V20 Regulation Academic Regulations Course Structure & Syllabi for B. Tech in Electrical and Electronics Engineering



Department of Electrical and Electronics Engineering Sri Vasavi Engineering College (Autonomous) Pedatadepalli, Tadepalligudem

Vision & Mission of the College

Vision

• To be a premier technological institute striving for excellence with global perspective and commitment to the Nation.

Mission

- To produce Engineering Graduates of professional quality and global perspective through Learn Centric Education.
- To establish linkages with government, industry and Research laboratories to promote R&D activities and to disseminate innovations.
- To create an eco-system in the institute that leads to holistic development and ability for life-long learning.

Vision & Mission of the Department

Vision

• To evolve as a centre of excellence in Electrical and Electronics Engineering that produces graduates of high quality with ethical values.

Mission

- To impart technical knowledge through learner-centric education supplemented with practical exposure.
- To provide opportunities that promote personality development through co-curricular and extra-curricular activities.
- To inculcate human values & team spirit that enables the Electrical and Electronics Engineers to face the future challenges.

Academic Rules & Regulations for B. Tech Programme

COMMON ACADEMIC REGULATIONS (R20) for ALL AUTONOMOUS COLLEGES OF JNTUK

For

B. Tech Programme

(Applicable for the batches admitted from 2020-21)



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA KAKINADA – 533003, ANDHRA PRADESH, INDIA

AUTONOMOUS COLLEGES OF JNTUK COMMON ACADEMIC REGULATIONS (R20) FOR B. TECH PROGRAMME (Applicable for from the Academic Year 2020-21)

1. Award of B. Tech. Degree

- (a) A student will be declared eligible for the award of B. Tech. Degree if he fulfils the following academic regulations:
 - (i) A student shall be declared eligible for the award of B. Tech Degree, if he pursues a course of study in not less than four and not more than eight academic years. 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.
 - (ii) The candidate shall register for 160 credits and secure all the 160 credits.
- (b) The medium of instruction for the entire under graduate programme in Engineering & Technology will be in **English** only.

2. Programme Pattern:

- a) Total duration of the of B. Tech (Regular) Programme is four academic years
- b) Each Academic year of study is divided into Two Semesters.
- c) Minimum number of instruction days in each semester is 90.
- d) Grade points, based on percentage of marks awarded for each course will form the basis for calculation of SGPA (Semester Grade Point Average) and CGPA (Cumulative Grade Point Average).
- e) The total credits for the Programme is 160.
- f) Three week induction program is mandatory for all first year UG students and shall be conducted as per AICTE/UGC/APSCHE guidelines.
- g) Student is introduced to "Choice Based Credit System (CBCS)".
- A pool of interdisciplinary and job-oriented mandatory skill courses which are relevant to the industry are integrated into the curriculum of concerned branch of engineering (total five skill courses: two basic level skill courses, one on soft skills and other two on advanced level skill courses)
- i) A student has to register for all courses in a semester.
- j) All the registered credits will be considered for the calculation of final CGPA.
- k) Each semester has 'Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)'. Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as indicated by UGC and course structure as suggested by AICTE are followed.
- 1) A 10 months industry/field mandatory internship, both industry and social, during the summer vacation and also in the final semester to acquire the skills required for job and make engineering graduates to connect with the needs of the industry and society at large.
- m) All the students shall be mandatorily registered for NCC, NSS activities and Community Service Project as per the Government and University norms.
- n) Each college shall assign a faculty advisor/mentor after admission to each student or group of students from same department to provide guidance in courses registration/career growth/placements/opportunities for higher studies/GATE/other competitive exams etc.

3. Registration for Courses:

- a) In each semester a student shall mandatorily register courses which he/she wishes to pursue within a week from the starting of the class work with the advice of Head of the Department and mentor of the student of the concerned department of the college.
- b) If any student wishes to withdraw the registration of the course, he/she shall submit a letter to the Principal of the college through the Head of the Department and mentor within fifteen days.

- c) The concerned college shall thoroughly verify and upload the data/courses registered by each student in the university examination center within 20 days. The Principal of the concerned college shall ensure that there no wrong registration courses by the student. The university registration portal will be closed after 20 days.
- 4. (a) Award of B. Tech. Degree: A student will be declared eligible for the award of B. Tech. Degree if he fulfills the following academic regulations:
 - i. A student shall be declared eligible for award of the B. Tech Degree, if he pursues a course of study in not less than four and not more than eight academic years. 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.
 - ii. The student shall register for 160 credits and must secure all the 160 credits.
 - iii. All students shall mandatorily register for the courses like Environmental Sciences, Universal Human Values, Ethics, Indian Constitution, Essence of Indian Traditional Knowledge etc., shall be included in the curriculum as non-credit mandatory courses. Environmental Sciences is to be offered compulsorily as mandatory course for all branches. A student has to secure at least 40% of the marks allotted in the internal evaluation for passing the course and shall maintain 75% of attendance in the subject.
 - iv. All students shall mandatorily register for NCC/NSS activities and will be required to participate in an activity specified by NSS officer during second and third semesters. Grade shall be awarded as Satisfactory or Unsatisfactory in the mark sheet on the basis of participation, attendance, performance and behavior. If a student gets an unsatisfactory Grade, he/she shall repeat the above activity in the subsequent years, in order to complete the degree requirements.
 - v. Credits are defined as per AICTE norms.
 - (b) Award of B. Tech. (Honor)/B. Tech. (Minor): B. Tech. with Honors or a B. Tech. with a Minor will be awarded if the student earns 20 additional credits are acquired as per the regulations/guidelines. The regulations/guidelines are separately provided. Registering for an Honors/Minor is optional.

5. Attendance Requirements

- a) A student is eligible to write the University examinations if he acquires a minimum of 40% in each subject and 75% of attendance in aggregate of all the subjects.
- b) Condonation of shortage of attendance in aggregate up to 10% (65% and above, and below 75%) may be granted by the College Academic Committee. However, this condonation concession is applicable only to any two semesters during the entire programme.
- c) Shortage of Attendance below 65% in aggregate shall not be condoned.
- d) A student who is short of attendance in a semester may seek re-admission into that semester when offered within 4 weeks from the date of commencement of class work.
- e) Students whose shortage of attendance is not condoned in any semester are not eligible to write their end semester examination of that class.
- f) A stipulated fee of Rs. 500/- in the concerned semester shall be payable towards condonation of shortage of attendance. Students availing condonation on medical ground shall produce a medical certificate issued by the competitive authority.
- g) A student will be promoted to the next semester if he satisfies the (i) attendance requirement of the present semester and (ii) minimum required credits.
- h) If any candidate fulfills the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.
- i) For induction programme attendance shall be maintained as per AICTE norms.
- j) For non-credit mandatory courses the students shall maintain the attendance similar to credit courses

6. Evaluation-Distribution and Weightage of marks

- (i) Paper setting and evaluation of the answer scripts shall be done as per the procedures laid down by the University Examination section from time to time.
- (ii) To maintain the quality, external examiners and question paper setters shall be selected from reputed institutes like IISc, IITs, IIITs, IIISERs, NITs and Universities.
- (iii) For non-credit mandatory courses, like Environmental Sciences, Universal Human Values, Ethics, Indian Constitution, Essence of Indian Traditional Knowledge, the student has to secure 40% of the

marks allotted in the internal evaluation for passing the course. No marks or letter grade shall be allotted for all mandatory non-credit courses.

- (iv) A student is deemed to have satisfied the minimum academic requirements if he has earned the credits allotted to each theory/practical design/drawing subject/ project etc by securing not less than 35% of marks in the end semester exam and minimum 40% of marks in the sum total of the internal marks and end semester examination marks together.
- (v) Distribution and Weightage of marks:

The assessment of the student's performance in each course will be as per the details given:

			C	/	
S. No	Components	Internal	External	Total	
1	Theory	30	70	100	
2	Engineering Graphics/Design/Drawing	30	70	100	
3	Practical	15	35	50	
4	Mini Project/Internship/Industrial Training/ Skill	-	50	50	
	Development programmes/Research Project				
5	Project Work	60	140	200	

(vi) Continuous Internal Theory Evaluation:

- a) For theory subjects, during a semester, there shall be two mid-term examinations. Each mid-term examination consists of (i) one online objective examination (20 multiple choice questions) for 10 marks for a duration of 20 minutes (ii) one descriptive examination (3 full questions for 5 marks each) for 15 marks for a duration of 90 minutes and (iii) one assignment for marks. All the internal exams shall be conducted as per university norms from first 50% of the syllabi.
- b) In the similar lines, the second online, descriptive examinations assignment shall be conducted on the rest of the 50% syllabus.
- c) The total marks secured by the student in each mid-term examination are evaluated for 30 marks. The first mid marks (Mid-1) consisting of marks of online objective examination, descriptive examination and assignment shall be submitted to the University examination section within one week after completion of first mid examination.
- d) The mid marks submitted to the University examination section shall be displayed in the concerned college notice boards for the benefit of the students.
- e) If any discrepancy found in the submitted Mid-1 marks, it shall be brought to the notice of university examination section within one week from the submission.
- f) Second mid marks (Mid-2) consisting of marks of online objective examination, descriptive examination and assignment shall also be submitted to University examination section within one week after completion of second mid examination and it shall be displayed in the notice boards. If any discrepancy found in the submitted mid-2 marks, it shall be brought to the notice of university examination section within one week from the submission.
- g) Internal marks can be calculated with 80% weightage for better of the two mids and 20% Weightage for other mid exam.

Example:

Mid-1 marks = Marks secured in (online examination-1+descriptive examination-1 +one assignment-1)

Mid-2 marks = Marks secured in (online examination-2+descriptive examination-2+descriptive examination-2 +one assignment-2)

Final internal Marks = (Best of (Mid-1/Mid-2) marks x 0.8 + Least of (Mid-1/Mid-2) marks x 0.2)

- h) With the above criteria, university examination section will send mid marks of all subjects in consolidated form to all the concerned colleges and same shall be displayed in the concerned college notice boards. If any discrepancy found, it shall be brought to the notice of university examination section through proper channel within one week with all proofs. Discrepancies brought after the given deadline will not be entertained under any circumstances.
- (vii) Semester End Theory Examinations Evaluation:

- a) The semester end examinations will be conducted university examination section for 70 marks consists of five questions carrying 14 marks each. Each of these questions is from one unit and may contain sub-questions. For each question there will be an "either" "or" choice, which means that there will be two questions from each unit and the student should answer either of the two questions.
- b) For practical subjects there shall be continuous evaluation during the semester for 15 internal marks and 35 end examination marks. The internal 15 marks shall be awarded as follows: day to day work - 5 marks, Record-5 marks and the remaining 5 marks to be awarded by conducting an internal laboratory test. The end examination shall be conducted by the teacher concerned and external examiner appointed.
- c) For the subject having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 30 marks for internal evaluation (15 marks for continuous Assessment (day-to-day work) and 15 marks for internal tests) and 70 marks for end examination. There shall be two internal tests in a Semester for 15 marks each and final marks can be calculated with 80% weightage for better of the two tests and 20% weightage for other test and these are to be added to the marks obtained in day to day work.
- d) Evaluation of the summer internships: It shall be completed in collaboration with local industries, Govt. Organizations, construction agencies, Industries, Hydel and thermal power projects and also in software MNCs in the area of concerned specialization of the UG programme. Students shall pursue this course during summer vacation just before its offering as per course structure. The minimum duration of this course is at least 6 weeks. The student shall register for the course as per course structure after commencement of academic year. A supervisor/mentor/advisor has to be allotted to guide the students for taking up the summer internship. The supervisor shall monitor the attendance of the students while taking up the internship. Attendance requirements are as per the norms of the University. After successful completion, students shall submit a summer internship technical report to the concerned department and appear for an oral presentation before the departmental committee consists of an external examiner; Head of the Department; supervisor of the internship and a senior faculty member of the department. A certificate from industry/skill development center shall be included in the report. The report and the oral presentation shall carry 40% and 60% weightages respectively. It shall be evaluated for 50 external marks at the end of the semester. There shall be no internal marks for Summer Internship. A student shall secure minimum 40% of marks for successful completion. In case, if a student fails, he/she shall reappear as and when semester supplementary examinations are conducted by the University.
- e) The job oriented skill courses may be registered at the college or at any accredited external agency. A student shall submit a record/report on the on the list skills learned. If the student completes job oriented skill course at external agency, a certificate from the agency shall be included in the report. The course will be evaluated at the end of the semester for 50 marks (record: 15 marks and viva-voce: 35 marks) along with laboratory end examinations in the presence of external and internal examiner (course instructor or mentor). There are no internal marks for the job oriented skill courses.
- f) Mandatory Course (M.C): Environmental Sciences, Universal Human Values, Ethics, Indian Constitution, Essence of Indian Traditional Knowledge etc non-credit (zero credits) mandatory courses. Environmental Sciences shall be offered compulsorily as mandatory course for all branches. A minimum of 75% attendance is mandatory in these subjects. There shall be an external examination for 70 marks and it shall be conducted by the college internally. Two internal examinations shall be conducted for 30 marks and a student has to secure at least 40% of the marks for passing the course. There is no online internal exam for mandatory courses. No marks or letter grade shall be printed in the transcripts for all mandatory non-credit courses, but only Completed (Y)/Not-completed (N) will be specified.
- g) **Procedure for Conduct and Evaluation of MOOC:** There shall be a Discipline Centric Elective Course through Massive Open Online Course (MOOC) as Program Elective course. The student shall register for the course (Minimum of 12 weeks) offered by SWAYAM/NPTEL through online with the approval of Head of the Department. The Head of the Department shall appoint

