>Pos &amp; PSOs</b>
CO1	Acquire the basic knowledge on LASERS	PO1, PO12
CO2	Understand different types of LASERS	PO1, PO12
CO3	Develop knowledge on different applications of LASERS	PO1, PO12
CO4	Acquire the basic knowledge on Optical Fibers	PO1,PO12
CO5	Develop knowledge on different applications of Optical Fibers	PO1,PO12

**REFERENCE BOOKS:**

1. K.Thyagarajan and A.K.Ghatak "Lasers Theory and Applications " Macmillan India Limited, New Delhi.
2. B.Laud "Lasers And non-Linear Opics" second edition,NewAge International(P) limited,Publishers,New Delhi.
3. John Powers,Richard D Irwin "An Introduction to Fiber Optic Systems" ,Second Edition.
4. M.R.Srinivasan" Physics for Engineers" -, New Age International, 2009

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	-	-	-	-	-	-	-	-	-	-	1	2	-
C02	3	-	-	-	-	-	-	-	-	-	-	1	2	-
C03	3	-	-	-	-	-	-	-	-	-	-	1	2	-
C04	3	-	-	-	-	-	-	-	-	-	-	1	2	-
C05	3	-	-	-	-	-	-	-	-	-	-	1	2	-
CO*	3	-	-	-	-	-	-	-	-	-	-	1	2	-



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.  
(AUTONOMOUS)  
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**III B.Tech-VI Semester**

**20EEE363**

**CONTROL OF ELECTRICAL DRIVES  
(Skill oriented Course)**

L	T	P	C
2	0	0	2

**Pre-requisite:** A course on Power Electronics

**COURSE EDUCATIONAL OBJECTIVES:**

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

- 1 To understand the knowledge on dynamics of electrical drives
- 2 To apply the skill on operation and speed control of DC drives
- 3 To study the different speed control methods of various induction motor drives
- 4 To study the skills on operation and speed control of AC drives
- 5 To develop the skills on design of controllers for drives.

**UNIT-1 INTRODUCTION TO ELECTRICAL DRIVES (6)**

Concept of electrical drives – dynamics of electrical drives - fundamental torque equations, speed-torque conventions and multi quadrant operation – steady state stability - typical load torque characteristics – Selection of motor- Electric braking methods regenerative dynamic and plugging.

**UNIT- 2 CONVERTER / CHOPPER FED DC MOTOR DRIVE (6)**

Steady state analysis of the single and three phase converter fed separately excited DC motor drive– continuous conduction –Time ratio and current limit control – 4 quadrant operations of converter / chopper fed drive-Applications.

**UNIT-3 INDUCTION MOTOR DRIVES (6)**

Stator voltage control–V/f control– Rotor Resistance control-qualitative treatment of slip powerrecovery drives-closed loop control- vector control- Applications.

**UNIT-4 SYNCHRONOUS MOTOR DRIVES (6)**

V/f control and self-control of synchronous motor: Margin angle control and power factor control .Three phase voltage/current source fed synchronous motor- Applications.

**UNIT-5 DESIGN OF CONTROLLERS FOR DRIVE (6)**

Transfer function for DC motor / load and converter – closed loop control with Current and speed feedback–armature voltage control and field weakening mode – Design of controllers; current controller and speed controller- converter selection and characteristics.

**Total hours: 30**



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.  
(AUTONOMOUS)  
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE OUTCOMES:**

<b>On successful completion of the course the student will be able to</b>		<b>Pos &amp; PSOs</b>
<b>C01</b>	Understand operation and dynamics of electrical drives	PO1,PO2
<b>C02</b>	Understand converter control of various DC drives	PO1,PO2
<b>C03</b>	Understand various control strategies for Induction Motor Drive systems	PO1,PO2
<b>C04</b>	Understand various control strategies for Synchronous Motor Drive systems	PO1,PO2
<b>C05</b>	Understand design of controllers for drives.	PO1,PO2,PO3,PO1 2

**TEXT BOOKS:**

1. Fundamentals of Electric Drives , 2/e 2001 , G K Dubey , Tata McGraw – Hill Education Pvt. Ltd.. Noida
2. Modern Power Electronics and AC drives , 1/e 2002, B.K Bose , Pearson Publications–India.
3. R.Krishnan, Electric Motor & Drives: Modeling, Analysis and Control, Pearson, 2001

**REFERENCE BOOKS:**

1. Thyristor Control of Electric drives , 1/e 2008, VedamSubramanyam ,Tata McGraw – Hill Education Pvt. Ltd. Noida.
2. Power Semiconductor Drives, 1/e 2009 ,S. Sivanagaraju , H. Balasubbareddy and A. Mallikarjuna Prasad , PHI Learning Pvt Ltd – New Delhi.
3. Electrical Motors & Drives Fundamentals, Types and Applications, 4/e 2013 , Austin Huges and Bill Drury, Newnes publications –New Delhi.
4. Power Electronics, 2/e 2007 (3<sup>rd</sup> Reprint 2008) , M. D. Singh and K. B. Khanchandani, Tata McGraw – Hill Education Pvt. Ltd. – New Delhi.
5. Power Electronics Circuits, Devices and Applications , 3/e 2004 , Mohammad H. Rashid.

**REFERENCE WEBSITE LINK:**

<https://nptel.ac.in/courses/108/102/108102145/>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>C01</b>	3	2	-	-	-	-	-	-	-	-	-	-	2	-
<b>C02</b>	3	3	-	-	-	-	-	-	-	-	-	-	2	-
<b>C03</b>	3	3	-	-	-	-	-	-	-	-	-	-	2	-
<b>C04</b>	3	3	-	-	-	-	-	-	-	-	-	-	2	-
<b>C05</b>	3	2	3	-	-	-	-	-	-	-	-	2	2	-
<b>CO*</b>	<b>3</b>	<b>2.6</b>	<b>3</b>									<b>2</b>	<b>2</b>	<b>-</b>



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.  
(AUTONOMOUS)  
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**III B.Tech-VI Semester**

**20EEE364**

**POWER SYSTEMS AND SIMULATION LAB**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**Pre-requisite:** A course on power system engineering

**COURSE EDUCATIONAL OBJECTIVES:**

On successful completion of the course, students will be able

- 1.** To study the modeling and parameter estimation of transmissions lines
- 2.** To study the various methods used for solving load flow analysis
- 3.** To study the stability, dynamics and transient analysis of power systems
- 4.** To understand the concept of economic dispatch
- 5.** To study the modeling, simulation and analysis of AVR.

**Any TEN of following experiments are required to be conducted**

1. Fault Analysis of **LG & LL FAULT** on a Three-Phase Alternator.
2. Fault Analysis of **LLG & LLLG FAULT** on a Three-Phase Alternator.
3. Single Phase Earth Fault Relay
4. Single Phase Over Current Relay
5. Characteristics of Over Voltage Relay of Static Type
6. Equivalent Circuit of a Three Winding Transformer.
7. Power angle characteristics of salient pole synchronous Machine.
8. Y-BUS Formation for a given Power System Line Data.
9. Z-BUS Formation for a given Power System Line Data
10. GAUSS-SEIDAL Load Flow Analysis for a given Power System Line Data and Load Data.
11. NEWTON-RAPHSON Load Flow Analysis for a given Power System Line Data and Load Data.
12. Reactive Power Compensation of Power System



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**COURSE OUTCOMES:**

On successful completion of the course, student will be able to		Pos & PSOs
<b>CO1</b>	Understand power system planning and operational studies	<b>PO1</b>
<b>CO2</b>	Analyze and acquire knowledge on formation of Bus Admittance and Impedance Matrices and Solution of Networks	<b>PO2</b>
<b>CO3</b>	Design Bus Admittance and Impedance Matrices	<b>PO3</b>
<b>CO4</b>	Analyze and simulate the power flow using GS and NR method	<b>PO5</b>
<b>CO5</b>	Follow ethical principles to evaluate Symmetric and Unsymmetrical fault.	<b>PO8</b>
<b>CO6</b>	Do experiments effectively as an individual and as a member in a group.	<b>PO9</b>
<b>CO7</b>	Communicate verbally and in written form, the understandings about the experiments.	<b>PO10</b>
<b>CO8</b>	Continue updating their skill related to electronic devices and their applications during their life time	<b>PO12</b>

**TEXT BOOKS:**

1. I.J.Nagrath & D.P.Kothari Tata M Graw – Hill Publishing Company Ltd - 2nd edition. "Modern Power System Analysis"
2. A.Chakravarthi and S. Halder".Power System Analysis Operation and Control "3rd Edition, PHI
3. O.I Elgerd "Electric Energy Systems "- Mc Graw-hill Edition
4. Lab Manual of Power system simulation lab.

**REFERENCE BOOKS:**

1. Power System Analysis and Design by J.Duncan Glover and M.S.Sarma. - THOMPSON - 3rd Edition.
2. S. N.Singh "Electric Power Generation", Transmission and Distribution S. N.Singh, 2nd Edition, PHI.

**REFERENCE WEBSITE LINK:**

<https://nptel.ac.in/courses/108/101/108101040/>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>	3	-	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO2</b>	-	3	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO3</b>	-	-	3	-	-	-	-	-	-	-	-	-	2	-
<b>CO4</b>	-	-	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO5</b>	-	-	-	-	-	-	-	3	-	-	-	-	2	-
<b>CO6</b>	-	-	-	-	-	-	-	-	3	-	-	-	2	-
<b>CO7</b>	-	-	-	-	-	-	-	-	-	3	-	-	2	-
<b>CO8</b>	-	-	-	-	-	-	-	-	-	-	-	3	2	-
<b>CO*</b>	<b>3</b>	<b>3</b>	<b>3</b>	-	-	-	-	<b>3</b>	<b>3</b>	<b>3</b>	-	-	<b>3</b>	<b>2</b>



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.  
(AUTONOMOUS)  
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**III B.Tech-VI Semester**

**20ECE370**

**MICROPROCESSORS AND INTERFACING LAB**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**Pre-requisite:** A course on Switching Theory and logic design

**COURSE EDUCATIONAL OBJECTIVES:**

1. To provide knowledge on
  - Fundamentals of 8086 processor.
  - Basic Arithmetic, logical operations.
  - Fundamentals of Assembler.
2. To become skilled in 8086 Assembly language programming.
3. To develop skill to understand programmable peripheral devices and their interfacing With Processor.
4. To understand and learn how to program using String instructions.
5. To develop skills on interfacing 8086 with I/O devices.

**LIST OF EXPERIMENTS:**

**I MICROPROCESSOR 8086:**

1. Introduction to Masm/Tasm
2. Arithmetic Operations (16 bit Addition, subtraction, multiplication & Division)-Multibyte Addition and Subtraction, signed Multiplication and Division.
3. Logic Operations-Shift& Rotate-Converting Packed BCD to Unpacked BCD, BCD to ASCII Conversion
4. Factorial of a number using Recursive and Non recursive procedure
5. By using string operation and instruction prefix: move block, reverse string, Sorting, string comparison.

**II INTERFACING**

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

**EQUIPMENT REQUIRED FOR LABORATORY:**

1. 8086 MICROPROCESSOR KITS
2. INTERFACES/PERIPHERAL SUBSYSTEMS
  - a. 8259 PIC
  - b. 8279KB/DISPLAY
  - c. 8255 PPI
  - d. Stepper Motor
  - e. Traffic light controller



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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE OUTCOME:**

On successful completion of the course the student will be able to		Pos & PSOs
<b>CO1</b>	Develop testing and experimental procedures on 8086 microprocessor and analyze the operation under different cases.	<b>PO1</b>
<b>CO2</b>	Setup programming strategies and select proper mnemonics and run the program on the training boards.	<b>PO2</b>
<b>CO3</b>	Able to understand and work with microprocessor real time interfaces including digital to analog converters, stepper motors, analog to digital converters	<b>PO3</b>
<b>CO4</b>	Design and implement programs on 8051 microcontrollers	<b>PO4</b>
<b>CO5</b>	Able to program with development boards and understand the concept.	<b>PO5</b>
<b>CO6</b>	Follow ethical principles in designing, simulating and implementing various circuits.	<b>PO8</b>
<b>CO7</b>	Do experiments effectively as an individual and as a member in a group.	<b>PO9</b>
<b>CO8</b>	Communicate verbally and in written form, the understandings about the experiments.	<b>PO10</b>
<b>CO9</b>	Continue updating their skill related to semiconductors implementation for various application during their life time	<b>PO12</b>

**TEXT BOOKS:**

1. A,K,Ray and K, M, Bhurchandi "Advanced microprocessor and Peripherals", 2nd edition, 2000, A,K,Ray and K, M, Bhurchandi, TMH, New Delhi.
2. Microprocessor architecture, programming and applications with 8085/8080A 2<sup>nd</sup> edition, 1996, Ramesh S, Goankar, New age international Publishers, New Delhi.

**REFERENCES WEBSITE:**

<https://nptel.ac.in/courses/108/107/108107029/>

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>	3	-	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO2</b>	-	3	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO3</b>	-	-	3	-	-	-	-	-	-	-	-	-	2	-
<b>CO4</b>	-	-	-	3	-	-	-	-	-	-	-	-	2	-
<b>CO5</b>	-	-	-	-	3	-	-	-	-	-	-	-	2	-
<b>CO6</b>	-	-	-	-	-	-	-	3	-	-	-	-	2	-
<b>CO7</b>	-	-	-	-	-	-	-	-	3	-	-	-	2	-
<b>CO8</b>	-	-	-	-	-	-	-	-	-	3	-	-	2	-
<b>CO9</b>	-	-	-	-	-	-	-	-	-	-	-	3	-	-
<b>CO*</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>			<b>3</b>	<b>3</b>	<b>3</b>		<b>3</b>	<b>2</b>	



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
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**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**20EEE365**

**III B.Tech.-VI Semester**  
**PROJECT SKILL LAB**

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

**COURSE EDUCATIONAL OBJECTIVES:**

1. Objective is to give an opportunity to the student to get hands on training in design and innovation.
2. Comparing and contrast the several existing solutions for the problem identified.
3. Formulating and propose a plan for creating a solution for the research plan identified.
4. Conducting the experiments as a team and interpret the results.
5. Reporting and presenting the findings of the work conducted.

The aim of the project skill lab is to deepen comprehension of principles by applying them to a new problem which may be the device / system / component / working mode to be created / fabricated may be decided in consultation with the supervisor and if Possible with an industry. A project topic must be selected by the students in consultation with their supervisor. The students may be grouped into 3 to 5 and work under a project supervisor.

A project report to be submitted by the group and along with the model / system, which will be reviewed and evaluated for internal assessment by a Committee constituted by the Head of the Department. At the end of the semester examination the project work is evaluated based on oral presentation and the project report along with device / system / component / working model jointly by external and internal examiners constituted by the Head of the Department.