one mentor for each of the MOOC subjects offered. The student needs to register the course in the SWAYAM/NPTEL portal. During the course, the mentor monitors the student's assignment submissions given by SWAYAM/NPTEL. The student needs to submit all the assignments given and needs to take final exam at the proctor center. The student needs to earn a certificate by passing the exam. The student will be awarded the credits given in curriculum only by submission of the certificate. In case if student does not pass subjects registered through SWAYAM/NPTEL, the same or alternative equivalent subject may be registered again through SWAYAM/NPTEL in the next semester with the recommendation of HOD and shall be pass.

h) Major Project (Project - Project work, seminar and internship in industry):

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

Evaluation: The total marks for project work 200 marks and distribution shall be 60 marks for internal and 140 marks for external evaluation. The supervisor assesses the student for 30 marks (Report: 15 marks, Seminar: 15 marks). At the end of the semester, all projects shall be showcased at the department for the benefit of all students and staff and the same is to be evaluated by the departmental Project Review Committee consisting of supervisor, a senior faculty and HOD for 30 marks. The external evaluation of Project Work is a Viva-Voce Examination conducted in the presence of internal examiner and external examiner and is evaluated for 140 marks.

- 7. Results Declaration:
 - (i) Before results declaration, an academic council meeting shall be conducted and results shall be placed before the academic council for approval.
 - (ii) With the approval of academic council, the results shall be submitted to the University to get the approval from Honorable Vice-Chancellor.
 - (iii) The University may normalize the result, if required, before declaration of the result (Guidelines for normalization will be provided separately)
 - (iv) A copy of approved results in a CD shall be submitted to the University examination Center.
- 8. Academic Audit: Academic audit in each semester will be conducted as per norms.
- **9.** Recounting or Re-evaluation of Marks in the End Semester Examination: A student can request for recounting of revaluation of his/her answer book on payment of a prescribed fee as per university norms.
- **10.** Supplementary Examinations: A student who has failed to secure the required credits can appear for a supplementary examination, as per the schedule announced by the University.
- **11.** Malpractices in Examinations: Disciplinary action shall be taken in case of malpractices during Mid/End examinations as per the rules framed by the University.

12. Promotion Rules

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in <u>item no.5 for</u> promotion to higher classes

- a) A student shall be promoted from first year to second year if he fulfills the minimum attendance requirement as per University norm.
- b) A student will be promoted from II year to III year if he fulfills the academic requirement of 40% of credits up to either II year I-Semester or II year II-Semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in II year II semester.
- c) A student shall be promoted from III year to IV year if he fulfills the academic requirements of 40% of the credits up to either III year I semester or III year II semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester.

13. Course Pattern

a) The entire course of study is for four academic years; all years are on semester pattern.

- b) A student eligible to appear for the end semester examination in a subject, but absent from it or has failed in the end semester examination, may write the exam in that subject when conducted next.
- c) When a student is detained for lack of credits / shortage of attendance, he may be re-admitted into the same semester/year in which he has been detained. However, the academic regulations under which he was first admitted shall continue to be applicable to him.

14. Earning of Credit:

A student shall be considered to have completed a course successfully and earned the credits if he/she secures an acceptable letter grade in the range A+ to E as given below. Letter grade 'F' in any course implies failure of the student in that course and no credits earned. Absent is also treated as no credits earned. For project same % percentages will be followed for grading.

Marks Range Theory (Max – 100)	Marks Range Lab (Max – 50)	Level	Letter Grade	Grade Point
≥ 90	≥ 45	Outstanding	A+	10
≥ 80 to < 89	≥40 to <44	Excellent	А	9
≥70 to <79	≥35 to <39	Very Good	В	8
≥60 to <69	\geq 30 to <34	Good	С	7
\geq 50 to <59	≥25 to <29	Fair	D	6
≥40 to <49	≥20 to <24	Satisfactory	Е	5
<40	<20	Fail	F	0
_		Absent	AB	0

15. Award of Class

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

Class Awarded	CGPA to be secured	Remarks
First Class with Distinction	\geq 7.75 (Without any supplementary appearance)	
First Class	≥ 6.75	CGPA
Second Class	\geq 5.75 to < 6.75	secured
Pass Class	\geq 5.00 to < 5.75	160 Credits

16. Minimum Instruction Days

The minimum instruction days for each semester shall be 90 working days. There shall be no branch transfers after the completion of the admission process. There shall be no transfer from one college/stream to another within the Constituent Colleges and Units of Jawaharlal Nehru Technological University Kakinada.

17. Withholding of Results

If the student is involved in indiscipline/malpractices/court cases, the result of the student will be withheld.

18. Transitory Regulations

- a) Discontinued or detained candidates are eligible for re-admission as and when next offered.
- b) The re-admitted candidate will be governed by the rules & regulations under which the candidate has been admitted.
- c) (i) In case of transferred students from other Universities, credits shall be transferred to JNTUK as per the academic regulations and course structure of JNTUK.
 - d) The students seeking transfer to colleges affiliated to JNTUK from various other Universities / Institutions have to obtain the credits of any equivalent subjects as prescribed by JNTUK. In addition, the transferred candidates have to pass the failed subjects at the earlier Institute with already obtained internal/sessional marks to be conducted by JNTUK.

19. Gap - Year

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

20. General

- a) Wherever the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".
- b) The academic regulation should be read as a whole for the purpose of any interpretation.
- c) In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.
- d) The University may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the University.

ACADEMIC REGULATIONS (R19) FOR B. TECH. (LATERAL ENTRY SCHEME)

Applicable for the students admitted into II year B. Tech. from the Academic Year 2020-21 onwards

1 Award of B. Tech. Degree

A student will be declared eligible for the award of B. Tech. Degree if he fulfills the following academic regulations:

- a) A student shall be declared eligible for the award of the B. Tech Degree, if he pursues a course of study in not less than three academic years and not more than six academic years. 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.
- b) The candidate shall register for 121 credits and secure all the 121 credits.
- 2. The attendance regulations of B. Tech. (Regular) shall be applicable to B.Tech (lateral entry).

3. **Promotion Rules**

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

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

4. Award of Class

After a student has satisfied the requirement prescribed for the completion of the program and is eligible for the award of B. Tech. Degree, he shall be placed in one of the following four classes:

Class Awarded	CGPA to be secured	Remarks
First Class with Distinction	\geq 7.75 (Without any supplementary appearance)	From the CGPA
First Class	≥ 6.75	secured from
Second Class	\geq 5.75 to < 6.75	from II Year to
Pass Class	\geq 5.00 to < 5.75	IV Year

The Grades secured, Grade points and Credits obtained will be shown separately in the memorandum of marks.

5. All the other regulations as applicable to **B. Tech. 4-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme)**

COMMUNITY SERVICE PROJECT

Introduction

- 1. Community Service Project is an experiential learning strategy that integrates meaningful community service with instruction, participation, learning and community development
- 2. Community Service Project involves students in community development and service activities and applies the experience to personal and academic development.
- 3. Community Service Project is meant to link the community with the college for mutual benefit. The community will be benefited with the focused contribution of the college students for the village/ local development. The college finds an opportunity to develop social sensibility and responsibility among students and also emerge as a socially responsible institution.

Objective

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

- 1. To sensitize the students to the living conditions of the people who are around them,
- 2. To help students to realize the stark realities of the society.
- **3.** To bring about an attitudinal change in the students and help them to develop societal consciousness, sensibility, responsibility and accountability
- **4.** To make students aware of their inner strength and help them to find new /out of box solutions to the social problems.
- **5.** To make students socially responsible citizens who are sensitive to the needs of the disadvantaged sections.
- **6.** To help students to initiate developmental activities in the community in coordination with public and government authorities.
- 7. To develop a holistic life perspective among the students by making them study culture, traditions, habits, lifestyles, resource utilization, wastages and its management, social problems, public administration system and the roles and responsibilities of different persons across different social systems.

Implementation of Community Service Project

- 1. Every student should put in a minimum of **180 hours** for the Community Service Project during the summer vacation.
- 2. 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.
- 5. The log book has to be countersigned by the concerned mentor/faculty in charge.
- 6. Evaluation to be done based on the active participation of the student and grade could be awarded by the mentor/faculty member.
- 7. The final evaluation to be reflected in the grade memo of the student.
- 8. The Community Service Project should be different from the regular programmes of NSS/NCC/Green Corps/Red Ribbon Club, etc.
- 9. 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.

10. Award of marks shall be made as per the guidelines of Internship/apprentice/ on the job training *Procedure*

1. 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.

- 2. The Community Service Project is a twofold one
 - a) First, the student/s could conduct a survey of the habitation, if necessary, in terms of their own domain or subject area. Or it can even be a general survey, incorporating all the different areas. A common survey format could be designed. This should not be viewed as a duplication of work by the Village or Ward volunteers, rather, it could be another primary source of data.
 - b) Secondly, the student/s could take up a social activity, concerning their domain or subject area. The different areas, could be like
 - Agriculture
 - Health
 - Marketing and Cooperation
 - Animal Husbandry
 - Horticulture
 - Fisheries
 - Sericulture
 - Revenue and Survey
 - Natural Disaster Management
 - Irrigation
 - Law & Order
 - Excise and Prohibition
 - Mines and Geology
 - Energy
 - Internet
 - Free Electricity
 - Drinking Water

EXPECTED OUTCOMES

BENEFITS OF COMMUNITY SERVICE PROJECT TO STUDENTS Learning Outcomes

- 1. Positive impact on students' academic learning
- 2. Improves students' ability to apply what they have learned in "the real world"
- 3. Positive impact on academic outcomes such as demonstrated complexity of understanding, problem analysis, problem-solving, critical thinking, and cognitive development
- 4. Improved ability to understand complexity and ambiguity

Personal Outcomes

- 1. Greater sense of personal efficacy, personal identity, spiritual growth, and moral development
- 2. Greater interpersonal development, particularly the ability to work well with others, and build leadership and communication skills

Social Outcomes

- 1. Reduced stereotypes and greater inter-cultural understanding
- 2. Improved social responsibility and citizenship skills
- 3. Greater involvement in community service after graduation

Career Development

- 1. Connections with professionals and community members for learning and career opportunities
- 2. Greater academic learning, leadership skills, and personal efficacy can lead to greater opportunity

Relationship with the Institution

- 1. Stronger relationships with faculty
- 2. Greater satisfaction with college
- 3. Improved graduation rates

BENEFITS OF COMMUNITY SERVICE PROJECT TO FACULTY MEMBERS

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

BENEFITS OF COMMUNITY SERVICE PROJECT TO COLLEGES AND UNIVERSITIES

- 1. Improved institutional commitment
- 2. Improved student retention
- 3. Enhanced community relations

BENEFITS OF COMMUNITY SERVICE PROJECT TO COMMUNITY

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

SUGGESTIVE LIST OF PROGRAMMES UNDER COMMUNITY SERVICE PROJECT

The following the recommended list of projects for Engineering students. The lists are not exhaustive and open for additions, deletions and modifications. Colleges are expected to focus on specific local issues for this kind of projects. The students are expected to carry out these projects with involvement, commitment, responsibility and accountability. The mentors of a group of students should take the responsibility of motivating, facilitating, and guiding the students. They have to interact with local leadership and people and appraise the objectives and benefits of this kind of projects. The project reports shall be placed in the college website for reference. Systematic, Factual, methodical and honest reporting shall be ensured.

For Engineering Students

- 1. Water facilities and drinking water availability
- 2. Health and hygiene
- 3. Stress levels and coping mechanisms
- 4. Health intervention programmes
- 5. Horticulture
- 6. Herbal plants
- 7. Botanical survey
- 8. Zoological survey
- 9. Marine products
- 10. Aqua culture
- 11. Inland fisheries
- 12. Animals and species
- 13. Nutrition
- 14. Traditional health care methods
- 15. Food habits
- 16. Air pollution
- 17. Water pollution
- 18. Plantation
- 19. Soil protection
- 20. Renewable energy
- 21. Plant diseases
- 22. Yoga awareness and practice
- 23. Health care awareness programmes and their impact
- 24. Use of chemicals on fruits and vegetables
- 25. Organic farming
- 26. Crop rotation
- 27. Floury culture
- 28. Access to safe drinking water

- 29. Geographical survey
- 30. Geological survey
- 31. Sericulture
- 32. Study of species
- 33. Food adulteration
- 34. Incidence of Diabetes and other chronic diseases
- 35. Human genetics
- 36. Blood groups and blood levels
- 37. Internet Usage in Villages
- 38. Android Phone usage by different people
- 39. Utilization of free electricity to farmers and related issues
- 40. Gender ration in schooling level- observation.

Complimenting the community service project, the students may be involved to take up some awareness campaigns on social issues/special groups. The suggested list of programmes are;

Programmes for School Children

- 1. Reading Skill Programme (Reading Competition)
- 2. Preparation of Study Materials for the next class.
- 3. Personality / Leadership Development
- 4. Career Guidance for X class students
- 5. Screening Documentary and other educational films
- 6. Awareness Programme on Good Touch and Bad Touch (Sexual abuse)
- 7. Awareness Programme on Socially relevant themes.

Programmes for Women Empowerment

- 1. Government Guidelines and Policy Guidelines
- 2. Womens' Rights
- 3. Domestic Violence
- 4. Prevention and Control of Cancer
- 5. Promotion of Social Entrepreneurship

General Camps

- 1. General Medical camps
- 2. Eye Camps
- 3. Dental Camps
- 4. Importance of protected drinking water
- 5. ODF awareness camp
- 6. Swatch Bharat
- 7. AIDS awareness camp
- 8. Anti Plastic Awareness
- 9. Programmes on Environment
- 10. Health and Hygiene
- 11. Hand wash programmes

12. Commemoration and Celebration of important days

Programmes for Youth Empowerment

- 1. Leadership
- 2. Anti-alcoholism and Drug addiction
- 3. Anti-tobacco
- 4. Awareness on Competitive Examinations
- 5. Personality Development

Common Programmes

- 1. Awareness on RTI
- 2. Health intervention programmes
- 3. Yoga

4. Tree plantation

- 5. Programmes in consonance with the Govt. Departments like
 - i. Agriculture
 - ii. Health
 - iii. Marketing and Cooperation
 - iv. Animal Husbandry
 - v. Horticulture
 - vi. Fisheries
 - vii. Sericulture
 - viii. Revenue and Survey
 - ix. Natural Disaster Management
 - x. Irrigation
 - xi. Law & Order
 - xii. Excise and Prohibition
 - xiii. Mines and Geology
 - xiv. Energy

Role of Students:

- 1. Students may not have the expertise to conduct all the programmes on their own. The students then can play a facilitator role.
- 2. For conducting special camps like Health related, they will be coordinating with the Governmental agencies.
- 3. As and when required the College faculty themselves act as Resource Persons.
- 4. Students can work in close association with Non-Governmental Organizations like Lions Club, Rotary Club, etc or with any NGO actively working in that habitation.
- 5. And also, with the Governmental Departments. If the programme is rolled out, the District Administration could be roped in for the successful deployment of the programme.
- 6. An in-house training and induction programme could be arranged for the faculty and participating students, to expose them to the methodology of Service Learning.

Timeline for the Community Service Project Activity

Duration: 8 weeks

1. Preliminary Survey (One Week)

- a) A preliminary survey including the socio-economic conditions of the allotted habitation to be conducted.
- b) A survey form based on the type of habitation to be prepared before visiting the habitation with the help of social sciences faculty. (However, a template could be designed for different habitations, rural/urban.
- c) The Governmental agencies, like revenue administration, corporation and municipal authorities and village secretariats could be aligned for the survey.

2. Community Awareness Campaigns (Two Weeks)

Based on the survey and the specific requirements of the habitation, different awareness campaigns and programmes to be conducted, spread over two weeks of time. The list of activities suggested could be taken into consideration.

3. Community Immersion Programme (Four Weeks)

Along with the Community Awareness Programmes, the student batch can also work with any one of the below listed governmental agencies and work in tandem with them. This community involvement programme will involve the students in exposing themselves to the experiential learning about the community and its dynamics. Programmes could be in consonance with the Govt. Departments.

4. Community Exit Report (One Week)

During the last week of the Community Service Project, a detailed report of the outcome of the 8 weeks works to be drafted and a copy shall be submitted to the local administration. This report will be a basis for the next batch of students visiting that particular habitation. The same report submitted to the teacher-mentor will be evaluated by the mentor and suitable marks are awarded for onward submission to the University.

Throughout the Community Service Project, a daily log-book need to be maintained by the students batch, which should be countersigned by the governmental agency representative and the teacher-mentor, who is required to periodically visit the students and guide them.

MALPRACTICES RULES

	DISCIPLINARY ACTION FOR / IMPRO	JPER CONDUCT IN EXAMINATIONS
	Nature of Malpractices/Improper conduct	Punishment
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the University.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that 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 candidate is subject to the academic regulations in connection with forfeiture of seat
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction 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	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.

	amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	
7.	Leaves the exam hall taking away answer script or intentionally tears the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action and impose suitable punishment.	

Malpractices identified by squad or special invigilators

- Punishments to the candidates as per the above guidelines. 1. 2.
 - Punishment for institutions: (if the squad reports that the college is also involved in encouraging malpractices)
 - (i) A show because notice shall be issued to the college.
 - Impose a suitable fine on the college. (ii)
 - (iii) Shifting the examination centre from the college to another college for a specific period of not less than one year.

* * * * *



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA KAKINADA - 533 003, Andhra Pradesh, India For Constituent Colleges and Affiliated Colleges of JNTUK





Prohibition of ragging in educational institutions Act 26 of 1997

Salient Features

- > Ragging within or outside any educational institution is prohibited.
- Ragging means doing an act which causes or is likely to cause Insult or Annoyance of Fear or Apprehension or Threat or Intimidation or outrage of modesty or Injury to a student.



In Case of Emergency CALL TOLL FREE NO.: 1800 - 425 - 1288

LET US MAKE JNTUK A RAGGING FREE UNIVERSITY

B.Tech in Electrical and Electronics Engineering

Programme Educational Objectives (PEOs)

PEO1: Be the practicing engineers in chosen technical fields such as designing, manufacturing and testing of various electrical systems.

PEO2: Fulfil the needs of society by solving technical problems in an ethical, responsible and an optimal way.

PEO3: Demonstrate professionalism through life-long learning.

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and concepts of electrical engineering to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and electrical.

PO3: Design/development of solutions: Design solutions for complex Electrical 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 Electrical Engineering and IT tools including prediction and modelling to complex electrical 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 electrical 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 Electrical 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 Electrical 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.

P012: 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.

Programme Specific Outcomes (PSOs)

- To contribute for the Development of green energy technologies to meet future energy demands.
- To identify, formulate, design, investigate and operate various electrical systems.



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Department of Electrical & Electronics Engineering (NBA Accredited)

I-Semester							
S No	Course	Course Title	Hours per Week			Crodits	
5.110.	Code	course ritte	L	Т	Р	creates	
1	V20MAT01	Linear Algebra and Differential Equations	3	0	0	3	
2	V20CHT01	Engineering Chemistry	3	0	0	3	
3	V20ENT01	English for Professional Enhancement	3	0	0	3	
4	V20MEL02	Engineering Workshop	1	0	4	3	
5	V20CST01	Programming in C for problem solving	3	0	0	3	
6	V20ENL01	Hone Your Communications Skills Lab-I	0	0	3	1.5	
7	V20CHL01	Engineering Chemistry Lab	0	0	3	1.5	
8	V20CSL01	Programming lab in C for problem solving	0	0	3	1.5	

COURSE STRUCTURE OF V20 REGULATION B.TECH (EEE)

Total Contact Hours: 26

II-Semester

Total Credits: 19.5

S No	Course	Course Title	Hou	rs per W	leek	Credits	
5.110.	Code	course mile	L	Т	Р		
1	V20MAT02	Numerical Methods and Vector Calculus	3	0	0	3	
2	V20PHT01	Engineering Physics	3	0	0	3	
3	V20ECT01	Switching Theory and Logic Design	3	0	0	3	
4	V20EET03	Electrical Circuit Analysis-I	3	0	0	3	
5	V20MEL01	Engineering Graphics	1	0	4	3	
6	V20EEL03	Electrical Engineering Workshop	0	0	3	1.5	
7	V20PHL01	Engineering Physics Lab	0	0	3	1.5	
8	V20ENL02	Hone Your Communications Skills Lab-II	0	0	3	1.5	
9	V20CHT02	Environmental Studies	2	0	0	0	

Total Contact Hours: 28

Total Credits: 19.5



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Department of Electrical & Electronics Engineering (NBA Accredited)

III-Semester

S No	Course	Course Title	Hour	s per V	Week	Credits
5.110.	Code		L	Т	P	cieuits
1	V20MAT05	Transform Calculus	3	0	0	3
2	V20EET04	Electrical Circuit Analysis-II	3	0	0	3
3	V20EET05	Electro Magnetic Fields	3	0	0	3
4	V20EET06	Electrical Machines-I	3	0	0	3
5	V20ECT06	Analog Electronics	3	0	0	3
6	V20EEL04	Electrical Circuits Lab	0	0	3	1.5
7	V20ECL03	Analog Electronics Laboratory	0	0	3	1.5
8	V20CSL31	Data Structures & Algorithms Lab	0	1	3	1.5
9 Skill Oriented Course		1	0	2	2	
10 V20ENT02 Professional Communication Skills-I		2	0	0	0	
Total Credits 2						21.5

Total Contact Hours: 29

Total Credits: 21.5

IV-Semester

S No	Course	Course Title	Hours	Credits		
5.110.	Code		L	Т	Р	Cicuits
1	V20EET07	Signals and Systems	3	0	0	3
2	V20EET08	Electrical Machines - II	3	0	0	3
3	V20EET09	Electrical and Electronic Measurements	3	0	0	3
4	V20EET10	Electrical Power Generation and Transmission	3	0	0	3
5	V20MBT51	Managerial Economics and Financial Analysis	3	0	0	3
6	V20CSL32	Python Programming Lab	0	1	3	1.5
7	V20EEL05	Electrical Machines-I Lab	0	0	3	1.5
8	V20EEL06	Electrical Measurements Lab	0	0	3	1.5
9		Skill Oriented Course	1	0	2	2
10 V20ENT03 Professional Communication Skills-II		2	0	0	0	
Total Credits					21.5	

Total Contact Hours: 29

Total Credits : 21.5

Internship two months (Mandatory) during summer vacation.