**COURSE OUTCOMES:**

<b>On successful completion of course, the student will be able to</b>		<b>Pos &amp; PSOs</b>
<b>CO1</b>	Demonstrate in-depth knowledge on the project topic	<b>PO1</b>
<b>CO2</b>	Identify, analyze and formulate complex problem chosen for project work to attain substantiated conclusions.	<b>PO2</b>
<b>CO3</b>	Design solutions to the chosen project problem.	<b>PO3</b>
<b>CO4</b>	Undertake investigation of project problem to provide valid conclusions	<b>PO4</b>
<b>CO5</b>	Use the appropriate techniques, resources and modern engineering tools necessary for project work	<b>PO5</b>
<b>CO6</b>	Apply project results for sustainable development of the society.	<b>PO6</b>
<b>CO7</b>	Understand the impact of project results in the context of environmental sustainability.	<b>PO7</b>
<b>CO8</b>	Understand professional and ethical responsibilities while executing the project work.	<b>PO8</b>
<b>CO9</b>	Function effectively as individual and a member in the project	<b>PO9</b>
<b>CO10</b>	Develop communication skills, both oral and written for preparing and presenting project report.	<b>PO10</b>
<b>CO11</b>	Demonstrate knowledge and understanding of cost and time analysis required for carrying out the project.	<b>PO11</b>
<b>CO12</b>	Engage in lifelong learning to improve knowledge and competence in the chosen area of the project.	<b>PO12</b>





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**III B.Tech.-VI Semester**

**20MAC352**

**DESIGN THINKING FOR INNOVATION**

**L T P C**  
**2 - - -**

**PRE-REQUISITES:** NIL.

**COURSE EDUCATIONAL OBJECTIVES:**

1. To Study the concepts of design thinking and innovations.
1. To know the basic research concepts in design thinking.
2. To learn the basic concepts of start-ups in design process.
3. To understand the business model design concepts.
4. To study the principles of innovations in design thinking.

**UNIT-1: INTRODUCTION TO DESIGN THINKING (6)**

Concept, frame work and principles of design thinking – Criteria of an inspirational design – Writing the inspirational design – Research findings about inspirational design – Pitfalls to avoid – Defining personas – Creating Personas – Importance and application of Personas – Customer experience mapping.

**UNIT-2: DESIGN THINKING TO BRIDGE RESEARCH AND CONCEPT (6)**

Challenges in idea generation – Need for a systematic method – Visualizing and empathizing – Applying the method – New design ideas – Design heuristics – Value of the design heuristics. **Prototypes in Design:** Product development framework – Prototypes in process – Integrating design into the front end of the innovation process and challenges – Design practice and tools – Integrate design professionals in front end innovation process.

**UNIT-3: START-UPS UNDERSTAND AND APPLY DESIGN PROCESSES (6)**

Emerging start-up culture – IPR to protect innovation – Path from idea to product – Impact of corporate culture and forces – Pillars of innovation– Knowledge management as intelligence and task – Designing amidst uncertainty– Selected tools for breakthrough innovation – Organizational implications – Design thinking within the firm – Role of key personnel – Organizational practices and culture – Value of design thinking.

**UNIT-4: BUSINESS MODEL DESIGN AND PRINCIPLES OF INNOVATION (6)**

Business model – Business model design and method – Process of designing a business model – Implementation of business model. **Principles of Innovations:** Most powerful competitors – Type of products will buy the – Best customers for products – Scope of the business right – Avoid commoditization – Disruptive growth – Strategy development process – Good money and bad money – Role of senior executives.

**UNIT-5: INNOVATION MANAGEMENT (6)**

Importance and overview of innovation process – Innovation in an organizational context – Development activities and design environment – Innovation and invention – Successful and unsuccessful innovation – Different types of innovation – Models of innovation – Disruptive innovations – Cyclic model of innovation with interconnected cycles.

**Total Hours: 30**





**20HSM471A**

**INDUSTRIAL ENGINEERING AND PSYCHOLOGY**

**L T P C**

**3 - - 3**

**PRE-REQUISITES:** NIL.

**COURSE EDUCATIONAL OBJECTIVES:**

1. To learn the concepts and characteristics of personnel Management.
2. To understand the organizational structures and plant layout.
3. To know the basic need of work and method study and industrial psychology.
4. To learn the Forecasting and process planning concepts.
5. To study the inventory control and personnel management in an industry.

**UNIT-1: CONCEPTS OF MANAGEMENT (9)**

**Management:** Importance of administration and organization – Managerial skills, policies, and objectives – Management contribution of FW Taylor, Henry Foyaland Gilberth– Principles, types, process, levels and functions of management – Management chart– Concepts in project management and MIS–Industrial ownership – Responsibilities of supervisor/foreman – Leadership concepts. **Personnel Management:** Concepts, recruitment, selection, training, job evaluation, merit rating, wage plans, incentives, safety, housekeeping, welfare measures, promotion, lay-off, transfer and discharge.

**UNIT-2: ORGANIZATIONAL STRUCTURES AND PLANT LAYOUT (9)**

**Organization:** Concept, importance, characteristics and process of organization – Organization theory, principle, structure, chart and committees – Project, matrix and informal organization – Departmentation – Authority and delegation – Group dynamics – Organizational change, development and conflict – Leadership and communication system. **Plant Layout:** Types, flow pattern, work station, storage, layout and factory design.

**UNIT-3: WORK STUDY AND INDUSTRIAL PSYCHOLOGY (9)**

Work and method study – Ergonomics principles – Process chart symbols – Flow process, activity chart, flow and string diagram – Operation analysis and motion and economy– Design and layout of work place– Therbligs –SIMO chart – Time study – Standard data – Analytical estimating – Performance Rating –Allowances – PMTS. **Industrial Psychology:** Concept, individuals and group – Motivation theories – Hawthorne experiment – Morale and motivation – Environmental condition –Industrial fatigue.

**UNIT-4: PRODUCTION PLANNING AND CONTROL (9)**

**Productivity:** I/O model– Factors affecting the productivity–Productivity resources and measures. **Production Planning:** Continuous and intermittent production –Job, open and closed job shop– Large projects–Forecasting–Process planning – Batch quantity–Tool control and production–Loading, scheduling, dispatching and routing and flow control.

**UNIT-5: MATERIALS MANAGEMENT AND INVENTORY CONTROL (9)**

**Materials Management:** Concepts–Procurement–Purchase and order–Buyingtechniques. **Inventory Control:** Classification – Objectives – Functions – Economic order quantity (EOQ) – Inventory models– ABC analysis–Material requirements planning (MRP)– Manufacturing resource planning(MRP-II).

**TOTAL HOURS: 45**



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**COURSE OUTCOMES:**

<b>On successful completion of the course, students will be able to,</b>		<b>Pos &amp; PSOs</b>
<b>CO1</b>	Understand the concepts of management and characteristics of Administration and organization	<b>PO1, PO2, PO12</b>
<b>CO2</b>	Explain the organizational structures and plant layout for productivity Improvements	<b>PO1, PO2, PO12</b>
<b>CO3</b>	Describe the basic need of work study, method study, time study and industrial psychology	<b>PO1, PO2, PO12</b>
<b>CO4</b>	Explain the Forecasting, Process planning and control of manufacturing a product	<b>PO1,PO2, PO12</b>
<b>CO5</b>	Demonstrate the inventory control and personnel management in an industry	<b>PO1, PO2, PO11, PO12</b>

**TEXT BOOKS:**

1. O.P. Khanna, "Industrial Engineering and Management", Dhanpat Rai PublishingCompany(P)Ltd.,New Delhi,17/e,2010.
2. Pravin Kumar, "Industrial Engineering and Management", Pearson Education, NewDelhi,1/e,2015.

**REFERENCE BOOKS:**

1. S. N. Chary, "Production and Operations Management", Tata McGraw-Hill EducationPvt.Ltd.,Noida, 6/e,2019.
2. William J Stevenson, "Operations Management", Tata McGraw-Hill Education Pvt.Ltd.,Noida, 12/e,2018.
3. ShailendraKale, "Production and Operations Management", Tata McGraw-Hill Education Pvt. Ltd., Noida, 1/e, 2013.
4. Kanishka Bedi, "Production and Operations Management", Oxford University Press, India,3/e,2013.
5. Harold T A mrine, John A Ritchey, Colin L Moodie and Joseph F K mec, "Manufacturing Organization and Management", Pearson Education, New Delhi, 6/e,2004.

**REFERENCE WEBSITE:**

- 1.<https://nptel.ac.in/courses/112/107/112107292/>
- 2.<https://nptel.ac.in/courses/112/107/112107142/>
- 3.<https://nptel.ac.in/courses/112/107/112107143/>

**CO-PO MAPPING:**

<b>CO-PO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO1</b>	<b>PSO2</b>
<b>CO1</b>	3	2	-	-	-	-	-	-	-	-	-	2	2	-
<b>CO2</b>	3	2	-	-	-	-	-	-	-	-	-	2	2	-
<b>CO3</b>	3	2	-	-	-	-	-	-	-	-	-	2	2	-
<b>CO4</b>	3	2	-	-	-	-	-	-	-	-	-	2	2	-
<b>CO5</b>	3	2	-	-	-	-	-	-	-	-	1	2	2	-
<b>CO*</b>	<b>3</b>	<b>2</b>	-	-	-	-	-	-	-	-	<b>1</b>	<b>2</b>	<b>2</b>	-



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
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**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**IV B.Tech.-VII Semester**

**20HSM471B**

**INTELLECTUAL PROPERTY RIGHTS AND PATENTS**

**L T P C**  
**3 - - 3**

**PRE-REQUISITES: NIL**

**COURSE EDUCATIONAL OBJECTIVES:**

1. To introduce the fundamental aspects of intellectual property Rights.
2. To disseminate knowledge on fundamentals of patent, transfer and infringement.
3. To introduce the fundamental aspects of copyrights and trademarks.
4. To acquire knowledge on geographical indication, industrial design and IC layout.
5. To disseminate knowledge on intellectual property management.

**UNIT-1: INTRODUCTION TO INTELLECTUAL PROPERTY (9)**

Definitions and importance of intellectual property – Introduction and history of WTO – Structure of WTO agreements and dispute settlements – Principles of trading system – Trade policy reviews – Agreement on TRIPS – Ministerial conferences – Emerging issues in IPR – Protection of plant varieties – Patent sharks – Open-source movement – Bio-piracy.

**UNIT-2: FUNDAMENTALS OF PATENT, TRANSFER AND INFRINGEMENT (9)**

**Fundamentals of Patent:** History of patents in India – Grant of patent – Inventions those are not patentable – Process and product patent – Specification and procedure of patent – e-filing – Temporal and spatial – Opposition to grant of patent – Rights and PCT of patents – Marketing rights – Milestones in Indian patent. **Transfer and Infringement:** Transfer and Infringement of patent rights – Surrender of patents – Challenges in patents.

**UNIT-3: COPYRIGHT AND TRADE MARKS (9)**

**Copyright:** Definition – Copyright board registration in India – Ownership of copyright – Rights of the owner – Terms of copyright – Registration of copyright – Convention and UCC – Rights of broadcasting – International copyright – Infringement of copyright – Copyright Act, Amendment and Issues. **Trademarks:** Developing a Trademark – Trademark registration – Trademark applications – Procedure for trademark registration in India – Terms, assignment, transmission, certification, infringement of trademarks.

**UNIT-4: GEOGRAPHICAL INDICATION, INDUSTRIAL DESIGN AND IC LAYOUT (9)**

**Geographical Indications:** Concept, historical perspective, potential benefit, renewal and status of Geographical Indications – Geographical Indications in India – Infringement of GI – Status of GI registration in India. **Industrial Designs and IC Layouts:** Registration of Industrial Designs – Copyrights in Industrial designs – Terms, procedure and conditions for Industrial Designs – Infringement of ID – Integrated circuit layout design – Trade secrets.

**UNIT-5: INTELLECTUAL PROPERTY MANAGEMENT (9)**

**Creating Intellectual Property:** Need for creating intellectual property – Development of IP and Knowledge – Types of innovations – Behavioral aspects. **Intellectual Property Management:** Need and importance of IP management – IP management activities – 5Cs model of managing IP – Research and Developments in India (Case Study).

**TOTAL HOURS: 45**



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**COURSE OUTCOMES:**

On successful completion of the course, students will be able to		Pos & PSOs
<b>CO1</b>	Understand fundamental aspects of intellectual property Rights.	<b>PO1, PO12</b>
<b>CO2</b>	Demonstrate knowledge on fundamentals of patent, transfer and infringement.	<b>PO1, PO3, PO12</b>
<b>CO3</b>	Understand fundamental aspects of copyrights and trademarks.	<b>PO1, PO3, PO12</b>
<b>CO4</b>	Demonstrate knowledge on geographical indication, industrial design and IC layout.	<b>PO1, PO3, PO12</b>
<b>CO5</b>	Demonstrate knowledge on intellectual property management.	<b>PO1, PO3, PO12</b>

**TEXTBOOKS:**

1. Intellectual Property Rights, Pandey Neeraj and DharniKhusdeep, 2014, PHI Learning Ltd., India.
2. Intellectual Property Rights and Copyrights, S.P. Satarkar, EssEss Publications, 2003.

**REFERENCEBOOKS:**

1. Intellectual Property in the New Technological Age, 2016: Vol. I Perspectives, Trade Secrets and Patents, Peter S. Menell, Mark A. Lemley, and Robert P. Merges. 2016
2. Intellectual Property in the New Technological Age, 2016: Vol. II Copyrights, Trademarks and State IP Protections, Peter S. Menell, Mark A. Lemley, and Robert P. Merges. 2016.
3. Intellectual Property Rights Law in India, T. Ramappa, 2/e, 2016, Asia Law House.
4. Resisting Intellectual Property, Debora J. Halbert, 2006, Taylor & Francis Ltd, 2007
5. Law Relating to Intellectual Property Rights, V K Ahuja, 3/e, 2017, Lexis Nexis.

**REFERENCEWEBSITE:**

1. [https://onlinecourses.swayam2.ac.in/cec22\\_lw12/preview](https://onlinecourses.swayam2.ac.in/cec22_lw12/preview)
2. [https://onlinecourses.nptel.ac.in/noc22\\_mg98/preview](https://onlinecourses.nptel.ac.in/noc22_mg98/preview)

**CO-PO MAPPING:**

CO-PO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02
<b>C01</b>	3	-	-	-	-	-	-	-	-	-	-	3	2	-
<b>C02</b>	3	-	1	-	-	-	-	-	-	-	-	3	2	-
<b>C03</b>	3	-	1	-	-	-	-	-	-	-	-	3	2	-
<b>C04</b>	3	-	1	-	-	-	-	-	-	-	-	3	2	-
<b>C05</b>	3	-	1	-	-	-	-	-	-	-	-	3	2	-
<b>CO*</b>	<b>3</b>	<b>-</b>	<b>1</b>	<b>-</b>	<b>3</b>	<b>2</b>	<b>-</b>							



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.  
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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**IV B.Tech.-VIISemester**

**20HSM471C**

**MANAGING INNOVATION AND ENTREPRENEURSHIP**

**L T P C  
3 - - 3**

**PRE-REQUISITES: NIL**

**COURSE EDUCATIONAL OBJECTIVES:**

1. To the scope of innovation management principles.
2. To study the characteristics of innovation within firms.
3. To study the technological entrepreneurship and innovation practices.
4. To study the concepts in entrepreneurship for engineers.
5. To understand the financial requirements for starting new venture.