List of Skill Oriented Courses:

S. No.	Course Code	Course Title
1.	V20EES01	PCB Design
2.	V20EES02	Scilab
3.	V20EES03	Electrical CAD
4.	V20EES04	Arduino Board
5.	V20EES05	Fundamentals of Drone Technology
6.	V20EES06	Industrial Automation with PLC



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Department of Electrical & Electronics Engineering (NBA Accredited)

V20 Regulation V to VIII Semesters Course Structure & Syllabus

Semester V

S. No	Code	Course Title	H	lour	S	Credits
			L	Τ	Р	
1	V20EET11	Control Systems	3	0	0	3
2	V20EET12	Switchgear & Protection	3	0	0	3
3	V20EET13	Power Electronics	3	0	0	3
4		Open Elective -I	0	0	6	3
5	V20EET14 V20EET15 V20EET16 V20EET17	 Professional Elective-I 1. Utilization of Electrical Energy 2. Renewable Energy Systems 3. Instrumentation 4. Energy Audit & Demand side management 	3	0	0	3
6	V20EEL07	Electrical Machines-II Lab	0	0	3	1.5
7	V20EEL08	Control Systems Lab	0	0	3	1.5
8	V20ENT04	Professional Communication Skills- III	2	0	0	0
9		Soft Skills	1	0	2	2
Summer Internship 2 Months (Mandatory) after second year (to be evaluated during V Semester			0	0	0	1.5
Total Credits			21.5			
Honors 3-1-0 a	Honors/Minor Courses (The hours distribution can be 3-0-2 or 3-1-0 also)			0	0	4

Category	Credits
Professional Core Courses	12
Professional Elective Courses	3
Open Elective Course/Job Oriented Elective	3
Skill advanced Course/ Soft Skill Course*	2
Summer Internship	1.5
Total Credits	21.5

Department Vision:

[•] To evolve as a centre of excellence in Electrical and Electronics Engineering that produces graduates of high quality with ethical values. Department Mission:

[•] To impart technical knowledge through learner-centric education supplemented with practical exposure.

To provide opportunities that promote personality development through co-curricular and extra-curricular activities.

[·] To inculcate human values & team spirit that enables the Electrical and Electronics Engineers to face the future challenges.

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Pedatadepalli, TADEPALLIGUDEM-534 101.W.G.Dist. (A.P)

Department of Electrical & Electronics Engineering (NBA Accredited)

S. No	Code	Course Title	H	Iour	S	Credits
			L	Τ	Ρ	
1	V20EET18	Power System Analysis	3	1	0	3
2	V20EET19	Electrical Drives	3	0	0	3
3	V20EET20	Microprocessors & Microcontrollers	3	0	0	3
4	V20EET21 V20EET22 V20EET23 V20EET24	 Professional Elective-II Smart Grid Technologies Power Quality & Custom Power Devices Modern Control Theory IoT Applications In Electrical Engineering 	3	0	0	3
5		Open Elective –II	3	0	0	3
6	V20EEL09	Power Systems Lab	0	0	3	1.5
7	V20EEL10	Power Electronics & Simulation Lab	0	0	3	1.5
8	V20EEL11	Microprocessors & Microcontrollers Lab	0	0	3	1.5
9	V20CEMC01	IPR & Patents	2	0	0	0
10	V20SOSO4	Skill advanced Course	1	0	2	2
				21.	5	

Industrial/Research Internship (Mandatory) 2 Months during summer			
vacation			
Category	Credits		
Professional Core Courses	13.5		
Professional Elective Courses	3		
Open Elective Course/Job Oriented Elective	3		
Skill advanced Course/ Soft Skill Course*	2		
Mandatory Course (AICTE)	0		
Industrial/Research Internship (Mandatory) 2 Months	-		
Total Credits	21.5		

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Somostor VI



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Department of Electrical & Electronics Engineering (NBA Accredited)

S. No.	Course Code	Course Title				
1.		Machine Learning				
2.		Data Science				
3.		Augmented Reality				
4.		Robotics				
5.		Clouds computing				
6.	VOLEECO2 /	Industrial IoT (IIoT)				
7.	V20EESU3/	Embedded Systems				
8.	V20EE504	Integrated Systems				
9.		Web Development				
10.		Deep Learning				
11.		Block Chain Technology				
12.		Cyber Security				
13.		MEAN Stack Technologies				
14.		Big Data Analytics				

Skill Advanced Courses

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Pedatadepalli, TADEPALLIGUDEM-534 101.W.G.Dist. (A.P)

Department of Electrical & Electronics Engineering (NBA Accredited)

Semester VII							
S. No	Code	Course Title Ho				Credits	
			L	Т	P		
		Professional Elective-III					
	V20EET25	1. Extra High Voltage AC Transmission					
1	V20EET26	2. Power System Operation and Control	3	0	0	3	
	V20EET27	3. Digital Control Systems					
	V20EET28	4. Electrical Machine Modelling & Analysis					
		Professional Elective-IV					
	V20EET29	1. High Voltage Engineering					
2	V20EET30	2. Electrical Distribution Systems	3	0	0	3	
	V20EET31	3. Power System Reforms					
	V20EET32	4. Advanced Power Electronics					
		Professional Elective-V					
	V20EET33	1. Special Electrical Machines					
3	V20EET34	2. AI Techniques for Power Systems	3	0	0	3	
	V20EET35	3. Energy Storage and Battery Management					
	V20EET36	4. Hybrid Electric Vehicles					
4		Open Elective – III	3	0	0	3	
5	V20EEL12	Advanced Electrical Simulation Lab	0	0	6	3	
6	V20MBT54	Universal Human Values	3	0	0	3	
	V20SOC05 Skill advanced Course			0	2	2	
Industi	Industrial/Research Internship 2 Months (Mandatory) after third				0	2	
year (to	o be evaluated	during VII semester	U	U	U	3	
		Total Credits			23		

Category	Credits
Professional Elective Courses	9
Open Elective Course/Job Oriented Elective	6
Humanities and Social Science Elective	3
Skill advanced Course/ Soft Skill Course*	2
Industrial/Research Internship	3
Total Credits	23

Semester VIII

S. No	Category	Code	Course Title	Hours		Credits	
				L	T	P	
1	Major Project	PROJ	Project Work, Seminar and Internship in Industry	0	0	0	12
	Internship (6 Months)						
Total Credits						12	

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Semester	I SEM	L	Т	Р	С	COURSE CODE	
Regulation	V20	3	-	-	3	V20MAT01	
Name of the Course	Linear Algebra and Differential Equations						
Branches	Common to All Branches						

Course Outcomes:

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

CO No.	Course Outcome	Knowledge Level
CO1	Apply matrix technique to solve system of linear equations	K3
CO2	Find Eigenvalues and Eigen vectors	K3
CO3	Solve the ordinary differential equations of first order & first degree	K3
CO4	Solve the linear differential equations of higher order with constant coefficients	K3
CO5	Apply Laplace Transformation to given function	K3
CO6	Find maxima and minima of functions of two variables	K3

UNIT I: System of linear equations:

Rank-Echelon form-Normal form – Solution of linear systems – Gauss elimination – Gauss Jordon- Gauss Jacobi and Gauss Seidal methods.

UNIT II: Eigenvalues, Eigen vectors and Cayley-Hamilton theorem:

Eigenvalues - Eigen vectors- Properties - Cayley-Hamilton theorem (without proof) -Inverse and powers of a matrix by using Cayley-Hamilton theorem.

UNIT-III: Differential equations of first order and first degree:

Linear-Bernoulli-Exact-Reducible to exact differential equations -Newton's Law of cooling-Law of natural growth and decay-Orthogonal Trajectories.

UNIT IV: Linear differential equations of higher order:

Linear non homogeneous differential equations of higher order with constant coefficients involving RHS term of the type e ax, sinax, cosax, polynomials in x, e axV(x), xV(x)- method of variation of parameters.

UNIT V: Laplace Transformation:

Laplace transforms of standard functions, properties(without proof), transforms of tf(t), f(t)/t, transforms of derivatives and integrals, transforms of unit step function, Dirac delta function, Inverse Laplace transforms, convolution theorem (without proof)

Application: Solving ordinary differential equations with initial conditions using Laplace transforms.

UNIT VI: Partial Differentiation:

Introduction to partial differentiation -Total derivative - Functional dependence -Jacobian.- maxima and minima of functions of two variables (without constraints) and Lagrange's method (with constraints).

Text Books:

- 1. B.S.Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
- 2. N.P.Bali, Engineering Mathematics, Lakshmi Publications.

Reference Books:

- 1. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, Wiley-India
- 2. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press
- 3. Srimanta Pal, SubodhC.Bhunia, Engineering Mathematics, Oxford University Press.
- 4. Dass H.K., RajnishVerma. Er., Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.

Semester	I SEM	L	Т	Р	С	COURSE CODE	
Regulation	V20	3	-	-	3	V20CHT01	
Name of the Course	se Engineering Chemistry						
Branches	Common to All Branches						

Course Outcomes:

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

CO No.	Course Outcome	Knowledge Level
CO1	Solve boiler troubles originated due to poor water quality and suggest suitable water treatment methods.	K3
CO2	Choose plastics and rubbers for engineering applications	K3
CO3	Associate concepts of Electro Chemistry in designing electrochemical energy systems	K2
CO4	Assess the quality of fuels	K3
CO5	Apply corrosion principles for protection of metallic structures	КЗ
CO6	Interpret important applications of engineering materials	K2

UNIT I: Water Technology

Sources of water; Impurities in water, Hardness of water, Types of Hardness, Units of hardness, Determination of hardness of water, Numerical problems on temporary and permanent hardness.

Boiler troubles: Priming and Foaming, Sludge and Scale formation, Boiler corrosion, Caustic embrittlement. Softening of hard water- Zeolite process and Ion exchange process; Water for drinking purpose, BSI standards of drinking water, Disinfection: Chlorination, Break point chlorination. Desalination - Reverse Osmosis and Electro dialysis.

UNIT II: Polymer Technology

Introduction, Polymerization, Mechanism of Free radical addition polymerization; Plastics as engineering materials; Advantages and limitations, Thermoplastics and Thermosetting plastics, Fabrication of plastics (Compression, Injection, Transfer, and Extrusion Moulding) - Preparation, properties and applications of Polythene (HDPE and LDPE), PVC, Bakelite.

Elastomers: Disadvantages of natural rubber, Vulcanization of rubber, Advantages of vulcanized rubber, Preparation, properties and applications of Buna -S and Buna-N.

UNIT III: Electrochemistry

Galvanic cell, Electrode potential and EMF - Reference electrodes (Calomel and Glass electrodes), Determination of pH of a solution using glass electrode, Conduct metric titration (Strong Acid– Strong Base).

Batteries: Types, Primary battery - Li-MnO₂ battery, Secondary batteries - Lead acid battery, Lithium ion battery.

Fuel cells: Definition, H₂ - O₂ fuel cell

UNIT IV: Fuel Technology

Fuels – Characteristics of a good fuel, Classification of fuels, Calorific value (HCV and LCV), Dulong's formula, Numerical problems on HCV and LCV.

Solid fuels: Coal – Proximate and ultimate analysis, Significance of the analyses.

Liquidfuels: Petroleum composition, Classification, Synthetic petrol (Fischer Tropsch and Bergius process), Knocking, Anti knocking agents, Octane and Cetane ratings.

Gaseous fuels – Natural gas, LPG and CNG

Biofuels - Biogas, Biodiesel.

UNIT V: Corrosion And Its Prevention

Definition, Theories of Corrosion (Chemical & Electrochemical), Pilling-Bedworth Rule, Types of electrochemical corrosion (Galvanic corrosion, Concentration cell corrosion, Stress corrosion and

Pitting corrosion), Galvanic series, Factors which influence the rate of corrosion. Protection from corrosion - Design & Selection of metals, Cathodic protection, Protective coatings – Metallic coatings (Anodic and cathodic coatings), Methods of application of coatings on metals (Galvanizing, Tinning, and Electroplating).

UNIT VI: Chemistry of Engineering Materials

Nano materials: Introduction, Carbon nanotubes - Types, preparation (Arc discharge, Laser ablation and CVD Method) - Properties and applications of carbon nanotubes.

Cement: Composition, Manufacture of cement (Wet process), Setting and hardening of cement.

Biodegradable polymers: PHBV, Poly Lactic Acid - Applications

Conducting polymers: Types, Conduction mechanism in Polyacetylene, Applications.

Text Books:

- 1. Engineering Chemistry by Jain and Jain; DhanpatRai Publications & Co.
- 2. A Text book of Engineering Chemistry by S. S. Dara; S. Chand &Co Ltd.

Reference Books:

- 1. Engineering Chemistry by Vajiram and others. Wiley India Pvt. Ltd.,
- 2. Engineering Chemistry by PrasanthRath, Cengage Learning.
- 3. Engineering Chemistry by ShikhaAgarwal; Cambridge University Press.
- 4. Engineering Chemistry, by B. Sivasankar, McGraw-Hill.

Semester	I SEM	L	Т	Р	С	COURSE CODE	
Regulation	V20	3	-	-	3	V20ENT01	
Name of the Course	e English for Professional Enhancement						
Branches	Common to All Branches						

Course Outcomes:

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

CO	Course Outcome	Knowledge
No.		Level
CO1	Identify the central theme of the text, use cohesive items for coherence in a paragraph, recognize nouns and basic sentence structures.	K2
CO2	Restate the central idea of the letter by using appropriate vocabulary. Gain mastery over articles and prepositions	K2
CO3	Find the success formula after reading the text in detail to answer questions. Use appropriate tense and concord, find suitable vocabulary and format to draft letters and e-mails.	K3
CO4	Employ reading skills to comprehend the given biography. Interpret visual information .Use quantifiers appropriately and get acquainted with writing for media and statement of purpose	K3
CO5	Appraise the delivered lecture and text, recognize the contextual vocabulary, write error free academic proposals and prepare poster presentations.	K4
CO6	Infer the real meaning of the text, listen for global comprehension and identify foreign phrases, use active and passive voice, practise note making.	K4

<u>UNIT-I</u>

A Drawer Full Of Happiness (From Infotech English, Maruthi Publications).

Vocabulary: Technical vocabulary, GRE Vocabulary, Antonyms and Synonyms, Word Applications, Verbal Reasoning and Sequencing of Words.

Grammar: Word forms and Function words; Nouns: singular and plural, Countable and uncountable, Basic Sentence Structure and Word Order, yes/no questions, Wh-questions.

Listening: Listening to short audio texts and identifying the topic, context and specific pieces of information to answer a series of questions both in speaking and writing.

Speaking: Self- Introduction and Introducing others. Asking and answering general questions on topics such as home, family, work, studies and interests.

Reading: Skimming text to get the main idea. Scanning to look for specific pieces of information.

Writing: Mechanics of Writing, Punctuation, Paragraph Writing

Non- Detailed: The Post Office by Rabindranath Tagore (Macmillan India)

<u>UNIT-II</u>

Nehru's Letter to His Daughter Indira On Her Birthday (From Infotech English, Maruthi Publications).

Vocabulary: Technical Vocabulary, GRE Vocabulary, Analogies, Antonyms and Synonyms, Word Applications.

Grammar: Articles, Prepositions

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts both in speaking and writing.

Speaking: Discussion in pairs/ small groups on specific topics. Functional English: Greeting and Leave Taking.

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

Writing: Identifying the main ideas, Rephrasing and Summarizing them, Paraphrasing.

Non- Detailed : The Post Office by Rabindranath Tagore (Macmillan India)

<u>UNIT-III</u>

Stephen Hawking - Positivity 'Benchmark' (From Infotech English, Maruthi Publications).

Vocabulary: Technical Vocabulary, GRE Vocabulary, Verbal Reasoning, Using Equivalents.

Grammar: Verbs, Tenses, Concord: Subject - Verb Agreement.

Listening: Listening for global comprehension and summarizing what is listened to both in speaking and writing

Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed. Functional English: Complaining and Apologizing.

Reading: Reading a text in detail by making basic inferences –recognizing, and interpreting specific context clues; strategies to use text clues for comprehension, critical reading.

Writing: Letter writing- types, format and principles of letter writing, E-mail Etiquette, Writing a Resume/CV and Covering Letter.

Non- Detailed: The Post Office by Rabindranath Tagore (Macmillan India)

<u>UNIT-IV</u>

Like A Tree, Unbowed: Wangari Maathai - Biography (From Infotech English, Maruthi Publications).

Vocabulary: Technical Vocabulary, GRE Vocabulary, Antonyms and Synonyms, Word Applications, Cloze Encounters, Phrasal Verbs, Verbal Reasoning.

Grammar: Quantifying Expressions - Adjectives and Adverbs: comparing and contrasting; Degrees of comparison

Listening: Making predictions while listening to conversations/ transactional dialogues without video (only audio), listening to audio-visual texts.
Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - Asking for and Giving Information/Directions. Functional English: Asking for Permissions, Requesting, Inviting.

Reading: Studying the use of graphic elements in text to convey information.

Writing: Interpreting Visual Information, Statement of Purpose, Writing for Media, Writing for Clarity.

Non- Detailed: The Post Office by Rabindranath Tagore (Macmillan India)

UNIT-V

Stay Hungry, Stay Foolish (From Infotech English, Maruthi Publications).

Vocabulary: Technical Vocabulary, GRE Vocabulary, Antonyms and Synonyms, Word Applications, Phrasal Verbs, Verbal Reasoning.

Grammar: Identifying and Correcting Common Errors in Grammar and Usage (articles, prepositions, tenses, subject-verb agreement), Reported Speech.

Listening: Identifying key Terms, Understanding Concepts and Interpreting the Concepts both in speaking and writing.

Speaking: Formal oral presentations on topics from academic contexts. Functional English: Suggesting/Opinion giving.

Writing: Writing Academic Proposals - Writing Research Articles, Poster Presentation.

Non- Detailed : The Post Office by Rabindranath Tagore (Macmillan India)

<u>UNIT-VI</u> On Saying Please – A.G.Gardiner

Vocabulary: Technical Vocabulary, GRE Vocabulary, Antonyms and Synonyms, Foreign phrases.

Grammar: Active and Passive Voice.

Listening: Understanding Concepts, Global Comprehension from a TED talk.

Speaking: Giving Commands/instructions.

Readin : Reading Comprehension Practice for IELTS.

Writing: Note making, Blog writing.

Non- Detailed : The Post Office by Rabindranath Tagore (Macmillan India)

Books Prescribed

"Infotech English", Maruthi Publications. (Detailed)

"The post Office" by Rabindranath Tagore, Macmillan India (Non -Detailed)

Reference books:

- 1. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
- 2. Chase, Becky Tarver. Pathwasys: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
- 3. Skillful Level 2 Reading and Writing Student's Book Pack (B1) Macmillan Educational.
- 4. The Official Cambridge Guide to IELTS, for Academic and General Training.(2015)

Practical English Usuage, Michael Swan, OUP, 1995.

Semester	I SEM	L	Т	Р	С	COURSE CODE
Regulation	V20	1	-	4	3	V20MEL02
Name of the Course	Engineering Workshop					
Branches	Common to All Branches					

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

CO No.	Course Outcome	Knowledge Level
CO1	Prepare different models in the carpentry trade and understand basic concepts of carpentry	K3
CO2	Develop various basic prototypes in the trade of Tin smithy and understand basic concepts of Tin smithy.	K3
CO3	Prepare various basic prototypes in the trade of fitting and understand basic concepts of fitting.	K3
CO4	Prepare different models in the Black smithy and understand basic concepts of Black smithy.	K3
CO5	Develop various basic House Wiring techniques, Electrical wiring circuits	K3
CO6	Develop various basic prototype models in Welding and Foundry shop.	K3

<u>Module-I</u>

General safety Considerations during operation of:

Bench Tools, Hammers, Screw Drivers, Punches, Chisels, Scrapers, Scribers, Files, Pliers and Cutters, Wrenches, Hacksaw, Bench Vise, Hand drill, Taps and Dies, Hand Shears, Rules, Tapes and Squares, Soldering Iron, Rivets. **Hand Working Operations:**

Hand Working Operations:

Sawing, Filing, Threading, Scribing, Shearing, Soldering, Sharpening of hand tools. Measuring and Gauging:

Calipers, depth Gauge, Feeler Gauge, Micrometers, Vernier Calipers, Vernier Height Gauge, Snap Gauge, Hole Gauge, Bevel Protractor, Dial Indicator, Gauge Blocks and Surface Plate

<u>Module-II</u>

Carpentry:

Introduction, Carpentry Tools, Marking and Layout, Operations.

Sheet Metal Works:

Introduction, Sheet Metal Tools, Marking and Layout, Operations – Bending, Cutting, Rolling.

Fitting:

Introduction, Fitting Tools, Marking and Layout, Operations.

Forging:

Introduction, Forging Tools, Operations – Upsetting, Drawing, Cutting, Bending, Punching, Forging Presses and Hammers.

House wiring:

Introduction, House wiring Tools and accessories, Connections, Circuit diagrams.

Metal Joining:

Safety Considerations, Introduction, Soldering, Brazing, Welding – Gas Welding, Arc Welding,

Foundry:

Introduction, Pattern Making, Foundry Tools, Core Making, Melting Furnace – Cupola, Sand Casting Process.

<u>Module-III</u>

Note: At least two exercises to be done from each.

Carpentry

- 1. T-Lap Joint
- 2. Cross Lap Joint
- 3. Dovetail Joint
- 4. Mortise and Tenon Joint

<u>Tin Smithy</u>

- 1. Taper Tray
- 2. Square Box without lid
- 3. Open Scoop
- 4. Funnel

Fitting shop

- 1. V- Fit
- 2. Square Fit
- 3. Half Round Fit
- 4. Dovetail Fit

Black smithy

- 1. Round rod to Square
- 2. S-Hook
- 3. Round Rod to Flat Ring
- 4. Round Rod to Square headed bolt

House wiring

- 1. Parallel / Series Connection of three bulbs
- 2. Stair Case wiring
- 3. Florescent Lamp Fitting
- 4. Measurement of Earth Resistance

Welding shop (Arc welding)

- 1. Butt Joint
- 2. Lap Joint

Foundry Practice

Preparation of sand mould using split piece pattern and cast the component.

Text Books:

- 1. A Course in Work shop Technology, Vol.1, Raghuwanshi, DhanpatRai&Co.
- 2. Elements of Workshop Technology, Vol.1, S.K.HajraChoudary, Asia Publishing House.
- 3. Production Technology, Vol.1, R.K.Jain and S.C Gupta, Khanna Publications.
- 4. Workshop Practice Manual, K. Venkata Reddy, B.S. Publications.
- 5. Workshop Manual, P.Kannaiah, KL.Narayana, Scitech Publications.

Semester	I SEM	L	Т	Р	С	COURSE CODE
Regulation	V20	-	-	3	1.5	V20CST01
Name of the Course	e Programming in 'C' for problem Solving					
Branches	Common to All					

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

CO No.	Course Outcome	Knowledge Level
CO1	Describe various problem solving strategies such as Algorithms and Flowcharts	K2
CO2	Develop various programming constructs using Control Structures	K3
CO3	Construct Programs using modular programming approach	K3
CO4	Illustrate the usage of Arrays, String and pointers	K3
CO5	Construct Programs using Structures and Unions	K3
CO6	Distinguish between Sequential files and Random access files	K4

UNIT-I: Problem solving concepts: Algorithms, Flow-charts, Types of Programming Languages, Compiler, Assembler and Linker, Testing and Debugging a program. **Introduction to C Programming:** Overview and importance of C, C Program Structure, Creation and Compilation of C Programs, Identifiers, Variables, Data types, Constants, Declarations, **Input and output statements:** Input and output functions.

UNIT-II: Operators: Arithmetic, relational and logical operators, increment and decrement operators, conditional operator, assignment operator, bitwise operators, special operators, expressions, Precedence, Associatively, Order of evaluation, Type conversion, Programming Examples. **Control Structures:** Conditional statements - If-else, Switch-case constructs, Loops - while, do-while, for.

UNIT-III: Functions: Top down approach of problem solving, standard library functions, user defined functions, parameter passing - call by value, call by reference, return statement, passing arrays as parameters to functions, recursion. **Storage Classes:** Scope and extent, Storage Classes - auto, extern, static and register.