**UNIT-1: IMPORTANCE OF INNOVATION AND MANAGEMENT (9)**

Importance of innovation- Innovation in an organizational context – Development activities and design environment – Innovation and invention – Successful and unsuccessful innovation – Types and models of innovation- DUI mode of innovation – Disruptive innovations – Cyclic model of innovation with interconnected cycles.

**UNIT-2: MANAGING INNOVATION WITHIN FIRMS (9)**

Organizations and innovation – The dilemma of innovation management – Innovation dilemma in low technology sectors – Dynamic capabilities – Managing uncertainty – Managing innovation projects – Organizational characteristics that facilitate the innovation process – Industrial firms – Organizational structures and innovation – The role of the individuals in innovation – IT systems and their impact on innovation – Management tools for innovation. **Operations and Process Innovation:** Design and innovation in the context of operations – Process design and innovation – Innovation in the management of the operations process – Design of the organization and its suppliers – Lean innovation.

**UNIT-3: TECHNOLOGICAL ENTREPRENEURSHIP AND INNOVATION PRACTICES (9)**

Types of entrepreneurships – Sustainable entrepreneurship – Learning lifecycle and the learning strategy – Incubators – Technology management and transfer – Technology transfer mechanisms and models – Technology transfer obstacles – Success factors for technology transfer – Spin offs – Strategic alliances and commercialization metrics.

**UNIT-4: ENTREPRENEURSHIP FOR ENGINEERS (9)**

**Industrial Evolution:** Necessity of industrial viewpoints – Entrepreneurial mind. **How to Commercialize Invention:** Discovery of a new function or material – Performance improvement – Product planning creativity – Marketing creativity. **Start-Up:** The Founder and team – Entrepreneurial process – Legal procedure. **Business Plan:** Executive summary – Management and organization – Product/service – Marketing plan – Administrative policies, procedures, and controls – Growth plan – Financial plan.

**UNIT-5: BUSINESS PLAN TO FUNDING VENTURE (9)**

**How to Find Financial Resources:** Debt and equity – Internal and external funds including loans – Financial resources at the start-up stage – Government grants and Research funds – Private financing. **Financial Management:** Sales and payroll – Daily accounting – Financial statements – Demand, supply, and market equilibrium.

**Total Hours: 45**



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
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**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE OUTCOMES:**

On successful completion of the course, students will be able to		Pos & PSOs
<b>CO1</b>	Describe the scope of importance in innovation and management	<b>PO1, PO6,PO8,PO9, PO11, PO12</b>
<b>CO2</b>	Understand the concepts of managing innovation within firms.	<b>PO1, PO6,PO8,PO9, O11, PO12</b>
<b>CO3</b>	Illustrate the concept of technological entrepreneurship and innovation practices	<b>PO1, PO6,PO8,PO9, O11, PO12</b>
<b>CO4</b>	Summarize the systematic approach to entrepreneurship for engineers	<b>PO1, PO6,PO8,PO9, O11, PO12</b>
<b>CO5</b>	Understand the business plan to funding venture.	<b>PO1, PO6,PO8,PO9, O11, PO12</b>

**TEXTBOOKS:**

1. Paul Trott, -Innovation Management and New Product Development|| 6/e, Pearson Education Ltd.,
2. Elias G. Carayannis, Elpida T. Samara & Yannis L. Bakouros-Innovation and Entrepreneurship - Theory, Policy and Practice|| Springer International Publishing Switzerland, 2015.
3. Kenji Uchino, —Entrepreneurship for engineers|| by Taylor and Francis Group, LLC,2010.

**REFERENCEBOOKS:**

1. Robert D. Hisrich, Michael P. Peters, Dean A. -Entrepreneurship|| 10/e, McGraw-Hill, 2017.
2. Michael G. Luchs, K. Scott Swan and AbbieGriffin., —Design Thinking - New Product Development Essentials from the PDMA||, John Wiley & Sons, Inc., 2016.
3. Clayton M. Christensen and Clayton M. Christensen-The Innovator's Solution - Creating and SustainingSuccessful Growth|| , Harvard Business School Press.

**REFERENCEWEBSITE:**

1. <https://nptel.ac.in/courses/127105007>
2. <https://nptel.ac.in/courses/109105176>
3. <https://nptel.ac.in/courses/107101086>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
<b>CO1</b>	1	-	-	-	-	1	-	1	1	-	3	1	2	-
<b>CO2</b>	1	-	-	-	-	1	-	1	1	-	3	1	2	-
<b>CO3</b>	1	-	-	-	-	1	-	1	1	-	3	1	2	-
<b>CO4</b>	1	-	-	-	-	1	-	1	1	-	3	1	2	-
<b>CO5</b>	1	-	-	-	-	1	-	1	1	-	3	1	2	-
<b>CO*</b>	<b>1</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>1</b>	<b>-</b>	<b>1</b>	<b>1</b>	<b>-</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>-</b>



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.  
(AUTONOMOUS)  
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**IV B.TECH. - VII SEMESTER**

**20HSM472**

**UNIVERSAL HUMAN VALUES AND ETHICS**

(COMMON TO ALL)

**L T P C**

**3 - - 3**

**PRE-REQUISITES: NIL**

**COURSE EDUCATIONAL OBJECTIVES:**

1. To develop a holistic perspective based on self-exploration about themselves (Human being), family, society and nature/existence
2. To understanding (or developing clarity) of the harmony in the human being, family, society, and nature/existence
3. To Strengthening of self-reflection.
4. To develop of commitment and courage to act.
5. To study the holistic understanding of harmony on professional ethics.

**UNIT –1: BASIC GUIDELINES, CONTENT AND PROCESS FOR VALUE EDUCATION (9)**

Purpose and motivation for the course, recapitulation from Universal Human Values – Self-exploration-what is it? - its content and process; „natural acceptance“ and experiential validation- as the process for self-exploration – continuous happiness and prosperity- a look at basic human aspirations – Right understanding, relationship and physical facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority – Right understanding, relationship and physical facility-the basic requirements for fulfilment of aspirations of every human being with their correct priority – Right understanding, relationship and physical facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority.

**Activities:** Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking

**UNIT –2: UNDERSTANDING HARMONY IN THE HUMAN BEING (9)**

Understanding human being as a co-existence of the sentient „I“ and the material „Body“ – Understanding the needs of Self („I“) and „Body“ - happiness and physical facility – Understanding the Body as an instrument of „I“ (I being the doer, seer and enjoyer) – Understanding the characteristics and activities of „I“ and harmony in „I“ – Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail – Programs to ensure Sanyam and Health.

**Activities:** Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one’s own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease.

**UNIT –3: UNDERSTANDING HARMONY IN THE FAMILY AND SOCIETY (9)**

Understanding values in human-human relationship; meaning of justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; trust and respect as the foundational values of relationship – Understanding the meaning of trust; difference between intention and competence – Understanding the meaning of respect, difference between respect and differentiation; the other salient values in relationship – Understanding the harmony in the society (society being an extension of family): resolution, prosperity, fearlessness (trust) and co-existence as comprehensive human goals – Visualizing a universal harmonious order in society-undivided society, universal order-from



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family to world family.

**Activities:** Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives.

**UNIT –4: UNDERSTANDING HARMONY IN THE NATURE AND EXISTENCE (9)**

Understanding the harmony in the nature – Interconnectedness and mutual fulfilment among the four orders of nature-recyclability and self-regulation in nature – Understanding existence as co-existence of mutually interacting units in all-pervasive space – Holistic perception of harmony at all levels of existence.

**Activity:** Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology.

**UNIT –5: UNDERSTANDING OF HARMONY ON PROFESSIONAL ETHICS (9)**

Natural acceptance of human values – Definitiveness of Ethical Human Conduct – Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order – Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems – Case studies of typical holistic technologies, management models and production systems – Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations – Sum up.

**Activity:** Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. To discuss the conduct as an engineer or scientist etc.

**Total Hours: 45**

**COURSE OUTCOMES:**

On successful completion of the course, students will be able to		Pos & PSOs
<b>CO1</b>	Students are expected to become more aware of themselves, and their surroundings (family, society, nature)	<b>PO6, PO7, PO8, PO9, PO12</b>
<b>CO2</b>	They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.	<b>PO6, PO7, PO8, PO9, PO12</b>
<b>CO3</b>	They would have better critical ability.	<b>PO6, PO7, PO8, PO9, PO12</b>
<b>CO4</b>	They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).	<b>PO6, PO7, PO8, PO9, PO12</b>
<b>CO5</b>	It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.	<b>PO6, PO7, PO8, PO9, PO12</b>



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**TEXT BOOKS:**

1. R R Gaur, R Asthana, G P Bagaria, "A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
2. R R Gaur, R Asthana, G P Bagaria, "Teachers" Manual for A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

**REFERENCE BOOKS:**

1. A. N. Tripathi, "Human Values", New Age Intl. Publishers, New Delhi, 2004.
2. Mohandas Karamchand Gandhi "The Story of My Experiments with Truth"
3. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantik, 1999.
4. Mohandas K. Gandhi, "Hind Swaraj or Indian Home Rule"
5. Vivekananda - Romain Rolland(English)
6. Gandhi - Romain Rolland (English)

**REFERENCE WEBSITE:**

1. <https://nptel.ac.in/courses/109104068>
2. <https://nptel.ac.in/courses/110105097>
3. <https://nptel.ac.in/courses/109106117>
4. <https://nptel.ac.in/courses/109103142>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
C01	-	-	-	-	-	2	2	3	2	-	-	3	2	-
C02	-	-	-	-	-	2	2	3	2	-	-	3	2	-
C03	-	-	-	-	-	2	2	3	2	-	-	3	2	-
C04	-	-	-	-	-	2	2	3	2	-	-	3	2	-
C05	-	-	-	-	-	2	2	3	2	-	-	3	2	-
CO*	-	-	-	-	-	2	2	3	2	-	-	3	2	-



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**(AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**IV B.Tech- VII Semester**

<b>20EEE471A ENERGY AUDITING AND DEMAND SIDE MANAGEMENT</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>(Professional Elective Course-3)</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**PRE-REQUISITES:** A Course on Power systems

**Course Educational Objectives:**

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

- 1** Learn about energy consumption and situation in India
- 2** Learn about Energy Auditing in terms of loss and distribution.
- 3** Learn about Energy Measuring Instruments.
- 4** Understand the Demand Side Management.
- 5** Know the concept of Cost Effectiveness Tests of DSM Programs

**UNIT -1: INTRODUCTION TO ENERGY AUDITING (9)**

Energy Situation – 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 -2: ENERGY EFFICIENT MOTORS AND POWER FACTOR IMPROVEMENT (9)**

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– Methods of Improvement, Power factor With Non Linear Loads

**UNIT -3: LIGHTING AND ENERGY INSTRUMENTS FOR AUDIT (9)**

Good Lighting System Design and Practice, Lighting Control, Lighting Energy Audit -Energy Instruments- Watt Meter, Data Loggers, Thermocouples, Pyrometers, Lux Meters, Tong Testers, Application of PLCs

**UNIT -4 : INTRODUCTION TO DEMAND SIDE MANAGEMENT (9)**

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 Management, Load Priority Technique, Peak Clipping, Peak Shifting, Valley Filling, Strategic Conservation, Energy Efficient Equipment. Management and Organization of Energy Conservation Awareness Programs.

**UNIT- 5: ECONOMICS AND COST EFFECTIVENESS TESTS OF DSM PROGRAMS (9)**

Basic payback calculations, Depreciation, Net present value calculations. Taxes and Tax Credit – Numerical Problems. Importance of evaluation, measurement and verification of demand side management programs. Cost effectiveness test for demand side management programs - Ratepayer Impact Measure Test, Total Resource Cost, Participant Cost Test, Program Administrator Cost Test Numerical problems: Participant cost test, Total Resource Cost test and Ratepayer Impact measure test.

**Total Hours: 45**



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**COURSE OUTCOMES:**

On successful completion of the course, students will be able to		Pos & PSOs
<b>CO1</b>	Demonstrate knowledge on energy auditing and evaluate energy audit results.	<b>PO1, PO2, PO3.</b>
<b>CO2</b>	Acquire knowledge on motor energy audit	<b>PO1,PO2</b>
<b>CO3</b>	Analyze demand side management concepts through case study	<b>PO1,PO2</b>
<b>CO4</b>	Understand the Demand Side Management.	<b>PO1,PO2</b>
<b>CO5</b>	Acquire knowledge on demand side management cost Estimation.	<b>PO1,PO2,PO3</b>

**TEXT BOOKS:**

1. Arry C. White, Philip S. Schmidt, David R. Brown, "Industrial Energy Management System"s, Arry Hemisphere Publishing Corporation, New York, 1994.
2. Albert Thumann "Fundamentals of Energy Engineering" -, Prentice Hall Inc, EnglewoodCliffs, New Jersey, 1984.

**REFERENCES BOOKS:**

1. W.R. Murphy & G. Mckay Butter worth "Energy management" Heinemann Publications, 2007.
2. Paul o" Callaghan "Energy management" , Mc-graw Hill Book company-1<sup>st</sup> edition, 1998
3. John .C. Andreas, Marcel Dekker "Energy efficient electric motors" Inc Ltd- 2nd edition, 1995.
4. Economic Analysis of Demand Side Programs and Projects – California Standard Practice Manual, June 2002 – Free download available online

**REFERENCES WEBSITE:**

- [http://www.calmac.org/events/spm\\_9\\_20\\_02.pdf](http://www.calmac.org/events/spm_9_20_02.pdf)

**CO-PO MAPPING:**

CO-PO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02
<b>C01</b>	3	3	2	-	-	-	-	-	-	-	-	-	2	-
<b>C02</b>	3	-	2	-	-	-	-	-	-	-	-	-	2	-
<b>C03</b>	3	-	2	-	-	-	-	-	-	-	-	-	2	-
<b>C04</b>	3	3	2	-	-	-	-	-	-	-	-	-	2	-
<b>C05</b>	2	2	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO*</b>	<b>2.8</b>	<b>2.6</b>	<b>2</b>										<b>2</b>	<b>-</b>



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
**(AUTONOMOUS)**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**IV B.Tech- VII Semester**

<b>20EEE471B</b>	<b>POWER SYSTEM OPERATION AND CONTROL</b> <b>(Professional Elective Course-3)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>

**PRE-REQUISITES:** A Course on Power system Analysis

**COURSE EDUCATIONAL OBJECTIVES:**

On successful completion of the course, students will be able

1. To understand optimal dispatch of generation with and without losses.
2. To study the optimal scheduling of hydro thermal systems.
3. To study the optimal unit commitment problem.
4. To study the load frequency control for single and Two area system with and without controller.
5. To understand the reactive power control and compensation of transmission lines

**UNIT-1: ECONOMIC OPERATION OF POWER SYSTEMS (9)**

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

**UNIT-2: HYDROTHERMAL SCHEDULING (7)**

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

**UNIT-3: MODELING OF TURBINE - GOVERNOR (9)**

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 of small signal transfer function - BlockDiagram.

**UNIT-4: LOAD FREQUENCY CONTROL (9)**

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. Load frequency control of 2-area system - uncontrolled case and controlled case - tie-line bias control. Proportional plus Integral control of single area and its block diagram representation - steady state response - Load Frequency Control and Economic dispatch control.

**UNIT-5: REACTIVE POWER CONTROL & POWER SYSTEM RESTRUCTURIN (10)**

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. Introduction-Need for regulation-Motivation for power system restructuring - key issues in deregulation

**Total Hours: 45**



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**COURSE OUTCOMES:**

<b>On successful completion of the course, students will be able to</b>		<b>Pos &amp; PSOs</b>
<b>CO1</b>	Compute optimal scheduling of Generators.	<b>PO1,PO2</b>
<b>CO2</b>	Understand hydrothermal scheduling.	<b>PO1,PO2</b>
<b>CO3</b>	Understand the unit commitment problem.	<b>PO1,PO2</b>
<b>CO4</b>	Understand the load frequency controllers in single area and two area systems	<b>PO1,PO2</b>
<b>CO5</b>	Understand reactive power control and compensation for transmission line.	<b>PO1,PO2</b>

**TEXT BOOKS:**

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

**REFERENCE BOOKS:**

3. Power System Analysis and Design by J.Duncan Glover and M.S.Sarma. - THOMPSON - 3rd Edition.
4. S. N.Singh "Electric Power Generation", Transmission and Distribution S. N.Singh, 2nd Edition, PHI.
5. S. A. Nasar, Schaum's "Electric Power Systems" Outline Series, Revised 1st Edition, TMH.
6. O I Elgerd "Electric Energy Systems" Mc Graw-hill Edition.

**REFERENCE WEBSITE LINK:**

<https://nptel.ac.in/courses/108/101/108101040/>

**CO-PO MAPPING:**

CO-PO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02
<b>C01</b>	3	3	-	-	-	-	-	-	-	-	-	-	2	-
<b>C02</b>	3	2	-	-	-	-	-	-	-	-	-	-	2	-
<b>C03</b>	3	3	-	-	-	-	-	-	-	-	-	-	2	-
<b>C04</b>	3	3	-	-	-	-	-	-	-	-	-	-	2	-
<b>C05</b>	2	2	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO*</b>	<b>2.8</b>	<b>2.6</b>											<b>2</b>	<b>-</b>



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**

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**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**IV B.Tech- VII Semester**

**20EEE471C**

**POWER SYSTEM DYNAMICS  
(Professional Elective Course-3)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**PRE-REQUISITES:** A Course on Electrical Machines

**COURSE EDUCATIONAL OBJECTIVES:**

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

- 1** Introduce the basics of dynamics and stability problems.
- 2** Educate on modeling of synchronous machines.
- 3** Educate on the excitation system and speed-governing controllers.
- 4** Study small signal stability of a single machine infinite bus system with excitation System and power system stabilizer.
- 5** Educate on the transient stability simulation of multi machine power system.

**UNIT -1: BASIC CONCEPTS**

**(9)**

Power system stability- states of operation and system security - system dynamics - problems - system model - analysis of steady state stability and transient stability - simplified representation of excitation control.

**UNIT-2: MODELING OF SYNCHRONOUS MACHINE**

**(9)**

Synchronous machine - Park's transformation - analysis of steady state performance - per unit quantities- Equivalent circuits of synchronous machine - Determination of parameters of equivalent circuits.

**UNIT-3: EXCITATION SYSTEM**

**(9)**

Excitation system modeling - block diagram - system representation by state equations - dynamics of a synchronous generator connected to infinite bus - system model - Synchronous machine model - stator and rotor equations - Synchronous machine model with field circuit.

**UNIT-4: ANALYSIS OF SINGLE MACHINE SYSTEM**

**(9)**

Small signal analysis with block diagram - Representation characteristic equation and application of Routh Hurwitz criterion - synchronizing and damping torque analysis - small signal model - State equations.

**UNIT-5: APPLICATION OF POWER SYSTEM STABILIZERS**

**(9)**

Basic concepts in applying PSS - Control signals - Structure and tuning of PSS - Washout

**Total Hours: 45**



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**COURSE OUTCOMES:**

On successful completion of the course, students will be able to		Pos & PSOs
<b>CO1</b>	Demonstrate knowledge on fundamental dynamic behavior of power systems	<b>PO1,PO2,PO3</b>
<b>CO2</b>	Acquire knowledge on synchronous machine modeling	<b>PO1,PO3</b>
<b>CO3</b>	Demonstrate knowledge on excitation system modeling	<b>PO1,PO3</b>
<b>CO4</b>	Acquire knowledge on analyzing single machine system	<b>PO1,PO2,PO3</b>
<b>CO5</b>	Demonstrate knowledge on application of power system stabilizers	<b>PO1,PO2</b>

**TEXT BOOKS:**

1. K R Padiyar, "Power Systems Dynamics", B.S. publications.
2. P M Anderson and A A Fouad, "Power system control and stability", IEEE Press

**REFERENCE BOOKS:**

1. R Ramanujam, "Power Systems Dynamics", PHI publications.
2. P Kundur, "Power system stability and control", McGraw Hill publishers

**REFERENCE WEBSITE LINK:**

<https://nptel.ac.in/courses/108/101/108101004/>

**CO-PO MAPPING:**

CO-PO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02
<b>C01</b>	3	3	2	-	-	-	-	-	-	-	-	-	2	-
<b>C02</b>	3	-	2	-	-	-	-	-	-	-	-	-	2	-
<b>C03</b>	3	-	2	-	-	-	-	-	-	-	-	-	2	-
<b>C04</b>	3	3	2	-	-	-	-	-	-	-	-	-	2	-
<b>C05</b>	2	2	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO*</b>	<b>2.8</b>	<b>2.6</b>	<b>2</b>										<b>2</b>	<b>-</b>



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**IV B.Tech- VII Semester**

<b>20EEE472A</b>	<b>HVDC TRANSMISSION SYSTEMS (Professional Elective Course-4)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**PRE-REQUISITES:** A Course on Electrical Power Transmission and power electronics.

**COURSE EDUCATIONAL OBJECTIVES:**

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

- 1** Understand the concept of DC power transmission and comparison with AC Power transmission.
- 2** Analyze HVDC converters.
- 3** Study about the Converter Control and HVDC system control.
- 4** Understand the significance of reactive power control and design of filters.
- 5** Study about DC system model.

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

DC Power transmission technology – Comparison of AC and DC transmission – Application of DC transmission – Description of DC transmission system – Planning for HVDC transmission – Modern trends in HVDC technology – DC breakers – Operating problems – HVDC transmission based on VSC – Types and applications of MTDC systems.

**UNIT-2: ANALYSIS OF HVDC CONVERTERS (9)**

Line commutated converter - Analysis of Graetz circuit with and without overlap - Pulse number –Choice of converter configuration – Converter bridge characteristics – Analysis of a 12 pulse Converters – Analysis of VSC topologies and firing schemes.

**UNIT-3: CONVERTER AND HVDC SYSTEM CONTROL (9)**

Principles of DC link control – Converter control characteristics – System control hierarchy – Firing angle control – Current and extinction angle control – Starting and stopping of DC link – Power control – Higher level controllers – Control of VSC based HVDC link.

**UNIT-4: REACTIVE POWER AND HARMONICS CONTROL (9)**

Reactive power requirements in steady state – Sources of reactive power – SVC and STATCOM – Generation of harmonics – Design of AC and DC filters – Active filters.

**UNIT-5: POWER FLOW ANALYSIS IN AC/DC SYSTEMS (9)**

Over View of Power flows analysis – DC system model –Solution Procedure- Inclusion of constraints – case study.

**Total Hours: 45**



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**COURSE OUTCOMES:**

On successful completion of the course, students will be able to		Pos & PSOs
<b>CO1</b>	Acquire knowledge on AC and DC Transmission System and Modern Trends in HVDC systems	<b>PO1,PO2,PO3,PO12</b>
<b>CO2</b>	Able Know the operation of converters	<b>PO1,PO2,PO3</b>
<b>CO3</b>	To understand the concepts Converter Control and HVDC system control	<b>PO1,PO3,PO4</b>
<b>CO4</b>	Acquire Knowledge on concept of reactive power control and Design of Filters	<b>PO1,PO3,PO4</b>
<b>CO5</b>	Able to Understand the Power flows analysis in AC/DC System	<b>PO1,PO3,PO4,PO12</b>

**TEXT BOOKS:**

1. HVDC Power Transmission Systems: Technology and system Interactions – by K.R.Padiyar, New Age International (P) Limited, and Publishers.
2. HVDC Transmission By S.Kamakshaiah Andv.Kamaraju-Tata Mcgraw-Hill

**REFERENCE BOOKS:**

1. Kundur P., " Power System Stability and Control", McGraw-Hill,1993.
2. Colin Adamson and Hingorani NG," High Voltage Direct Current Power Transmission", Garraway Limited, London, 1960.
3. Edward Wilson Kimbark," Direct Current Transmission", Vol.I, Wiley inter science, New York, London, Sydney,1971.
4. E.W.Kimbark, John Wiley & Sons Direct Current Transmission.

**REFERENCE WEBSITE:**

<https://nptel.ac.in/courses/108/104/108104013/>

**CO-PO MAPPING:**

CO-PO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02
<b>C01</b>	3	2	2	-	-	-	-	-	-	-	-	1	2	-
<b>C02</b>	3	3	2	-	-	-	-	-	-	-	-	-	2	-
<b>C03</b>	3	-	3	3	-	-	-	-	-	-	-	-	2	-
<b>C04</b>	3	-	3	3	-	-	-	-	-	-	-	-	2	-
<b>C05</b>	2	-	3	3	-	-	-	-	-	-	-	2	2	-
<b>CO*</b>	<b>2.8</b>	<b>2.5</b>	<b>2.6</b>	<b>3</b>								<b>1.5</b>	<b>2</b>	<b>-</b>



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**

**(AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**IV B.Tech- VII Semester**

**20EEE472B**

**POWER QUALITY  
(Professional Elective Course-4)**

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

**PRE-REQUISITES:** A Course on Electrical Power Transmission

**COURSE EDUCATIONAL OBJECTIVES:**

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

- 1 Know the fundamental of electric power quality phenomena
- 2 Learn the Voltage Sags and Interruptions
- 3 Know the detailed analysis of Transient and over voltages
- 4 Learn about Harmonics fundamentals
- 5 Learn the power quality Benchmarking process.

**UNIT- 1: INTRODUCTION**

**(9)**

What is power quality? Power quality – voltage quality - why are we concerned about power quality? - the power quality Evaluation procedure - Terms and Definitions - Transients - Long-duration voltage variations - short-voltage variations - voltage imbalance - wave form distortion - voltage fluctuation - power frequency variations - power quality terms CBEMA and ITI curves.

**UNIT -2: VOLTAGE SAGS AND INTERRUPTIONS**

**(9)**

Sources of sags and interruptions - Estimating voltage sag performance - fundamental principles of protection - solutions at the end-use level - Motor-starting sags - utility system fault-clearing issues.

**UNIT -3: TRANSIENT OVER VOLTAGES**

**(9)**

Sources of over voltages - principles of over voltage protection - devices for over voltage protection - utility capacitor-switching transients - utility system lightning protection.

**UNIT -4: FUNDAMENTALS OF HARMONICS & APPLIED HARMONICS**

**(9)**

Harmonic Distortion - Voltage versus current distortion - Harmonics versus Transients - power system qualities under non sinusoidal conditions - Harmonic indices - Harmonic sources from commercial loads - Harmonic sources from Industrial loads Effects of Harmonics - Harmonic distortion evaluations - Principles of Controlling Harmonics - Devices for Controlling Harmonic Distortion

**UNIT -5: POWER QUALITY BENCH MARKING AND MONITORING**

**(9)**

Benchmarking process, RMS voltage variation indices Power Quality Contracts. Monitoring considerations-Power quality measurement equipment, assessment of power quality measurement data, application of intelligent systems - Power quality Monitoring standards.

**Total Hours: 45**



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
**(AUTONOMOUS)**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE OUTCOMES:**

<b>On successful completion of the course, students will be able to</b>		<b>Pos &amp; PSOs</b>
<b>CO1</b>	Understand voltage sag, swell, long and short duration voltage variations.	<b>PO1,PO2,PO4,PO12</b>
<b>CO2</b>	Understand the sources, principle of protection of voltage sag and interruption.	<b>PO1,PO2,PO3,PO4,PO12</b>
<b>CO3</b>	Understand the concept of capacitor switching and lightning.	<b>PO1,PO2,PO4,PO12</b>
<b>CO4</b>	Understand the controlling of harmonic distortion.	<b>PO1,PO2,PO3,PO4,PO12</b>
<b>CO5</b>	Understand various power qualities monitoring equipment and benchmarking process.	<b>PO1,PO3,PO4,PO12</b>

**TEXT BOOKS:**

1. Roger C. Dugan - Mark F. McGranaghan "Electrical Power Systems Quality" Surya SantosH.Wayne Beaty - 2nd Edition - TMH Education Pvt. Ptd.
2. G.T. Heydt, "Electric Power Quality", 2nd Edition. (West Lafayette, IN, Stars in a Circle Publications, 1994.

**REFERENCE BOOKS:**

1. J. Arrillaga - N.R. Watson - S. Chen "Electrical systems quality Assessment" - John Wiley& Sons,2003.
2. Math H. J. Bollen "Understanding Power quality problems" IEEE Press.
3. M.H.J Bollen, "Understanding Power Quality Problems: Voltage Sags and Interruptions", (New York: IEEE Press), 2000.

**REFERENCE WEBSITE**

<https://nptel.ac.in/courses/108/107/108107157/>

**CO-PO MAPPING:**

CO-PO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02
<b>CO1</b>	2	2	-	3	-	-	-	-	-	-	-	3	2	-
<b>CO2</b>	2	2	3	3	-	-	-	-	-	-	-	3	2	-
<b>CO3</b>	2	2	-	3	-	-	-	-	-	-	-	3	2	-
<b>CO4</b>	2	2	3	3	-	-	-	-	-	-	-	3	2	-
<b>CO5</b>	2	-	3	3	-	-	-	-	-	-	-	3	2	-
<b>CO*</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>3</b>								<b>3</b>	<b>2</b>	<b>-</b>



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**

**(AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**IV B.Tech- VII Semester**

**20EEE472C**

**SPECIAL ELECTRICAL MACHINES  
(Professional Elective Course-4)**

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

**PRE-REQUISITES:** A Course on Electrical Machines

**COURSE EDUCATIONAL OBJECTIVES:**

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

- 1** Demonstrate knowledge on construction and performance of synchronous reluctance motors
- 2** Offer knowledge on construction and operation, drive system and circuit control and their modes of operation of stepper motor.
- 3** Provide knowledge on drive system and circuit control of switched reluctance motor.
- 4** Afford knowledge on construction and performance of PMBLDC motor.
- 5** Supply knowledge on construction and performance of permanent magnet synchronous motor and their characteristics

**UNIT - 1: SYNCHRONOUS RELUCTANCE MOTORS (9)**

Constructional features – Types – Axial and Radial flux motors – Operating principles – Voltage and Torque Equations - Phasor diagram - performance characteristics and Applications–Vernier Motor-Principles of operation.