Understanding pointers: Accessing the address of a variable, declaring pointer variables, initialization of pointer variables, accessing a variable through its pointer, pointer arithmetic.

UNIT-IV: Arrays: Single-Dimensional Arrays, multi-Dimensional Arrays, initialization and accessing individual elements. **Strings** in C- Concepts, string handling functions. Pointer and arrays, pointers and character strings, array of pointers. **Dynamic Memory Allocation**: calloc(), malloc() and free()

UNIT-V: Structures: Defining, declaring, initialization, accessing, comparing, operations on individual members, array of structures, structures within structures, structures and functions, bit fields, Programming Examples. **Unions:** Definition – difference between structures and unions – declaring and accessing unions.– pointers and structures – self-referential structures.

UNIT-VI: File Processing: Creating and Opening a file, file opening modes, closing a file, input/output operations on files, error handling during I/O operations, random access to files, Command line arguments. Programming Examples.

TEXT BOOKS:

1. Programming in ANSI C by E Balagursamy, McGraw Hill, 8th Edition. **REFERENCE BOOKS:**

- 1. Let Us C, <u>YashavantKanetkar</u>, BPB Publications, 15th Edition
- 2. Programming in C, ReemaThareja, Oxford.
- 3. Programming with C, Second edition, Byron S Gottfried, Tata McGrawhill
- 4. Problem Solving and Programm design in C, Hanly J R &Koffman E.B, Pearson Education, 2009.
- 5. Programming in C, PradipDey, ManasGhosh, Oxford University Press, 2007.
- 6. Problem Solving Using C: Structured Programming Techniques, <u>YukselUckan</u>.
- 7. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE.
- 8. Computer Programming in C Kerninghan& Ritchie, PHI
- 9. C: The Complete Reference: Herbert Schildt, Osborne/Mcgraw Hill, Inc.

Semester	I SEM	L	Т	Р	C	COURSE CODE	
Regulation	V20	-	-	3	1.5	V20ENL01	
Name of the Course	ourse Hone your Communication Skills, Lab-I						
Branches	Common to All Branches						

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

CO No.	Course Outcome	Knowledge Level
CO1	Identify suitable expressions to greet people, say good bye to them, introduce one another, listen to consonants	K2
CO2	Select suitable words to invite someone, accept or decline invitations, listen to, identify and produce vowel sounds	K2
CO3	Choose suitable expressions to seek/refuse permissions, to apologize and listen to word accent	K3
CO4	Find apt expressions to give suggestions, express opinions and identify tone groups.	K3
CO5	Use appropriate words to give commands, requests and identify pauses and prominent syllables	K3
CO6	Practise listening to dialogues, role-plays using common vocabulary used in dialogues	K3

Unit-1 Hello, I'm

- Greeting people
- Saying goodbye to people
- Introducing yourself to someone/someone to someone else
- Listening and Identifying Consonants

Unit-2 I Would Love to.... but,

- Inviting someone
- Accepting or declining invitations
- Complaining about something
- Listening to, Identifying and Producing Vowel Sounds

Unit-3 With Your Permission I would like to.....

- Seeking Permission
- Granting/refusing permissions
- Apologising
- Listening to syllables and Word Accent and practice.

Unit-4 Why don't we....?

- Making Suggestions
- Agreeing/disagreeing with a suggestion
- Expressing Opinions

- Using Weak Forms
- Identifying Tone Groups

Unit-5 Could you Please....

- Giving Commands/instructions
- Requesting someone for something
- Identifying pauses and prominent syllables
- Identifying and using different tones

Unit-6 Dialogues

- The norms of dialogues
- Common vocabulary used in dialogues
- Carrying on a dialogue
- Listening to dialogue.

Book Prescribed

Strengthen Your Steps - A multimodal course in communication skills (Maruthi Publications)

Books for Further Reference

- 1. Better English Pronunciation (J.D.O'Connor), Cambridge University.
- 2. English Conversation Practice (A Practical Guide to improve Conversational Skills), Sterling Publishers.
- 3. Exercise in spoken English, Parts-I-III.CIFEL, Hyderabad, Oxford University Press.

Semester	I SEM	L	Т	Р	C	COURSE CODE
Regulation	V20	-	-	3	1.5	V20CHL01
Name of the Course	Engineering Chemistry Laboratory					
Branches	Common to All Branches					

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

CO No.	Course Outcome	Knowledge Level
CO1	Analyze quantitatively a variety of samples using volumetric methods and instrumental methods	K4
CO2	Apply volumetric and instrumental methods for the determination of water quality parameters namely Alkalinity, Hardness and pH	K3
CO3	Prepare polymeric materials, nanoparticles and analyze the given coal samples	K3

List of Experiments:

1. Introduction to chemistry laboratory – Molarity, Normality, Primary, Secondary standard solutions,

Volumetric titrations, Quantitative analysis, Qualitative analysis etc.,

- 2. Estimation of HCl using standard Na_2CO_3 solution.
- 3. Estimation of KMnO₄ using standard oxalic acid solution.
- 4. Determination of alkalinity of a sample of water.
- 5. Determination of total hardness of water using standard EDTA solution.
- 6. Estimation of copper using standard EDTA solution.
- 7. Estimation of ferrous iron using standard $K_2Cr_2O_7$ solution.
- 8. Estimation of pH of the given sample solution using pH meter.
- 9. Conductometric titration between strong acid and strong base.
- 10. Proximate analysis of coal.
- 11. Preparation of phenol formaldehyde resin.
- 12. Preparation of ZnO₂ Nanoparticles by sol-gel method.

Text Book:

1. Lab manual prepared by Department of Chemistry, Sri Vasavi Engineering College.

Reference Books:

1. Practical Engineering Chemistry by K. Mukkanti, B.S. Publications.

2. Vogel's Quantitative Chemical Analysis – 5th Edition, Longman.

3. A Text Book on experiments and Calculations Engineering by S.S.Dara, S.Chand& Co Ltd.

Semester	I SEM	L	Т	Р	C	COURSE CODE
Regulation	V20	-	-	3	1.5	V20CSL01
Name of the Course	of the Course Programming Lab in 'C' for problem Solving					
Branches	Common to All					

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

CO No.	Course Outcome	Knowledge Level
CO1	Demonstrate problem solving techniques using Control Structures	K3
CO2	Construct Programmes using the concepts of Arrays, Strings and Pointers	K3
CO3	Apply the concepts of Functions, Structures and Unions	K3
CO4	Use various file processing operations to develop real- time applications	K4

List of Experiments

Tutorial 1: Problem solving using computers.

Lab1: Familiarization with programming environment.

Tutorial 2: Variable types and type conversions.

Lab 2: Simple computational problems using arithmetic expressions.

Tutorial 3: Branching and logical expressions.

Lab 3: Problems involving if-then-else structures switch – case.

Tutorial 4: Loops, while and for loops.

Lab 4: Iterative problems e.g. sum of series.

Tutorial 5: Functions call by value, call by reference

Lab 5: Simple functions.

Tutorial 6: Recursion, structure of recursive calls.

Lab 6: Recursive functions.

Tutorial 7: Pointers.

Lab 7: Programming with pointers.

Tutorial 8: 1D Arrays: searching, sorting.

Lab 8: 1D Array manipulation.

Tutorial 9: 2D arrays.

Lab 9: Matrix problems.

Tutorial 10: String handling.

Lab 10: String handling functions.

Tutorial 11: Structures, unions and dynamic memory allocation.

Lab 11: Structures & unions.

Tutorial 12: File handling, command line arguments.

Lab 12: File operations.

Text Books:

1. Programming in Ansi C by E Balagursamy, McGraw Hill, Eight Edition. **Reference Books:**

- 1. Mastering C, K.R. Venugopal and S.R. Prasad, TMH Publishers.
- 2. Computer Programming in C, V. Rajaraman, PHI.
- 3. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
- 4. C- The Complete Reference, Herbert Schildt, Osborne/Mcgraw Hill, Inc.
- 5. Programming with C, Byron S Gottfried, Second edition, Tata McGrawhill.
- 6. Programming in C, ReemaThareja, Oxford.
- 7. Problem Solving and Program design in C, Hanly J R &Koffman E.B, Pearson Education, 2009
- 8. Programming and Problem Solving Using C, ISRD Group, Tata McGraw Hill,2008

Semester	II SEM	L	Т	Р	С	COURSE CODE
Regulation	V20	3	-	-	3	V20MAT02
Name of the Course	Numerical Methods and Vector Calculus					
Branches	Common to All Branches					

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

CO No.	Course Outcome	Knowledge Level
CO1	Compute approximate roots of algebraic and transcendental equations and interpolating polynomial for the given data	K3
CO2	Solve ordinary differential equations with initial conditions using numerical methods	K3
CO3	Find multiple integrals and improper integrals	K3
CO4	Calculate gradient of a scalar function, divergence and curl of a vector function	K3
CO5	Apply the knowledge of vector integral concepts to find characteristics of vector fields	K3
C06	Find Fourier series of a periodic functions	K3

UNIT I: Solution of Algebraic and Transcendental Equations and Interpolation:

Introduction- Bisection method – Method of false position– Newton-Raphson method (One variable) - finite differences- forward differences, backward differences – simple relations on forward, backward, central, average and shifting operators - Newton's formulae for interpolation - Lagrange's interpolation formula.

UNIT II: Numerical Integration and solution of Ordinary Differential equations: Trapezoidal rule- Simpson's 1/3rd and 3/8th rule-Solution of ordinary differential equations by Taylor's series- Picard's Method - Euler's method- Euler's modified Method – Runge-Kutta method (fourth order).

UNIT III: Multiple Integrals:

Definition of Improper integrals - Double and triple integrals – Change of variables – Change of order of integration.

UNIT IV: Vector Differentiation:

Vector differential operator - Gradient- Divergence- Curl - Laplacian and second order operators -Vector identities.

UNIT V: Vector Integration:

Line integral: Work done – Potential function – Surface and volume integrals - Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof) and related problems.

UNIT VI: Fourier series:

Fourier series -Introduction, Periodic functions, Fourier series of a periodic function, Dirichlet's conditions, Even and odd functions, Change of interval, Half-range sine and cosine series.

Text Books:

- 1. B.S.Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
- 2. N.P.Bali, Engineering Mathematics, Lakshmi Publications.

Reference Books:

- 1. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, Wiley-
- 2. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press
- 3. V.Ravindranath and P.Vijayalakshmi, Mathematical Methods, Himalaya Publishing House. India
- 4. Srimanta Pal, SubodhC.Bhunia, Engineering Mathematics, Oxford University Press.
- 5. Dass H.K., RajnishVerma. Er., Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.

Semester	II SEM	L	Т	Р	C	COURSE CODE	
Regulation	V20	3	-	-	3	V20PHT01	
Name of the Course	Engineering Physics						
Branches	Common to All Branches						

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

CO No.	Course Outcome	Knowledge Level
CO1	Grasp the basic principles of structure of materials, crystallography and X-ray diffraction.	K2
CO2	Expose the students to the basic concepts of Lasers and their applications in optical fiber communication link	K3
CO3	Classify the applications of sound waves in various fields.	K2
CO4	Interpret wavelike behavior of matter and motivates the need of fundamental physical laws for better understanding of materials.	K3
CO5	Describe the properties of semiconducting materials	K2
CO6	Illustrate the fundamental concepts of dielectrics and Superconductors.	K4

UNIT-I

Crystallography : Introduction – Space lattice – Basis – Unit Cell – Lattice parameters –Crystal systems- Bravais lattices– Structures and packing fractions of SC,BCC and FCC

X-Ray Diffraction: Directions and planes in crystals – Miller indices – Separation between successive [h k l] planes – Bragg's law-Bragg's x-ray spectrometer.

UNIT-II

Lasers: Introduction –Characteristics of lasers – Spontaneous and Stimulated emission of radiation – Einstein's coefficients –Pumping schemes– Population inversion– Ruby laser- Helium Neon laser-Applications of LASER.

Fiber Optics: Introduction –Structure of an optical fiber- Principle of Optical Fiber – Acceptance angle and acceptance cone – Numerical aperture- Basic optical communication system-Advantages of optical fibers over conventional transmission lines.