**UNIT 2: STEPPER MOTORS (9)**

Constructional features- principle of operation–Types of stepper motor-Modes of operation – Drive circuits –Static and Dynamic Characteristics and Applications. Closed loop and Microprocessor control of stepper motor.

**UNIT -3: SWITCHED RELUCTANCE MOTORS (9)**

Constructional and Principles of operation - Torque Equation of SRM– drive circuits – Torque speed characteristics. Current control schemes–Microprocessor based control; closed loop and sensor less control of SRM drive –Methods of rotor Position sensing – Applications.

**UNIT- 4: PERMANENT MAGNET BRUSH LESS DC MOTORS (9)**

Comparison between mechanical and electronic commutators – Principle of operation - driving circuits – Torque and EMF equation – Torque and Speed characteristics –sensor less control of B LDC motors–applications.

**UNIT-5: PERMANENT MAGNET SYNCHRONOUS MOTORS (9)**

Principles of operation – Constructional features – Phasor diagram – torque speed characteristics – torque and EMF equations –power controllers – applications. Construction and types of Linear Synchronous Motor (LSM) and its applications.

**TOTAL HOURS: 45**



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
**(AUTONOMOUS)**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE OUTCOMES:**

On successful completion of the course, students will be able to		Pos & PSOs
<b>CO1</b>	Demonstrate knowledge on construction and performance of synchronous reluctance motors	<b>PO1,PO2,PO3</b>
<b>CO2</b>	Acquire knowledge on the modes of operation, drive system and circuit control of stepper motor.	<b>PO1,PO2,PO3</b>
<b>CO3</b>	analyze and understand construction and principle of operation of switched reluctance motor.	<b>PO1,PO2</b>
<b>CO4</b>	analyze and understand drive system and circuit control of PMSBLDC motor.	<b>PO1,PO2,PO3</b>
<b>CO5</b>	analyze and understand the performance of permanent magnet synchronous motor.	<b>PO1,PO2</b>

**TEXT BOOKS**

1. Venkataratnam K- "Special Electrical Machines" - Universities Press - Hyderabad - 2008.
2. P.P.Acarney-"Stepping Motors -A Guide to Modern theory and practice" - Peter Peregrines - London - 2002.
3. Dr.P.S.Bhimbra-"Generalized theory of Electrical machines"-Khanna Publishers
4. Sen.P.C."Principles of Electrical Machines and Power Electronics", John Willey & sons, Second Edition, 2008.

**REFERENCE BOOKS**

1. J.Gnanavadivel, Dr.S.Muralidharan-"Principles of Special Electrical Machines" - Anuradha Publications-Chennai.
2. T.J.E. Miller-"Brush less Permanent Magnet and reluctance Motor Drives" - Clarendon Press - Oxford - 1989. Say. M.G
3. " Alternating current machines" John Willey & sons, fifth edition 1983

**REFERENCE WEBSITE**

<https://nptel.ac.in/courses/108/102/108102156/>

**CO-PO MAPPING:**

CO-PO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02
<b>C01</b>	3	3	2	-	-	-	-	-	-	-	-	-	2	-
<b>C02</b>	3	3	2	-	-	-	-	-	-	-	-	-	2	-
<b>C03</b>	3	3	-	-	-	-	-	-	-	-	-	-	2	-
<b>C04</b>	3	3	2	-	-	-	-	-	-	-	-	-	2	-
<b>C05</b>	3	3	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO*</b>	<b>3</b>	<b>3</b>	<b>2</b>									-	<b>2</b>	<b>-</b>



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.  
(AUTONOMOUS)  
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**IV B.Tech- VII Semester**

<b>20EEE473A</b>	<b>FLEXIBLE AC TRANSMISSION SYSTEMS (Professional Elective Course-5)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**PRE-REQUISITES:** A Course on Electrical Transmission systems and Power electronics.

**COURSE EDUCATIONAL OBJECTIVES:**

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

- 1** understand the need for FACTS
- 2** Know the concept of shunt compensation techniques
- 3** understand the series compensation techniques
- 4** understand the concept of unified power flow controller
- 5** learn about controlled voltage and Phase angle regulator

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

Electrical transmission network – Need of transmission interconnections – power flow in AC systems – power flow and dynamic stability considerations – Relative importance of controllable parameters – Basic types of FACTS controllers Brief description && definitions – Benefits from FACTS technology.

**UNIT-2: STATIC VAR COMPENSATOR (SVC) (9)**

Introduction to shunt compensation – Objectives of Shunt compensation –Voltage control by SVC – VI characteristics – advantages of slope in dynamic characteristics – Influence of SVC on system voltage, SVC applications: Steady state power transfer capacity – enhancement of transient stability – Prevention of voltage instability – Introduction to PODC.

**UNIT-3: THYRISTORS CONTROLLED SERIES CAPACITOR (TCSC) (9)**

Introduction to series compensation – Objectives of series compensation –Operation of TCSC: Different modes of operation – Modeling of TCSC: variable reactance model, Transient stability model – TCSC applications: Improvement of system stability limit – voltage collapse prevention.

**UNIT-4: EMERGING FACTS CONTROLLERS (9)**

Basic concept of voltage source converters and current source converter SSSC – principle of operation – Applications, STATCOM – principle of operation –VI characteristics – Applications – UPFC: - Modes of operation – Applications –Introduction to IPFC – Comparison of SVC and STATCOM.

**UNIT-5: STATIC VOLTAGE AND PHASE ANGLE REGULATOR (9)**

Objectives of voltage and phase angle regulators -- Approaches to thyristor controlled voltage and phase angle regulators – Industrial applications of FACTS devices.



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
**(AUTONOMOUS)**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE OUTCOMES:**

On successful completion of the course, students will be able to		Pos & PSOs
<b>CO1</b>	understand the need for FACTS	<b>PO1,PO2,PO3,PO12</b>
<b>CO2</b>	learn shunt compensation techniques	<b>PO1,PO2</b>
<b>CO3</b>	learn series compensation techniques	<b>PO1,PO2,PO3</b>
<b>CO4</b>	learn the concept of unified power flow controller	<b>PO1,PO2,PO3</b>
<b>CO5</b>	learn about controlled voltage and Phase angle regulator	<b>PO1,PO3</b>

**TEXT BOOKS:**

1. Narain G.Hingorani and Laszl Gyugyi, "Understanding FACTS – Concept & technology of flexible AC transmission systems", Standard publishers distributors, IEEE press, 2001.
2. Padiyar.K.R," FACTS Controllers in Power Transmission and Distribution",NewAge International (P) Limited, Publishers, New Delhi, 2008.

**REFERENCE BOOKS:**

1. Mohan. R.Mathur & Rajiv K. Varma, "Thyristor – Based FACTS controllers for Electrical transmission systems", Wiley Inter science publications, 2002.
2. Enrique Acha, Claudio R.Fuerte, Esquivel, Hygo Ambriz, Perez & Cesar Angeles – Camacho, "FACTS – Modeling and Simulators in Power Networks", John wiley & sons, 2004.
3. John. A.T. "Flexible AC transmission systems", Institution of Electrical and Electronics Engineers, IEEE press, 1999.
4. V.K.Sood, HVDC and FACTS controllers–Applications of Static Converters in Power System, APRIL2004, KluwerAcademic Publishers,2004.

**REFERENCE WEBSITE:**

<https://nptel.ac.in/noc/courses/noc18/SEM2/noc18-ee44/>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>	3	3	3	-	-	-	-	-	-	-	-	3	2	-
<b>CO2</b>	3	3	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO3</b>	3	3	3	-	-	-	-	-	-	-	-	-	2	-
<b>CO4</b>	3	3	3	-	-	-	-	-	-	-	-	-	2	-
<b>CO5</b>	3	-	3	-	-	-	-	-	-	-	-	-	2	-
<b>CO*</b>	<b>3</b>	<b>3</b>	<b>3</b>									3	2	-



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
**(AUTONOMOUS)**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**IV B.Tech- VII Semester**

**20EEE473B**

**POWER SYSTEM TRANSIENTS**  
**(Professional Elective Course-5)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**PRE-REQUISITES:** A Course on Network Analysis

**COURSE EDUCATIONAL OBJECTIVES:**

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

- 1 Study the generation of switching transients and their control using circuit theoretical concept.
- 2 Study the mechanism of switching transients and their adverse effects.
- 3 Study the mechanism of lightning strokes and the production of lightning surges.
- 4 Study the propagation, reflection and refraction of travelling waves.
- 5 Study the impact of voltage transients caused by faults, circuit breaker action, and load rejection on integrated power system.

**UNIT -1: INTRODUCTION AND SURVEY**

**(9)**

Review and importance of the study of transients – causes for transients. RL circuit transient with sine wave excitation – double frequency transients – basic transforms of the RLC circuit transients. Different types of power system transients – effect of transients on power systems- role of the study of transients in system planning.

**UNIT -2: SWITCHING TRANSIENTS**

**(9)**

Over voltages due to switching transients – resistance switching and the equivalent circuit for interrupting the resistor current – load switching and equivalent circuit – waveforms for transient voltage across the load and the switch – normal and abnormal switching transients. Current suppression – current chopping– effective equivalent circuit. Capacitance switching – effect of source regulation – capacitance switching with a restrike, with multiple restrikes.

**UNIT -3: LIGHTNING TRANSIENTS**

**(9)**

Review of the theories in the formation of clouds and charge formation – rate of charging of thunder clouds – mechanism of lightning discharges and characteristics of lightning strokes – model for lightning stroke – factors contributing to good line design – protection using ground wires – tower footing resistance – interaction between lightning and power system.

**UNIT-4: TRAVELING WAVES ON TRANSMISSION LINE**

**(9)**

Computation of transients – transient response of systems with series and shunt lumped parameters and distributed lines. Traveling wave concept – step response – Bewley's lattice diagram – standing waves and natural frequencies – reflection and refraction of travelling waves.

**UNIT -5: TRANSIENTS IN INTEGRATED POWER SYSTEM**

**(9)**

The short line and kilometric fault – distribution of voltages in a power system – line dropping and load rejection – voltage transients on closing and reclosing lines – over voltage induced by faults – switching surges on integrated system – Quantitative application of EMTP for transient computation.

**Total Hours: 45**



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
**(AUTONOMOUS)**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE OUTCOMES:**

On successful completion of the course, students will be able to		Pos & PSOs
<b>CO1</b>	Study the generation of circuit transients and their control using circuit– theoretical concept.	<b>PO1, PO2, PO4</b>
<b>CO2</b>	Acquire knowledge on switching transients and their adverse effects.	<b>PO1,PO2, PO4</b>
<b>CO3</b>	Acquire knowledge on lighting strokes and the production of lighting surges	<b>PO1,PO3</b>
<b>CO4</b>	Understands wave propagation, reflection and refraction of travelling waves	<b>PO1,PO2, PO3</b>
<b>CO5</b>	know the impact of voltage transients caused by faults, circuit breaker action, load rejection on integrated power system	<b>PO1,PO2,PO3,PO4</b>

**TEXT BOOKS:**

1. Allan Greenwood, "Electrical transients in Power systems", Wiley Inter Science, New York, 2<sup>nd</sup> Edition, 1991.
2. Pritindra Chowdhari, "Electromagnetic transients in power systems", John Wiley and Sons, 2<sup>nd</sup> Edition, 2009.

**REFERENCE BOOKS:**

1. M.S.Naidu and V.Kamaraju, "High voltage engineering", TMH, 5<sup>th</sup> Edition, 2013.
2. R.D. Begamudre, "Extra high voltage AC transmission engineering", Wiley Eastern Ltd.,1986.
3. Y.Hase, "Handbook of power system engineering", Wiley India, 2102.
4. C.S. Indulkar, D.P.Kothari, K.Ramalingam, "Power system Transients – A statistical approach", PHI Learning Private Limited, 2<sup>nd</sup> Edition, 2010.

**REFERENCE WEBSITE:**

<https://nptel.ac.in/courses/108/105/108105104/>

**CO-PO MAPPING:**

CO-PO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02
<b>C01</b>	3	2	-	3	-	-	-	-	-	-	-	-	2	-
<b>C02</b>	3	2	-	2	-	-	-	-	-	-	-	-	2	-
<b>C03</b>	3	-	2	-	-	-	-	-	-	-	-	-	2	-
<b>C04</b>	3	3	2	-	-	-	-	-	-	-	-	-	2	-
<b>C05</b>	3	3	3	2	-	-	-	-	-	-	-	-	2	-
<b>CO*</b>	<b>3</b>	<b>2.5</b>	<b>2.3</b>	<b>2.3</b>									<b>2</b>	<b>-</b>



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**

**(AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**IV B.Tech- VII Semester**

**20EEE473C**

**ELEMENTS OF SMART GRID  
(Professional Elective Course-5)**

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

**PRE-REQUISITES: A Course on Electrical Transmission and Distribution systems**

**COURSE OBJECTIVES:**

1. To study overview of smart Grid.
2. To familiarize the smart grid technologies in transmission systems.
3. To familiarize the smart grid technologies in distribution systems.
4. To understand the smart meters and applications
5. To familiarize the high performance computing for Smart Grid applications

**UNIT-1: INTRODUCTION TO SMART GRID (9)**

Evolution of Electric Grid, Concept, Definitions and Need for Smart Grid, Smart grid drivers, functions, opportunities, challenges and benefits, Difference between conventional & Smart Grid, National and International Initiatives in Smart Grid

**UNIT-2: SMART GRID TECHNOLOGIES (Transmission) (9)**

Technology Drivers, Smart energy resources, Smart substations, Substation Automation, Feeder Automation, Transmission systems: EMS, FACTS and HVDC, Wide area monitoring, Protection and control

**UNIT-3: SMARTGRID TECHNOLOGIES (Distribution) (9)**

DMS, Volt/ VAR control, Fault Detection, Isolation and service restoration, Outage management, High – Efficiency Distribution Transformers, Phase Shifting Transformers, Plug in Hybrid Electric Vehicles (PHEV)

**UNIT-4: SMART METERS (9)**

Introduction to Smart Meters, Advanced Metering infrastructure (AMI) drivers and benefits, AMI protocols, standards and initiatives, AMI needs in the smart grid, Phasor Measurement Unit(PMU), Intelligent Electronic Devices(IED) & their application for monitoring & protection.

**UNIT-5:HIGH PERFORMANCE COMPUTING FOR SMART GRID APPLICATIONS (9)**

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 to make Smart Grids smarter, Cyber Security for Smart Grid.

**TOTAL HOURS:45**



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
**(AUTONOMOUS)**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE OUTCOMES:**

On successful completion of the course, students will be able to		Pos & PSOs
<b>CO1</b>	Ability to understand the concepts of Smart Grid and its present developments.	<b>PO1,PO2,PO3</b>
<b>CO2</b>	Able to knowledge on power quality management in Smart Grids	<b>PO1,PO2,PO3</b>
<b>CO3</b>	Able to study about different technologies in smart grid.	<b>PO1,PO3,PO4</b>
<b>CO4</b>	Able to acquire knowledge about different smart meters and advanced metering infrastructure.	<b>PO1,PO3,PO4</b>
<b>CO5</b>	Ability to develop more understanding on LAN, WAN and Cloud Computing for Smart Grid applications	<b>PO1,PO3,PO4</b>

**TEXT BOOKS**

1. Stuart Borlase "Smart Grid: Infrastructure, Technology and Solutions", CRC Press 2012.
2. Janaka Ekanayake, Nick Jenkins, Kithsiri Liyanage, Jianzhong Wu, Akihiko Yokoyama, "Smart Grid: Technology and Applications", Wiley.