UNIT – III

Acoustics: Introduction - Sound absorption- Absorption coefficient-Reverberation-Reverberation Time –Basic requirements for constructing an acoustically good hall - Sabine's formula-Factors affecting acoustics of buildings and their remedial measures.

Ultrasonics: Introduction- Production of Ultrasonic Waves Using Piezoelectric Effect and Magnetostriction Method- Non-Destructive Testing - Pulse Echo Technique – Applications of ultrasonics.

UNIT – IV

Quantum Mechanics: Introduction-de-Broglie's concept of matter waves – Schrodinger's Time Independent& time dependent wave equations –Physical significance of the wave function- Particle in a one dimensional potential box.

Free Electron Theory: Classical free electron theory (qualitative) –Assumptions and failures-Quantum free electron theory – Equation for electrical conductivity based on quantum free electron theory-Density of states (3D) - Fermi energy-Fermi – Dirac distribution.

UNIT – V

BAND THEORY OF SOLIDS: Bloch's function (qualitative) – Kronig – Penney model (qualitative)–formation of energy bands in crystalline solids based on Kronig Penny model –E vs K diagram- v vs K diagram- effective mass of an electron-Classification of crystalline solids-concept of hole.

Semiconductor Physics: Introduction - Types of Semiconductors-Intrinsic Semiconductors- Carrier concentration– Expression for Conductivity-Extrinsic semiconductors-Carrier concentrations-Dependence of Fermi energy on carrier concentration and temperature-Drift and diffusion currents-Einstein's Equation-Hall Effect-Hall coefficient- Applications of Hall Effect.

UNIT-VI

Superconductivity: Introduction- General properties – Meissner effect - Type I and Type II Superconductors- BCS Theory – Josephson effects (AC and DC) - Applications of superconductors.

Dielectric Properties: Introduction- Types of polarizations- Electronic, Ionic and Orientation polarizations (qualitative) – Internal electric field – Clausius- Mossoti Equation.

Text Books

- 1. A Text book of Engineering Physics, M.N. Avadhanulu and P.G.Kshirasagar, S.Chand Publications.
- 2. Engineering Physics DK Bhattacharya, Poonam and Tandom Publications.

Reference books:

- 1. Solid state Physics, A.J. Dekker by McMillan India Ltd.
- 2. Introduction to Solid state Physics, Charles Kittle, Willey India Pvt. Ltd.
- 3. Solid state Physics, S.O. Pillai by <u>New Academic Science.</u>
- 4. Basic Engineering Physics, Dr.P. SreenivasaRao, Himalaya Publishers.
- 5. Engineering Physics, V. Rajendran, McGraw Hill.
- 6. Engineering Physics, Sanjay D Jain and Girish G Sahasrabudhe., University Press.
- 7. Engineering Physics, Gaur and Guptha, DhanpatRai Publications.
- 8. Engineering Physics, P.K. Palanisamy, Sci Tech Publishers.

Semester	II SEM	L	Т	Р	С	COURSE CODE
Regulation	V20	-	-	3	1.5	V20ECT01
Name of the Course	Switching Theory and Logic Design					
Branches	Common to EEE, ECE, ECT, CSE & CST					

Course Outcomes (CO's) (Along with Knowledge Level (K)):

After going through this course the student will be able to

CO No.	Course Outcome	Knowledge Level
CO-1	Explain the different types of number Systems, number conversions, codes and logic Gates.	K_2
CO-2	Apply the concepts of Boolean algebra and use the knowledge of K-maps and tabular method for minimization of Boolean expressions.	K ₃
CO -3	Construct the higher order modules from their lower order structures of various combinational logic circuits.	K ₃
CO-4	Explain the concept of various flip flops	K_2
CO-5	Develop various sequential circuits like registers, counters by using basic flip flops.	K3
CO-6	Develop the various Finite State Machine Models	K3

Unit – I: Number Systems & Codes:

i) Representation of numbers of different radix, conversation from one radix to another radix, r-1's compliments and r's compliments of signed members, problem solving. ii) 4 bit codes, BCD, Excess-3, 2421, 84-2-1 9's compliment code etc., iii) Logic operations and error detection & correction codes; Basic logic operations -NOT, OR, AND, Universal building blocks, EX-OR, EX-NOR - Gates, Gray code, error detection, error correction codes (parity checking, even parity, odd parity, Hamming code).

Unit – II: Minimization Techniques

Boolean theorems, principle of complementation & duality, De-morgan theorems, minimization of logic functions using Boolean theorems, Standard SOP and POS, Forms, NAND-NAND and NOR-NOR realizations, minimization of switching functions using K-Map up to 5 variables, tabular minimization, problem solving (code-converters using K-Map etc..).

Unit – III: Combinational Logic Circuits Design

Design of Half adder, full adder, half subtractor, full subtractor, applications of full adders, 4-bit binary subtractor, adder-subtractor circuit, BCD adder circuit, Excess 3 adder circuit, look-a-head adder circuit, Design of decoder, DE multiplexer, 7 segment decoder, higher order DE multiplexing, encoder, multiplexer, higher order multiplexing, realization of Boolean functions using decoders and multiplexers, priority encoder, 4-bit digital comparator.

Unit – IV: Sequential Circuits –I

Classification of sequential circuits (synchronous and asynchronous); basic flipflops, truth tables and excitation tables (Nand RS latch, nor RS latch, RS flip-flop, JK flip-flop, T flip-flop, D flip-flop with reset and clear terminals). Asynchronous Inputs (Preset and Clear), Race around condition, Master Slave JK Flip flop, Conversion from one flip-flop to another flip-flop.

Unit – V: Sequential Circuits -II

Design of ripple counters, design of synchronous counters, Johnson counter, ring counter. Design of registers - Buffer register, control buffer register, shift register, bi-directional shift register, universal shift register.

Unit – VI: Finite State Machines

Finite State machine; Analysis of Clocked sequential circuits, state Diagrams, state Tables, Reduction of State Tables and State assignments, design Procedures. Realization of Circuits using various Flip Flops.Meelayto Moore Conversion and Vice-versa.

Text Books

- 1. Digital Design by M. Morris Mano, Michael D. Ciletti, PEA.
- 2. Switching & Finite Automata Theory, 2nd Edition, ZviKohavi, TMH, 1978
- 3. Fundamentals of Logic Design, 5/e Roth, Cengage.

Reference Books

- 1. Modern Digital Electronics by RP Jain, TMH
- 2. An Engineering Approach to Digital Design, William I. Fletcher, Pearson edition.
- 3. Switching Theory and Logic Design by A. Anand Kumar

Semester	II SEM	L	Т	Р	C	COURSE CODE
Regulation	V20	3	-	-	3	V20EET03
Name of the Course	Electrical Circuit Analysis-I					
Branches	EEE					

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

CO No.	Course Outcome	Knowledge Level
C112.1	Apply various network reduction techniques for solving electrical DC circuits.	K3
C112.2	Calculate different parameters of single phase alternating quantities.	K3
C112.3	Understand the concepts of different powers and apply network reduction techniques for solving electrical AC circuits.	K3
C112.4	Determine various parameters in series and parallel resonant circuits.	K3
C112.5	Apply the network theorems for solving electrical DC and AC circuits.	K3
C112.6	Compute electrical parameters for 3-phase balanced systems	K3

Unit-I: Introduction to Electrical Circuits

Classification of network elements, Basic terminology, Kirchhoff's laws; RLC Parameters - series and parallel combinations; Energy Sources; Source transformation; Y- Δ and Δ -Y transformation; Mesh analysis and Nodal analysis – Numerical problems

Unit-II: Single Phase A.C Systems - I

Basic terminology associated with alternating quantity- RMS value, Average value, form factor and peak factor; phase angle and phase difference –lagging, leading networks; steady state analysis of series and parallel combinations of R, L and C circuits, numerical problems.

Unit- III: Single Phase A.C Systems - II

Types of Powers; Power Factor and its significance; Power triangle, Mesh analysis and Nodal analysis of AC networks; Numerical problems.

Unit-IV: Resonance

Concept of Resonance - Series and parallel resonance, Bandwidth, quasi factor, selectivity; Numerical problems; Introduction to locus diagrams; Concept of Duality and Dual networks.

Unit-V: Magnetic Circuits

Basic definitions of MMF, Flux and Reluctance; Analogy between electrical and magnetic circuits; Analysis of series, parallel and composite magnetic circuits; Faraday's laws of electromagnetic induction; Concepts of self-inductance, mutual inductance and coefficient of coupling; Concept of Dot Convention and coupled coils.

Unit-VI: Balanced Three phase circuits

Generation of three phase voltages; Advantages of three phase system; Inter connection of three phase windings: Star and delta connection, Phase sequence, Relation between line, phase voltages and currents in balanced - Star and delta connected load.

Text Books:

- 1. Chakrabarthi , "Circuit Theory (Analysis and Synthesis)", DhanpatRai& Co, 7th Re Edition, 2018.
- 2. William Hayt and Jack E. Kemmerley, "Engineering Circuit Analysis", McGraw Hill Company,8th edition, 2013.
- Mac E. Van Valkenburg, "Network Analysis", Prentice-Hall of India Private Ltd., 3rd Edition, 2019.

Reference Books:

- 1. Charles K. Alexander and Mathew N.O. Sadiku, "Fundamentals of Electrical Circuits", McGraw Hill Education (India), 6th Edition, 2019.
- C. L. Wadhwa, "Network Analysis", New Age International Publishers, 3rd Edition, 2018.
- Sudhakar A. &Shyammohan S. Palli, "Electrical Circuit Analysis", McGraw Hill Publication, 5th Edition, 2017.
- Robert L. Boylestad, "Introductory Circuit Analysis", Pearson Publications, 13th Edition, 2016.
- 5. Lawrence P. Huelsman, "Basic Circuit Theory", 3rd Ed Pearson Publications, 2015.

Semester	II SEM	L	Т	Р	С	COURSE CODE
Regulation	V20	1	-	4	3	V20MEL01
Name of the Course	Engineering Graphics					
Branches	Common to All Branches					

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

CO No.	Course Outcome	Knowledge Level
CO1	Understand the basic commands in CAD Software and draw the conic sections	КЗ
CO2	Construct different types of scales and special curves	КЗ
CO3	Draw the projections of the points and lines	КЗ
CO4	Develop the projections of planes and surfaces of regular solids	КЗ
CO5	Draw the Isometric projections and conversion of views	КЗ

UNIT1:

Introduction to CAD Software: CAD Software Mechanical Desktop, Draw, Modify, Dimension tool bars, Annotations, Layers, ISI conventions in drawing.

Conic Sections - Ellipse, Parabola and Hyperbola

UNIT 2: Special Curves & Scales: Special Curves – cycloid, epicycloids, hypocycloid; Scales – Plain, Diagonal and Vernier Scales.

UNIT 3: Orthographic Projections: Introduction to Orthographic Projections-Projections of Points, Projection of lines inclined to both the planes.

UNIT 4: Projection Of Planes: Inclined to both the Planes.

Projection Of Regular Solids: Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes, Development of Surfaces of regular solids.

UNIT 5: Isometric Projections: Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple solids.

UNIT 6: Conversion of Isometric Views to Orthographic Views and Vice-versa.

Text Books:

- 1. Engineering Drawing by N.D. Bhat, Chariot Publications, 53rd Edition-2014
- Engineering Drawing by Agarwal&Agarwal, Tata McGraw Hill Publishers, 2nd Edition-2016

Reference Books:

- Engineering Drawing by K.L.Narayana& P. Kannaiah, Scitech Publishers, 2nd Edition-2014
- 2. Engineering Graphics for Degree by K.C. John, PHI Publishers-2014
- 3. Engineering Graphics by PI Varghese, McGrawHill Publishers-2013
- 4. Engineering Drawing AutoCad K Venugopal, V. Prabhu Raja, New Age, 5th Edition-2015

Course Evaluation:

Continuous Internal Evaluation (30M):

1. Day to Day Evaluation (20M): CAD Practice (Minimum of 20 Exercises)

2. Mid Examination (10M):

MID-I (10M) - Answer all 3 questions, each question carries 10 Marks with a total of 30M and scaled down to 10M.