**REFERENCES:**

1. Vehbi C. Gün gör , Dilan Sahin, Taskin Kocak, Salih Ergüt, Concettina Buccella , Carlo Cecati , and Gerhard P. Hancke , Smart Grid Technologies: Communication Technologies and Standards IEEE Transactions On Industrial Informatics, Vol. 7, No. 4, November 2011.
2. Xi Fang, Satya jayant Misra, Guoliang Xue, and Dejun Yang " Smart Grid – the new and Improved Power Grid: A Survey" , IEEE Transaction on Smart Grids.

**REFERENCE WEBSITE:**

<https://nptel.ac.in/courses/108/107/108107113/>

**CO-PO MAPPING:**

CO-PO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02
<b>C01</b>	3	2	2	-	-	-	-	-	-	-	-	1	2	-
<b>C02</b>	3	3	2	-	-	-	-	-	-	-	-	-	2	-
<b>C03</b>	3	-	3	3	-	-	-	-	-	-	-	-	2	-
<b>C04</b>	3	-	3	3	-	-	-	-	-	-	-	-	2	-
<b>C05</b>	2	-	3	3	-	-	-	-	-	-	-	2	2	-
<b>CO*</b>	<b>2.8</b>	<b>2.5</b>	<b>2.6</b>	<b>3</b>								<b>1.5</b>	<b>2</b>	<b>-</b>



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
**(AUTONOMOUS)**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**IV B.Tech. - VII Semester**

**200CIV471**

**DISASTER MANAGEMENT AND MITIGATION**  
(OPEN ELECTIVE - 3)

**L T P C**  
**3 - - 3**

**PRE-REQUISITES:** A Course on Environmental Studies.

**COURSE OUTCOMES:**

1. To explain the disaster phenomenon and disaster preparedness.
2. To demonstrate the roles and responsibilities of different agencies.
3. To explain the disaster management techniques
4. To explain concept of disaster mitigation strategies
5. To demonstrate the different case studies on disaster management

**UNIT-1: INTRODUCTION TO DISASTER PREPAREDNESS (9)**  
Disaster Management- Prevention-Preparedness and Mitigation-Disaster Preparedness-Concept & Nature-Disaster Preparedness Plan-Disaster Preparedness for People and Infrastructure · Community based Disaster Preparedness Plan. Mitigation process- disaster management techniques, disaster management aspects.

**UNIT-2: ROLES & RESPONSIBILITIES OF DIFFERENT AGENCIES (9)**  
Roll of Information-Education-Communication & Training-Role and Responsibilities of Central-State-District and local administration-Role and Responsibilities of Armed Forces-Police-Paramilitary Forces-Role and Responsibilities of International Agencies-NGOs-Community Based Org. (CBO s), disaster management quality control.

**UNIT-3: TECHNOLOGIES FOR DISASTER MANAGEMENT (9)**  
Role of IT in Disaster Preparedness-Remote Sensing-GIS and GPS-Use and Application of Emerging Technologies-Application of Modern Technologies for the Emergency Communication-Application and use of ICST for different disasters

**UNIT-4: DISASTER MITIGATION (9)**  
Meaning and concept-Disaster Mitigation Strategies-Emerging Trends in Disaster Mitigation · Mitigation Management-Role of Team and Coordination

**UNIT-5: DISASTER MANAGEMENT (9)**  
Applications and case studies and field works-Landslide Hazard Zonation-Case Studies-Earthquake Vulnerability Assessment of Buildings and Infrastructure-Case Studies- Drought Assessment-Case Studies-Coastal Flooding-Storm Surge Assessment-Floods- Fluvial and Pluvial Flooding-Case Studies-Forest Fire-Case Studies-Man Made Disasters- Case Studies-Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

**TOTAL HOURS: 45**



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
**(AUTONOMOUS)**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE OUTCOMES:**

On successful completion of the course the student will be able to,		Pos & PSOs
<b>CO1</b>	Explain the disaster phenomenon and disaster preparedness	<b>PO1</b>
<b>CO2</b>	Demonstrate the roles and responsibilities of different agencies	<b>PO6</b>
<b>CO3</b>	Analyse the techniques for disaster management	<b>PO2</b>
<b>CO4</b>	Demonstrate the disaster mitigation strategies	<b>PO6 PO7</b>
<b>CO5</b>	Apply the knowledge gained to manage the disasters.	<b>PO1, PO12</b>

**TEXTBOOKS:**

1. Bryant Edwards (2005): Natural Hazards, Cambridge University Press, U.K.
2. Roy, P.S "Space Technology for Disaster management" A Remote Sensing & GIS Perspective, Indian Institute of Remote Sensing (NRSA) Dehradun,. (2000)

**REFERENCES:**

1. Singh B.K., 2008, "Handbook of Disaster Management", Techniques & Guidelines, Rajat Publication.
2. Ghosh G.K., 2006, "Disaster Management", APH Publishing Corporation
3. Disaster Medical Systems Guidelines. Emergency Medical Services Authority, State of California, EMSA no.214, June2003
4. Inter Agency Standing Committee (IASC) (Feb. 2007). IASC Guidelines on Mental Health and Psychosocial Support in Emergency Settings. Geneva: IASC

**REFERENCE BOOKS:**

1. <https://nptel.ac.in/courses/105/104/105104183/>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>C01</b>	2	-	-	-	-	-	-	-	-	-	-	-	2	-
<b>C02</b>	-	-	-	-	-	3	-	-	-	-	-	-	2	-
<b>C03</b>	-	3	-	-	-	-	-	-	-	-	-	-	2	-
<b>C04</b>	-	-	-	-	-	3	2	-	-	-	-	-	2	-
<b>C05</b>	2	-	-	-	-	-	-	-	-	-	-	2	2	-
<b>CO*</b>	<b>2</b>	<b>3</b>	-	<b>2</b>	-	<b>3</b>	<b>2</b>	-	-	-	-	<b>2</b>	<b>2</b>	-



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
**(AUTONOMOUS)**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**200MEC471**

**IV B.TECH.-VII SEMESTER**  
**PRODUCT DESIGN AND INNOVATION**  
(Open Elective - 3)

**L T P C**  
**3 - - 3**

**PRE-REQUISITES:** Nil.

**COURSE EDUCATIONAL OBJECTIVES:**

1. To develop the Characteristics of successful product design and development in an organization
2. To evaluate the product planning and product specification of a product
3. To understand the generation, selection and testing of a concept in the product design.
4. To develop product architecture and design for manufacturing new product
5. To understand the prototypes and principles.

**UNIT-1: INTRODUCTION TO PRODUCT DESIGN AND INNOVATION (9)**

Characteristics and challenges of successful product development – Product development concept – Generic product development– Process flow and organization structure – Opportunity identification and process – Establish a charter – Generate many opportunities – Screening and develop of promising opportunities – Select exceptional opportunities.

**UNIT-2: PRODUCT PLANNING AND PRODUCT SPECIFICATION (9)**

Product planning process – Identification of opportunities – Evaluation and prioritization of projects – Allocation of resources and timing – Pre-project planning – Identification of customer needs – Collection and Interpretation of raw data from customers – Organization of the needs – Establishment of relative importance of needs–Product specifications– Target specifications–Setting-up offinal specifications.

**UNIT-3: CONCEPT GENERATION, SELECTION, TESTING (9)**

Concept generation – Clarification of the problem – Searching externally and internally – Systematic exploration – Concept selection – Concept screening and concept scoring – Concept testing – Survey population and format – Measuring the customer response.

**UNIT-4: PRODUCT ARCHITECTURE AND DESIGN FOR MANUFACTURE (9)**

Product architecture, modularity and implications – Delayed differentiation– Plat form planning–System-level – Quality of industrial design – Design for environment process – Potential environmental impacts – DFE guidelines to the product design – Assessing and elimination of environmental impacts –Design for manufacturing– Estimation of manufacturing costs – Reduction of costs of components, assembly, supporting production– Impact decisions of DFM.

**UNIT-5: PRODUCT DEVELOPMENT ECONOMICS AND MANAGING PROJECTS (9)**

Planning of prototypes – Robust design process –Identify the performance metrics, and noise factors – Objective function and experimental plan – Run the experiment – Repeat and confirm factor – Overview, formulation, strategy and utility of patents– Prior inventions– Refine claims – Product development economics and analysis – Financial model – Use of sensitivity analysis – Project success – Managing projects – Baseline project planning – Project execution.

**Total Hours: 45**



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
**(AUTONOMOUS)**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE OUTCOMES:**

On successful completion of the course, students will be able to		Pos & PSOs
<b>CO1</b>	Describe the Characteristics of successful product development in an organization	<b>PO1, PO2, PO3</b>
<b>CO2</b>	Evaluate the product planning and product specification of a product	<b>PO1, PO2, PO3</b>
<b>CO3</b>	Understand the generation, selection and testing of a product concept	<b>PO1, PO2, PO3</b>
<b>CO4</b>	Develop product architecture and design for manufacturing new product	<b>PO1, PO2, PO3</b>
<b>CO5</b>	Understand the principles of prototypes, economics and project management	<b>PO1, PO2, PO3, PO11</b>

**TEXTBOOKS:**

1. Ulrich K.T. and Eppinger S.D., "Product Design and Development", McGraw-Hill Education, 6/e, 2015.
2. Kevin Otto and Kristin Wood, "Product Design: Techniques in Reverse Engineering and New Product Development", Pearson Education, 1/e, 2003.

**REFERENCE BOOKS:**

1. Paul Trott, "Innovation Management and New Product Development", Pearson Education, 6/e, 2016.
2. Chitale.A. Kand Gupta.R.C, "Product Design and Manufacturing", Prentice Hall of India, New Delhi, 2011.
3. Mukesh Chaturvedi, Aseem Kumar and Rahul Manmohan, "Managing Innovations and New Product Development: Concepts and Cases", PHI Learning, 2009.
4. James M. Morgan and Jeffrey K.Liker, "Designing the Future", McGraw-Hill Education, 1/e, 2019.
5. James M. Morgan and Jeffrey K.Liker, "Designing the Future", McGraw-Hill Education, 1/e, 2019.

**REFERENCE WEBSITE:**

1. <https://nptel.ac.in/courses/112/107/112107217/>
2. <https://nptel.ac.in/courses/112/104/112104230/>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>	3	2	1	-	-	-	-	-	-	-	-	3	2	-
<b>CO2</b>	3	2	1	-	-	-	-	-	-	-	-	3	2	-
<b>CO3</b>	3	2	1	-	-	-	-	-	-	-	-	3	2	-
<b>CO4</b>	3	2	1	-	-	-	-	-	-	-	-	3	2	-
<b>CO5</b>	3	2	1	-	-	-	-	-	-	-	1	3	2	-
<b>CO*</b>	<b>3</b>	<b>2</b>	<b>1</b>	-	-	-	-	-	-	-	<b>1</b>	<b>3</b>	<b>2</b>	-



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**

**(AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**IV B.Tech. - VII Semester**

**200ECE471**

**MEDICAL ELECTRONICS**

(Open Elective - 3)

**L T P C**

**3 - - 3**

**PRE-REQUISITES: NIL**

**COURSE EDUCATIONAL OBJECTIVES:**

1. To gain knowledge and analyze the various physiological parameters and its recording methods, signal characteristics.
2. To understand the respiratory, Blood pressure, temperature measurements etc.
3. To study about the various assist devices used in the hospitals.
4. To gain knowledge about equipment used for physical medicine and the various recently developed diagnostic and therapeutic techniques.
5. To know the recent trends in Tele-medicine and laser in medicine.

**UNIT -1: ELECTRO-PHYSIOLOGY AND BIO-POTENTIAL RECORDING (9)**

The origin of Bio-potentials; bio potential electrodes, biological amplifiers, ECG, EEG, EMG, PCG, lead systems and recording methods, typical waveforms and signal characteristics.

**UNIT -2: BIO-CHEMICAL AND NONELECTRICAL PARAMETER MEASUREMENT (9)**

pH, PO<sub>2</sub>, PCO<sub>2</sub>, colorimeter, Auto analyzer, Blood flow meter, cardiac output, respiratory measurement, Blood pressure, temperature, pulse, Blood cell counters.

**UNIT -3: ASSIST DEVICES (9)**

Cardiac pacemakers, DC Defibrillator, Dialyzer, Heart lung machine

**UNIT -4: PHYSICAL MEDICINE AND BIOTELEMETRY (9)**

Diathermies- Shortwave, ultrasonic and microwave type and their applications, Surgical Diathermy Telemetry principles, frequency selection, biotelemetry, radiopill, electrical safety

**UNIT -5: RECENT TRENDS IN MEDICAL INSTRUMENTATION (9)**

Thermograph, endoscopy unit, Laser in medicine, cryogenic application, Introduction to Tele-medicine.

**Total Hours: 45**



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
**(AUTONOMOUS)**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE OUTCOMES:**

<b>On successful completion of the course, students will be able to</b>		<b>Pos &amp; PSOs</b>
<b>CO1</b>	Distinguish and analyze the various physiological parameters and its recording methods, signal characteristics.	<b>PO1, PO2</b>
<b>CO2</b>	Describe the respiratory, Blood pressure, temperature measurements etc.	<b>PO1, PO2</b>
<b>CO3</b>	Analyze function of various assist devices used in the hospitals.	<b>PO1, PO2</b>
<b>CO4</b>	Demonstrate knowledge about equipment used for physical. Medicine and the various recently developed diagnostic and therapeutic techniques.	<b>PO1, PO2</b>
<b>CO5</b>	Extend knowledge on recent trends in telemedicine and laser in medicine.	<b>PO1, PO2</b>

**TEXT BOOKS:**

1. Leslie Cromwell, "Biomedical Instrumentation and Measurement", Prentice Hall of India, New Delhi, 2007.
2. John G. Webster, "Medical Instrumentation Application and Design" Wiley India 3<sup>rd</sup>, Edition, 2007.

**REFERENCE BOOKS:**

1. Khandpur, R.S, "Handbook of Biomedical Instrumentation" TATA McGraw-Hill, New Delhi, 2003.
2. Joseph J. Carr and John M. Brown, "Introduction to Biomedical equipment Technology", John Wiley and Sons, New York, 2004.

**REFERENCE WEBSITE:**

1. [https://onlinecourses.nptel.ac.in/noc21\\_ee105](https://onlinecourses.nptel.ac.in/noc21_ee105)

**CO-PO MAPPING:**

CO-PO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02
<b>CO1</b>	3	3	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO2</b>	3	3	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO3</b>	3	3	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO4</b>	3	3	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO5</b>	3	3	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO*</b>	<b>3</b>	<b>3</b>	-	-	-	-	-	-	-	-	-	-	<b>2</b>	<b>-</b>



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**

**(AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**IV B.Tech - VII Semester**

**200CSM471**

**FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE**

(Open Elective - 3)

**L T P C**

**3 0 0 3**

**PRE-REQUISITES: NIL**

**COURSE EDUCATIONAL OBJECTIVES:**

1. To study the concepts of Artificial Intelligence.
2. To understand the search strategies and Problem solving using Artificial Intelligence.
3. To gain insight information about Logical Agents and Reasoning patterns in Positional logic
4. To study the Uncertain Knowledge and Reasoning
5. To study the Application of Robotics and predictive analytics using Rapid Miner

**UNIT- 1 : INTRODUCTION TO ARTIFICIAL INTELLIGENCE, PROBLEMS, PROBLEMSPACES AND SEARCH**

**(9)**

The AI Problems - The underlying assumption - The AI technique - The levels of the model - Criteria of success - Some general references - Defining the problem as a State space search - Production systems - Problem characteristics - Production system characteristics

**UNIT-2: PROBLEM SOLVING, UN-INFORMED SEARCH STRATEGIES, INFORMED SEARCH AND EXPLORATION**

**(9)**

Uninformed search strategies - Avoiding repeated states - Informed (Heuristic) search strategies - Heuristic functions - Local search algorithms and optimization problems - Local search in continuous spaces - Backtracking search for CSPs.

**UNIT-3: KNOWLEDGE AND REASONING**

**(9)**

Logical agents – Knowledge based agents - The wumpus world – Logic - Propositional logic - a very simple logic - Reasoning patterns in Propositional logic - Effective Propositional inference - Agents based on Propositional logic

**UNIT-4: UNCERTAIN KNOWLEDGE AND REASONING, LEARNING**

**(9)**

Uncertainty - Acting under uncertainty - Baye's rule and its use - Learning from observations - Forms of learning - Inductive learning - Learning decision trees

**UNIT-5: ROBOTICS AND PREDICTIVE ANALYTICS**

**(9)**

**Robotics:** Introduction-Robot hardware - Robotic perception - Planning to move-Robotic software Architectures - Application Domains

**TOTAL HOURS: 45**



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
**(AUTONOMOUS)**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE OUTCOMES:**

On successful completion of the course the student will be		Pos & PSOs
<b>CO1</b>	Gain the basic Knowledge about AI technique and Production systems	<b>PO1</b>
<b>CO2</b>	Comprehend the Un informed and Informed Search Strategies.	<b>PO1, PO2, PO3</b>
<b>CO3</b>	Analyze and Implement Reasoning patterns in propositional logic	<b>PO1, PO2, PO3</b>
<b>CO4</b>	Formulate the Knowledge and Reasoning techniques in solving problems	<b>PO1, PO2, PO4</b>
<b>CO5</b>	Apply Robotics to Solve Real world Problems	<b>PO1, PO2, PO4, PO5</b>

**TEXT BOOKS:**

1. Wolfgang Ertel, "Introduction to Artificial Intelligence", 2nd Edition, Springer International Publishing, 2017.
2. David L.Poole, Alan K.Mackworth, "Artificial Intelligence , Foundations of Computational Agents", 1<sup>st</sup> Edition, Cambridge University Press, 2010

**REFERENCE BOOKS:**

1. Stuart J.Russell, Peter Norvig, "Artificial Intelligence A Modern Approach", 4th Edition, Pearson Education, 2020.
2. Deepak Khemani, "A First Course in Artificial Intelligence", McGraw Hill, 2017.

**REFERENCE WEBSITE:**

1. <http://peterindia.net/AIlinks.html>
2. <https://nptel.ac.in/courses/106/102/106102220/>

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
<b>CO1</b>	3	-	-	-	-	-	-	-	-	-	-	-	2	-
<b>CO2</b>	2	2	3	-	-	-	-	-	-	-	-	-	2	-
<b>CO3</b>	3	2	3	-	-	-	-	-	-	-	-	-	2	-
<b>CO4</b>	2	3	-	2	-	-	-	-	-	-	-	-	2	-
<b>CO5</b>	2	2	-	2	2	-	-	-	-	-	-	-	2	-
<b>CO*</b>	<b>2.4</b>	<b>2.25</b>	<b>3</b>	<b>2</b>	<b>2</b>	-	-	-	-	-	-	-	<b>2</b>	<b>-</b>



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
**(AUTONOMOUS)**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**  
**IV B.Tech-VII SEMESTER**

**20OHSM471**

**NANO SCIENCE AND TECHNOLOGY**  
(Open Elective - 3)

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

**PRE-REQUISITES:** NIL

**COURSE EDUCATIONAL OBJECTIVES:**

1. To Understand the basic scientific concepts of Nanoscience, and various types of Nano materials.
2. To study various methods of synthesizing Nanomaterials
3. To identify different characterization techniques for Nanomaterials
4. To Understand the properties of Nanomaterials and the applications of Nano materials in various fields
5. To study various carbon Nanomaterials

**UNIT-1: INTRODUCTION TO NANO SCIENCE AND TECHNOLOGY (9)**

Definition of nano scale,-Significance of nano scale-Surface to volume ratio-Quantum confinement effect-Types of Nano materials: Zero, one and two dimensional nano materials with examples.

**UNIT-2: PREPARATION OF NANOMATERIALS (9)**

Top-Down and Bottom-Up approaches- Methods of preparation: Sol-gel method - Chemical vapor deposition- Plasma arching - Ball milling - Electro-chemical deposition.

**UNIT-3: STRUCTURE AND SURFACE CHARACTERIZATION OF NANO MATERIALS (9)**

X-Ray diffraction - Ultraviolet-Visible Spectroscopy - Fourier Transform Infrared Spectroscopy -Scanning Electron Microscopy - Transmission electron microscopy - Scanning Tunneling Microscope -Atomic force microscopy.

**UNIT-4: PROPERTIES AND APPLICATIONS OF NANO MATERIALS (9)**

Physical Properties - Chemical Properties - Mechanical properties - Electrical properties - Thermal properties - Magnetic properties - Optical Properties - Applications in Material science, Biology and Medicine, Surface science, Energy, Environment, Industry, Sports& Consumer products.

**UNIT-5 : CARBON NANOTUBES (9)**

Allotropes of carbon - Graphene- Fullerenes - Types of Carbon Nanotubes -Single walled carbon nanotubes- Multiwalled carbon nanotubes- Fabrication of carbon nanotubes using Plasma Arching Method- Properties and Applications of Carbon nanotubes.

**TOTAL HOURS: 45**



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
**(AUTONOMOUS)**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE OUTCOMES:**

On successful completion of the course the student will be able to,		Pos & PSOs
CO1	<b>Acquire</b> the basic knowledge on Nanoscience, and various types of Nano materials.	PO1, PO12
CO2	<b>Identify</b> appropriate method for the preparation of Nano materials	PO1, PO12
CO3	<b>Develops</b> skill to characterize Nanomaterials by various techniques	PO1, PO4, PO12
CO4	<b>Analyze</b> the different properties of Nanomaterials and identify their applications in various fields	PO1, PO12
CO5	<b>Develop</b> Knowledge on carbon Nano materials	PO1, PO12

**TEXT BOOKS:**

1. M.R. Srinivasan, New Age International, "Engineering Physics", Chennai 2011
2. K. Thyagarajan, "Engineering Physics", Mc Graw Hill Publishers, First Edition, New Delhi, 2014.
3. Er. Rakesh Rathi, S. Chand, "Nanotechnology-Technology Revolution" of 21<sup>st</sup> Century Publications

**REFERENCE BOOKS:**

1. Nanotechnology- A Gentle Introduction to the Next Big Idea. Kindersely, India. Pvt., New Delhi, 2003, Dorling
2. Nano- The Essentials Understanding Nano Science and Nanotechnology), Tata McGraw - Hill Publication 2010,

**CO-PO MAPPING:**

CO-PO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02
C01	3	-	-	-	-	-	-	-	-	-	-	1	2	-
C02	3	-	-	-	-	-	-	-	-	-	-	1	2	-
C03	3	-	-	2	-	-	-	-	-	-	-	1	2	-
C04	3	-	-	-	-	-	-	-	-	-	-	1	2	-
C05	3	-	-	-	-	-	-	-	-	-	-	1	2	-
CO*	<b>3</b>	-	-	<b>2</b>	-	-	-	-	-	-	-	<b>1</b>	<b>2</b>	-



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
**(AUTONOMOUS)**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**IV B.Tech. - VII Semester**

**200CIV472**

**INDUSTRIAL WASTE TREATMENT AND DISPOSAL**  
(OPEN ELECTIVE - 4)

**L T P C**  
**3 - - 3**

**PRE-REQUISITES:** A Course on Environmental Engineering

**COURSE OUTCOMES:**

1. To make the students understand about industrial waste characteristics and effects on sewer land and streams.
2. To provide knowledge about waste management approach through cleaner production
3. To make the students understand about pollution from major industries
4. To gain knowledge about various treatment technologies regarding industrial wastewater.
5. To provide knowledge about hazardous waste management and disposal

**UNIT-1: INTRODUCTION**

**(9)**

Types of industries and industrial pollution – Characteristics of industrial wastes – Population equivalent – Bioassay studies – effects of industrial effluents on streams, sewer, land, sewage treatment plants and human health – Environmental legislations related to prevention and control of industrial effluents and hazardous wastes

**UNIT-2: CLEANER PRODUCTION**

**(9)**

Waste management Approach – Waste Audit – Volume and strength reduction – Material and process modifications – Recycle, reuse and byproduct recovery – Applications.

**UNIT-3: POLLUTION FROM MAJOR INDUSTRIES**

**(9)**

Sources, Characteristics, waste treatment flow sheets for selected industries such as Textiles, Tanneries, Pharmaceuticals, Electroplating industries, Dairy, Sugar, Paper, distilleries, Steel plants, Refineries, fertilizer, thermal power plants – Wastewater reclamation concepts

**UNIT-4: TREATMENT TECHNOLOGIES**

**(9)**

Equalization – Neutralization – Removal of suspended and dissolved organic solids -Chemical oxidation – Adsorption - Removal of dissolved inorganics – Combined treatment of industrial and municipal wastes – Residue management – Dewatering - Disposal

**UNIT-5: HAZARDOUS WASTE MANAGEMENT**

**(9)**

Hazardous wastes - Physio chemical treatment – solidification – incineration – Secured landfills

**TOTAL HOURS: 45**





**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
**(AUTONOMOUS)**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**IV B.Tech.-VII Semester**

**200MEC472**

**SOLAR ENERGY TECHNOLOGY**  
(Open Elective - 4)

**L T P C**  
**3 - - 3**

**PRE-REQUISITES:** NIL

**COURSE EDUCATIONAL OBJECTIVES:**

1. Describing the solar radiation and various solar collectors.
2. Explaining the various solar thermal energy technologies and their applications.
3. Analyzing the various solar PV cell materials and conversion techniques.
4. Discussing various solar SPV systems designs and their applications.
5. Applying solar passive building techniques for cooling and heating applications.

**UNIT-1: SOLAR RADIATION AND COLLECTORS (9)**

Introduction to the sources of energy – Solar angles – Sunpath diagrams– Radiation–extra terrestrial characteristics - measurement and estimation on horizontal and tilted surfaces - flat plate collector thermal analysis - testing methods- evacuated tubular collectors-concentrator collectors–classification-design and performance parameters-tracking systems-compound parabolic concentrators - parabolic trough concentrators - concentrators with point focus - Heliostats–performance of the collectors.

**UNIT-2: SOLAR THERMAL TECHNOLOGIES (9)**

Principle of working, types, design and operation of - Solar heating and cooling systems – Thermal Energy storage systems–Solar Desalination–Solar cooker: domestic, community–Solar pond – Solar drying – solar chimney-solar thermal electricity conversion.

**UNIT-3: SOLAR PV FUNDAMENTALS (9)**

Semiconductor – properties - energy levels - basic equations of semiconductor devices physics. Solar cells - p-n junction: homo and hetero junctions - metal-semiconductor interface - dark and illumination characteristics - figure of merits of solar cell – efficiency limits - variation of efficiency with band-gap and temperature - efficiency measurements –high efficiency cells – Solar thermo-photo voltaic.

**UNIT-4: SPV SYSTEM DESIGN AND APPLICATIONS (9)**

Solar cell array system analysis and performance prediction- Shadow analysis: reliability -solar cell array design concepts - PV system design - design process and optimization -detailed array design - storage autonomy - voltage regulation - maximum tracking –centralized and decentralized SPV systems-standalone-hybrid and grid connected system - System installation - operation and maintenances - field experience - PV market analysis and economics of SPV systems.

**UNIT-5: SOLAR PASSIVE ARCHITECTURE (9)**

Thermal comfort - bioclimatic classification – passive heating concepts: direct heat gain -indirect heat gain - isolated gain and sunspaces - passive cooling concepts: evaporative cooling - Radiative cooling- application of wind, water and earth for cooling; shading -paints and cavity walls for cooling– roof radiation traps - earth air-tunnel– energy efficient landscape design- thermal comfort.

**Total Hours: 45**



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
**(AUTONOMOUS)**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE OUTCOMES:**

<b>On successful completion of the course, students will be able to</b>		<b>Pos &amp; PSOs</b>
<b>CO1</b>	Describe the solar radiation and various solar collectors.	<b>PO1,PO2, PO3</b>
<b>CO2</b>	Explain the various solar thermal energy technologies and their applications.	<b>PO1,PO2, PO3</b>
<b>CO3</b>	Analyze the various solar PV cell materials and conversion techniques.	<b>PO1, PO2, PO3</b>
<b>CO4</b>	Discuss various Solar SPV systems designs and their applications.	<b>PO1,PO2, PO3</b>
<b>CO5</b>	Apply solar passive building techniques for cooling and heating applications.	<b>PO1,PO2, PO3</b>

**TEXTBOOKS:**

1. G.D.Rai, "Non-Conventional Energy Sources", Khanna Publishers, NewDelhi, 2014.
2. Twidell, J.W. & Weir. A., "Renewable Energy Resources", EFN Spon Ltd., UK, 2015.

**REFERENCEBOOKS:**

1. Chetan Singh Solanki, "Solar Photovoltaics – Fundamentals, Technologies and Applications", PHI Learning Private limited, 2011.
2. John A.Duffie, William A.Beckman, "Solar Engineering of Thermal Processes", John Wiley & Sons, 2013.
3. LovegroveK., SteinW., "Concentrating Solar Power Technology", Wood head Publishing Series in Energy, Elsevier, 1/e, 2012.
4. "Solar Energy International, Photovoltaic-Design and Installation Manual", New Society Publishers, 2006.
5. Sukhatme SP, Nayak JK, "Solar Energy-Principle of Thermal Storage and collection", Tata McGrawHill, 2008.

**REFERENCEWEBSITE:**

1. <https://nptel.ac.in/courses/112/104/112104300/>
2. <https://nptel.ac.in/courses/115/103/115103123/>

**CO-PO MAPPING:**

CO-PO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02
<b>C01</b>	3	2	1	-	-	-	-	-	-	-	-	-	2	-
<b>C02</b>	3	2	1	-	-	-	-	-	-	-	-	-	2	-
<b>C03</b>	3	2	1	-	-	-	-	-	-	-	-	-	2	-
<b>C04</b>	3	2	1	-	-	-	-	-	-	-	-	-	2	-
<b>C05</b>	3	2	1	-	-	-	-	-	-	-	-	-	2	-
<b>CO*</b>	<b>3</b>	<b>2</b>	<b>1</b>	-	-	-	-	-	-	-	-	-	<b>2</b>	-



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**

**(AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**IV B.Tech. - VII Semester**

**200ECE472**

**PATTERN RECOGNITION**

(Open Elective – 4)

**L T P C**

**3 - - 3**

**PRE-REQUISITES:** NIL

**COURSE EDUCATIONAL OBJECTIVES:**

1. To provide knowledge on Basics Pattern Recognition.
2. To acquire knowledge on various methods of statistical Pattern Recognition.
3. To be able to solve dimensionality problem.
4. To understand the linear discriminate functions and neural network classifier.
5. To gain the principle of time varying pattern recognition and unsupervised classification.

**UNIT –1: INTRODUCTION TO PATTERN RECOGNITION (9)**

Linear Discriminant, Multiple Discriminant Analysis, Feature extraction and Pattern Representation Concept of Supervised and Unsupervised classification Introduction to Application Areas.

**UNIT –2: STATISTICAL PATTERN RECOGNITION (9)**

Bayes Decision Theory, Minimum Error and Minimum Risk Classifiers, Discriminant Function and Decision Boundary Normal Density, Discriminant Function, Discrete Features, Parameter estimation.

**UNIT –3: DIMENSIONALITY PROBLEM (9)**

Dimension and accuracy, Computational Complexity, Dimensionality Reduction, Fisher Density Estimation, Nearest Neighbor Rule, Fuzzy Classification.

**UNIT –4: LINEAR DISCRIMINANT FUNCTIONS (9)**

Separability, Two Category and Multi Category Classification, Linear Discriminators, Perceptron Criterion, Relaxation Procedure, Minimum Square Error Criterion, Widrow-Hoff Procedure, Ho-Kashyap Procedure, Kesler's Construction.

**Neural Network Classifier:**

Single and Multilayer Perceptron, Back Propagation Learning, Hopfield Network, Fuzzy Neural Network

**UNIT –5: TIME VARYING PATTERN RECOGNITION (9)**

First Order Hidden Markov Model, Evaluation, Decoding, Learning.

**Unsupervised Classification:**

Clustering, Hierarchical Clustering, Graph Based Method, Sum of Squared Error Technique Iterative Optimization.

**Total Hours: 45**





**PRE-REQUISITES:** A course on Probability and Statistics

**COURSE EDUCATIONAL OBJECTIVES:**

1. To learn the theoretical foundations of machine learning.
2. To understand various supervised learning algorithms.
3. To understand the support vector machine.
4. To learn different types of unsupervised learning algorithms.
5. To introduce the basic applications of machine learning.

**UNIT 1: INTRODUCTION**

**(9)**

Review of Linear Algebra, Definition of learning systems, Designing a learning system, Learning Paradigms – PAC learning – Basics of Probability – Version Spaces, Goals and applications of machine learning; Classification of learning system, Basic concepts in Machine Learning.

**UNIT 2: SUPERVISED LEARNING ALGORITHMS**

**(9)**

Linear and Non-Linear examples, Multi-Class & Multi-Label classification, Linear Regression, Multi linear Regression, Naïve Bayes Classifier, Decision Trees, K-NN classifier, Logistic regression, Perceptrons.

**UNIT 3: UNSUPERVISED LEARNING ALGORITHMS**

**(9)**

Clustering basics (Partitioned, Hierarchical and Density based), K-Means clustering, K-Mode clustering, Self organizing maps, Expectation maximization, Principal Component Analysis.

**UNIT 4: ENSEMBLE LEARNING AND EVALUATION METRICS**

**(9)**

Bagging and Boosting (Random forests, Adaboost, XG boost inclusive), ROC Curves, Evaluation Metrics, Significance tests – Error correction in Perceptrons.

**UNIT 5: MACHINE LEARNING IMPLEMENTATION**

**(9)**

Data collection – Preprocessing (Missing values, Normalization, Adopting to chosen algorithm etc.,) – Outlier Analysis (Z-Score) - Model selection & evaluation – Optimization of tuning parameters – Setting the environment – Visualization of results.

**COURSE OUTCOMES:**

<b>On successful completion of the course the student will be</b>		<b>Pos &amp; PSOs</b>
<b>CO1</b>	Understand the basics of machine learning.	<b>PO1, PO2</b>
<b>CO2</b>	Identify the suitable supervised learning algorithm for problem solving.	<b>PO1, PO2</b>
<b>CO3</b>	Understand the concept of support vector machine.	<b>PO1, PO2, PO3</b>
<b>CO4</b>	Apply appropriate unsupervised learning algorithm for solving real-world problems.	<b>PO1, PO2, PO3, PO4, PO5</b>
<b>CO5</b>	Explore the applications of machine learning.	<b>PO1, PO2, PO3, PO4, PO5</b>





**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**

**(AUTONOMOUS)**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**IV B.TECH. - VII SEMESTER**

**200HSM472**

**TOTAL QUALITY MANAGEMENT**  
(OPEN ELECTIVE – 4)

**L T P C**  
**3 - - 3**

**PRE-REQUISITES: NIL**

**COURSE EDUCATIONAL OBJECTIVES:**

1. To understand the concepts of total quality management, and Contributions of TQM
2. To learn TQM principles and impact of 5s, Kaizen, PDSA cycles in continuous process improvement.
3. To study the basic need of quality control and process control in an organization
4. To learn the traditional and modern TQM tools and techniques
5. To study the quality standard, requirements and elements in Quality management system

**UNIT –1: INTRODUCTION ON TOTAL QUALITY MANAGEMENT (9)**

Introduction – Need for quality – Evolution of quality – Definition of quality – Dimensions of manufacturing and service quality – Basic concepts of TQM – Definition of TQM – TQM frame work – Contributions of Deming, Juran and Crosby – Barriers to TQM.

**UNIT –2: TQM PRINCIPLES (9)**

Leadership – Strategic quality planning – Quality statements – Customer focus, customer orientation, customer satisfaction, customer complaints and retention – Employee involvement – Motivation – Empowerment – Teams and teamwork – Recognition and reward – Performance appraisal – Continuous process improvement – PDSA cycle, 5s, Kaizen – Supplier partnership, partnering, supplier selection and supplier rating.

**UNIT –3: QUALITY CONTROL (9)**

Control chart for attributes – Control chart for non-conforming – p chart and np chart – Control chart for nonconformities: C and U charts – Control chart for variables: X chart, R chart and  $\sigma$  chart – State of control and process out of control identification in charts, pattern study and process capability studies.

**UNIT –4: TQM TOOLS AND TECHNIQUES (9)**

The seven traditional tools of quality – New management tools – Six-sigma: Concepts, methodology, applications to manufacturing, service sector – Bench marking – Bench marking process – FMEA – Stages – Types – Quality circles – Quality function development (QFD) – Taguchi quality loss function – TPM – Reliability fundamentals and concepts.

**UNIT –5: QUALITY SYSTEMS AND STANDARDS (9)**

Need for ISO 9000 – ISO 9001-2008 Quality System – Benefits of ISO registration – ISO 9000 standards – AS 9100, TS16949 and TL 9000 – ISO 9001 Requirements – Implementation – Documentation – Internal and external audits – Registration – TQM implementation in manufacturing and service sectors. **Environmental Management System:** ISO 14000 Series Standards – Concepts and Requirements of ISO 14001.

**Total Hours: 45**



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
**(AUTONOMOUS)**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE OUTCOMES:**

On successful completion of the course, students will be able to		Pos & PSOs
<b>CO1</b>	Describe the concepts of total quality management, and Contributions of TQM	<b>PO1, PO11, PO12</b>
<b>CO2</b>	Understand the TQM principles and impact of 5s, Kaizen, PDCA cycles in continuous process improvement.	<b>PO1, PO11, PO12</b>
<b>CO3</b>	Illustrate the basic need of quality control and process control in an organization	<b>PO1, PO2, PO11, PO12</b>
<b>CO4</b>	Summarize the traditional and modern TQM tools and techniques	<b>PO1, PO3, PO11, PO12</b>
<b>CO5</b>	Realize the quality standard, requirements and elements in Quality management system	<b>PO1, PO11, PO12</b>

**TEXT BOOKS:**

1. Bester field Dale H, Bester field Carol, Bester field Glen H, Bester field Mary, Urdhwareshe Hemant and Urdhwareshe Rashmi, "Total Quality Management", Pearson Education, 5/e, 2018, New Delhi.
2. Douglas.C. Montgomery, John Wiley, "Introduction to Statistical Quality Control", 7/e, 2013,.

**REFERENCE BOOKS:**

1. D.R. Kiran, Butterworth-Heinemann, "Total Quality Management", 1/e, 2016, .
2. Poornima M. Charantimath, "Total Quality Management", Pearson Education, New Delhi, 3/e, 2017,
3. Tapan K. Bose, "Total Quality of Management", Pearson Education India 2010,.
4. Bedi Kanishka, "Quality Management", Oxford University Press, India 2006,.
5. Ramasamy Subbura, "Total Quality Management", McGraw Hill Education 2011,

**REFERENCE WEBSITE:**

1. <https://nptel.ac.in/courses/110/104/110104085/>
2. <https://nptel.ac.in/courses/110/104/110104080/>
3. <https://nptel.ac.in/courses/112/107/112107259/>
4. <https://nptel.ac.in/courses/110/101/110101150/>

**CODES/TABLES:**

1. Use of approved statistical table permitted in the examination.

**CO-PO MAPPING:**

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>	3	2	2	2	-	-	-	-	-	-	-	-	2	-
<b>CO2</b>	3	2	2	2	-	-	-	-	-	-	-	-	2	-
<b>CO3</b>	3	2	2	2	-	-	-	-	-	-	-	-	2	-
<b>CO4</b>	3	2	2	2	-	-	-	-	-	-	-	-	2	-
<b>CO5</b>	3	2	2	2	-	-	-	-	-	-	-	-	2	-
<b>CO*</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>2</b>	-	-	-	-	-	-	-	-	<b>2</b>	-



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES.**  
**(AUTONOMOUS)**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**IV B.Tech- VII Semester**

**20EEE474**

**ELECTRIC VEHICLE**  
**(Skill oriented Course)**

L	T	P	C
2	0	0	2

**Pre-requisite:** A course on power system engineering, power electronics

**COURSE EDUCATIONAL OBJECTIVES:**

- 1 Understand Electric and Hybrid Electric Vehicles
- 2 Study and analyze the Energy Storage for EV and HEV
- 3 Study and understand the concept of Electric Propulsion
- 4 Analyze and design the Electric and Hybrid Electric Vehicles
- 5 Study operation of Power Electronic Converter for Battery Charging.

**UNIT -1: ELECTRIC AND HYBRID ELECTRIC VEHICLES (9)**

Configuration of Electric Vehicles, Performance of Electric Vehicles, Traction motor characteristics, Tractive effort and Transmission requirement, Vehicle performance, Tractive effort in normal driving, Energy consumption Concept of Hybrid Electric Drive Trains, Architecture of Hybrid Electric Drive Trains, Series Hybrid Electric Drive Trains, Parallel hybrid electric drive trains.

**UNIT-2: ENERGY STORAGE FOR EV AND HEV (9)**

Energy storage requirements, Battery parameters, Types of Batteries, Modeling of Battery, Fuel Cell basic principle and operation, Types of Fuel Cells, PEMFC and its operation, Super Capacitors.

**UNIT -3: ELECTRIC PROPULSION (9)**

EV consideration, DC motor drives and speed control, Induction motor drives, Permanent Magnet Motor Drives, Switch Reluctance Motor Drive for Electric Vehicles, Configuration and control of Drives.

**UNIT -4: DESIGN OF ELECTRIC AND HYBRID ELECTRIC VEHICLES (9)**

Series Hybrid Electric Drive Train Design: Operating patterns, control strategies, Sizing of major components, power rating of traction motor, power rating of engine/generator, and design of PPS Parallel Hybrid Electric Drive Train Design: Control strategies of parallel hybrid drive train, design of engine power capacity, design of electric motor drive capacity, transmission design, and energy storage design.

**UNIT -5: POWER ELECTRONIC CONVERTER FOR BATTERY CHARGING (9)**

Charging methods for battery, Termination methods, charging from grid, The Z- converter, Isolated bidirectional DC-DC converter, Design of Z-converter for battery charging, High-frequency transformer based isolated charger topology, Transformer less topology.

**TOTAL: 45 Hours**



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**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE OUTCOMES:**

<b>On successful completion of the course, students will be able to</b>	<b>Pos &amp; PSOs</b>
<b>CO1</b> Understand Electric and Hybrid Electric Vehicles	PO1,PO2,PO3
<b>CO2</b> Study and analyze the Energy Storage for EV and HEV	PO1,PO2,PO3
<b>CO3</b> Study and understand the concept of Electric Propulsion	PO1,PO2, PO3
<b>CO4</b> Analyze and design the Electric and Hybrid Electric Vehicles	PO1,PO2,PO3
<b>CO5</b> Study operation of Power Electronic Converter for Battery Charging.	PO1,PO2,PO3

**TEXT BOOKS:**

1. M. Ehsani, Y. Gao, S. Gay and Ali Emadi, Modern Electric, "Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory, and Design", CRC Press, 2005.
2. Iqbal Husain, "Electric and Hybrid Vehicles: Design Fundamentals", CRC Press, 2003.

**REFERENCES BOOKS:**

1. Sheldon S. Williamson, Energy Management Strategies for Electric and Plug-in Hybrid Electric Vehicles, Springer, 2013.
2. C.C. Chan and K.T. Chau, Modern Electric Vehicle Technology, OXFORD University Press, 2001.
3. Chris Mi, M. Abul Masrur, David Wenzhong Gao, Hybrid Electric Vehicles Principles And Applications With Practical Perspectives, Wiley Publication, 2011.

**REFERENCE WEBSITE**

<https://www.edx.org/search?q=POWER%20SYSTEM>  
<https://www.edx.org/search?q=POWER%20ELECTRONICS>

**CO-PO MAPPING:**

<b>CO-PO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>	<b>PS01</b>	<b>PS02</b>
<b>CO1</b>	3	2	2	-	-	-	-	-	-	-	-	-	2	-
<b>CO2</b>	3	2	2	-	-	-	-	-	-	-	-	-	2	-
<b>CO3</b>	3	2	2	-	-	-	-	-	-	-	-	-	2	-
<b>CO4</b>	3	2	2	-	-	-	-	-	-	-	-	-	2	-
<b>CO5</b>	3	2	2	-	-	-	-	-	-	-	-	-	2	-
<b>CO*</b>	<b>3</b>	<b>2</b>	<b>2</b>										<b>2</b>	<b>-</b>