- i. Question -1 ---CO1
- ii. Question -2 ---CO2
- iii. Question -3 ---CO3

MID-II (10M) - Answer all 3 questions, each question carries 10 Marks with a total of 30M and scaled down to 10M.

- i. Question -1 ---CO4
- ii. Question -2 ---CO5
- iii. Question -3 ---CO5

10Marks will be allocated as, 80% of best and 20% of least of the mid examinations. **Semester External Examination (70M):**

1. Part A (48M): Answer four questions (Each question carry 12 marks)

2. Part B (22M) : Answer any one question

Part-A:

- i. Question-1 or Question-2 --- CO1 (12M)
- ii. Question-3 or Question-4 --- CO2 (12M)
- iii. Question-5 or Question-6 --- CO3 (12M)
- iv. Question-7 or Question-8 --- CO4 (12M)

PART-B:

i. Question-9 or Question-10 --- CO5 (22M)

Semester	II SEM	L	Т	Р	С	COURSE CODE
Regulation	V20	-	-	3	1.5	V20EEL03
Name of the Course	ame of the Course Electrical Engineering Workshop					
Branches	EEE					

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

CO No.	Course Outcome	Knowledge Level
C114.1	Design different wiring circuits	K4
C114.2	Use electrical parameter measuring instruments	K3
C114.3	Construct the circuits on PCB board	K4
C114.4	Test the domestic appliances	K4
C114.5	Identify the parts of the Machine	K3
C114.6	Analyze electrical circuits through simulation	K4

Any 12 of the following experiments are to be conducted

- 1. Wiring tools and Accessories
- 2. Electrical Wiring Joints
- 3. Lamp Circuits
- 4. Soldering Practice
- 5. AC and DC circuits
- 6. Resistance Measurement
- 7. Capacitance Measurement
- 8. Battery voltage measurement
- 9. Special Lamp Connections
- 10. Wiring Practice for Power Loads
- 11. Motor Connections
- 12. Practice on Motor winding
- 13. Earthing
- 14. Testing and repair of Domestic appliances
- 15. Verification of Kirchoff's Laws.
- 16. Measurement of Choke Coil Parameters.
- 17. Simulation of series RLC circuit.

Semester	II SEM	L	Т	Р	C	COURSE CODE
Regulation	V20	-	-	3	1.5	V20PHL01
Name of the Course	e Engineering Physics Lab					
Branches	Common to All Branches					

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

CO No.	Course Outcome	Knowledge Level
CO1	Analyze the physical principle involved in the various instruments; also relate the principle to new application.	K4
CO2	Demonstrate the various experiments in the areas of optics, mechanics and Electronics in all branches of engineering.	K3
CO3	Think innovatively and also apply the creative skills that are essential for engineering.	K4

List of Experiments:

(Any eight of the following to be done)

- 1. Determination of Rigidity modulus of a material Torsional Pendulum
- 2. Determination of acceleration due to gravity Compound Pendulum
- 3. Verification of laws of vibrations in stretched strings Sonometer
- 4. Determination of velocity of sound Volume Resonator
- 5. Verification of Magnetic field Induction along the axis of current carrying coil
 Stewart and Gee's apparatus.
- 6. Determination of Planck's constant using photocell.
- 7. Determination of wave length of laser source using diffraction grating.
- 8. Determination of frequency of electrically driven tuning fork Melde's experiment Transverse and longitudinal modes.
- 9. Study of V/I Characteristics of Zener diode.
- 10. Draw the frequency responsive curves of L-C-R Series Resonance Circuit.
- 11. Determination of Energy band gap of a Semiconductor p-n junction.
- 12. Characteristics of Thermistor Negative Temperature Coefficient of resistivity.

<u>Virtual labs:</u>

(Any two of the following to be done)

- 1. Crystal Structure.
- 2. Numerical Aperture of an Optical Fiber.
- 3. Photo-Electric Effect.
- 4. Hall Effect.

Semester	II SEM	L	Т	Р	C	COURSE CODE
Regulation	V20	-	-	3	1.5	V20ENL02
Name of the Course	Hone your Communication Skills, Lab-II					
Branches	Common to All Branches					

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

CO No.	Course Outcome	Knowledge Level
CO1	Collect suitable expressions and vocabulary to participate in JAM.	K1
CO2	Prepare, face and perform well in interviews with required etiquette.	K3
CO3	Use appropriate telephone etiquette to succeed in telephonic interviews.	K3
CO4	Show team spirit and communicative skills in group discussion.	K3
CO5	Arrange ideas and prepare to give presentations in a professional manner.	K4
C06	Debate rationally and cogently while putting forth the ideas.	K4

Unit-1 JAM Session

- Preparation for JAM Session
- Participation in JAM

Unit-2 Interviews

- Guidelines for facing interviews
- Three R's of interviews
- Practice Activity (Mock Interviews)

Unit-3 Effective Telephone Interviews

- Telephone Etiquette
- Preparing for telephonic interviews
- Acing interviews
- Practice Activity (Mock Interviews)

Unit-4 Group Discussions

- Tips to participate in Group Discussion
- Practice Activity

Unit-5 Presentation and Public Speaking

- Three P's of Presentation
- Do's and Don'ts in a Power-point Presentation
- Oral Presentations
- Introduction to Public Speaking
- Strategies for successful Public Speaking
- Practice Activity

Unit-6 Debate

- Introduction to Debate
- Parts of a Debate
- Guidelines to participate in a Debate
- Practice Activity

Book Prescribed

Strengthen Your Steps - A multimodal course in communication skills (Maruthi Publications)

Books for further reference

- 1. English Language Communication Skills, Lab Manual cum Workbook (with CD), Cengage Learning.
- 2. The Students Companion –Wilfred D. Best (New Edition) –Harper, Collins Publishers, 2012.
- 3. Hewings, Martin. Cambridge Academic English (B2).CUP, 2012.

Semester	II SEM	L	Т	Р	C	COURSE CODE
Regulation	V20	2	-	-	0	V20CHT02
Name of the Course	Environmental Studies					
Branches	Common to All Branches					

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

CO No.	Course Outcome	Knowledge Level
CO1	Recognise the importance of environment and ecosystem services	K2
CO2	Identify the characteristic features, uses and impact of overutilization of natural resources	K2
CO3	Explain biodiversity, biodiversity services and conservation of biodiversity	K2
CO4	Report the causes and impacts of various pollutions	K2
CO5	Illustrate social and global environmental issues; sustainable development practices	K2
CO6	Describe environmental management and environmental legislations in India	K2

UNIT 1: Multidisciplinary Nature of Environment & Ecosystem

Definition, Scope and importance of environment, Types of environment, Multidisciplinary nature of Environmental Studies, Components of environment. Ecosystem - Concept of an Ecosystem, Structure and function of an Ecosystem, Food chain & food web, Ecological Pyramids, Structure and function of Forest, Desert, Pond and Marine ecosystem.

UNIT 2: Natural Resources

Forest Resources: Uses, Overexploitation, Deforestation.

Water resources: Aquifers, Dams and benefits, Conflicts over water.

Mineral resources: Uses, Overexploitation, Environmental impact of extraction and use of mineral resources.

Land resources: Degradation, Soil erosion and desertification, Landslides. Renewable Energy resources: Solar energy, Geo thermal energy, Tidal Energy.

UNIT 3: Biodiversity and Its Conservation

Definition, Levels of Biodiversity, Values of Biodiversity, Hotspots of Biodiversity, Threats to Biodiversity, Endangered and Endemic species of India, In-situ and Exsitu Conservation.

UNIT 4: Environmental Pollution

Definition of pollution, Air pollution- Types of Air pollutants, Effects and control measures; Water pollution- Causes, Effects and control measures; Soil pollution; Biomedical waste; Industrial waste- Process of waste management, Sanitary land fill, Incineration, 3R strategy; E- Waste and its management.

UNIT 5: Social and Global Environmental Issues

Family welfare - Women Education, Value education, Role of information technology on environment and human health, Acid rains, Global warming, Ozone layer depletion and Population growth.

UNIT 6: Environmental Movements, Legislations And Management

Chipko movement, Tehri dam conflict, and Silent Valley Project.

Importance of environmental legislation, Environmental Protection Act, Wildlife Protection Act, Air Act (Prevention and control of pollution), Water Act; Environmental management- EIA.

Text books:

- 1. Environmental Studies, Fourth Edition, ANubhaKaushik, C P Kaushik, New Age International Publishers.
- 2. A Textbook of Environmental Studies, Shashi Chawla, TMH, New Delhi.
- 3. Fundamentals of Environmental Studies, DD Mishra, S Chand & amp; Co. Ltd.
- 4. Textbook of Environmental Science, DR M. Anjireddy, B.S Publications, Hyderabad.

List of Skill Oriented Courses:

S. No.	Course Code	Course Title
1.	V20EES01	PCB Design
2.	V20EES02	Scilab
3.	V20EES03	Electrical CAD
4.	V20EES04	Arduino Board
5.	V20EES05	Fundamentals of Drone Technology
6.	V20EES06	Industrial Automation with PLC

Semester	III SEM	L	Т	Р	C	Course Code
Regulation	V20	3	-	-	3	V20MAT05
Name of the Course	se Transform Calculus					
Branch	EEE					

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

CO No.	Course Outcome	Knowledge Level
CO1	find the integrals using Laplace transforms	K3
CO2	apply the Laplace transform for solving differential equations	K3
CO3	apply the Z- transform for solving difference equations	К3
CO4	find the Fourier series of periodic signals	К3
C05	find the Fourier transforms of given function	K3

Unit-I: Laplace Transforms

Laplace transforms-introduction– Definition and Laplace transforms of standard functions– properties (without proof)-Shifting theorems (without proof) – Transforms of derivatives and integrals – Unit step function –Dirac's delta function - Periodic function.

Unit-II: Inverse Laplace Transforms and Applications

Inverse Laplace transforms –properties (without proof) - inverse laplace transforms of derivatives and integrals - Convolution theorem (without proof). **Applications**: Solving ordinary differential equations (initial value problems) using Laplace transforms.

Unit-III: Z – Transforms

Z – Transforms – Properties (without proofs) – Damping Rule – Shifting Rule – Initial and Final value Theorems (without proofs) – Inverse Z- Transformsproperties (without proofs) – Convolution Theorem (without proof) **Applications:** Solutions of Difference equation by Z - transforms.

Unit – IV: Fourier series

Fourier series – Determination of Fourier Coefficients – Fourier series – even and odd functions – Fourier series in an arbitrary interval – Half –range sine and cosine series.

Unit –V: Fourier Transforms

Fourier Integral Theorem (only statement) – Fourier sine and cosine Integrals – Fourier Transform – sine and cosine Transforms – Properties (without proofs) – Inverse Transforms.

Text Books:

1. B.S.Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.

- 2. N.P.Bali, Engineering Mathematics, Lakshmi Publications.
- 3. B. V. Raman, Tata Mc Graw Hill, A text Book of Engineering Mathematics.

References:

- 1. Erwin Kreyszig, Wiley SIndia Pvt. Ltd, Advanced Engineering Mathematics.
- 2. Churchill, Complex Variables and applications.

Semester	III SEM	L	Т	Р	С	Course Code
Regulation	V20	3	-	-	3	V20EET04
Name of the Course	Electrical Circuit Analysis –II					
Branch	EEE					

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

CO No.	Course Outcome	Knowledge Level
C01	Determine electrical parameters for 3-phase unbalanced systems	К3
CO2	Apply the network theorems for solving electrical circuits.	К3
CO3	Analyze circuit parameters under transient conditions	К3
C04	Calculate two-port network parameters for any type of electrical networks	К3
C05	Understand the concept of filters	K2

Unit-I: Unbalanced Three phase circuits

Unbalanced star connected load supplied from: Balanced $3-\phi$, 4-wire system and balanced $3-\phi$, 3-wire system using Millman's, Mesh/Loop and Star-Delta transformation methods; Unbalanced delta connected load supplied from: Balanced $3-\phi$, 3-wire system; Measurement of $3-\phi$ active power using two wattmeter method; Measurement of $3-\phi$ reactive power using one wattmeter method; Numerical Problems.

Unit-II: Network Theorems (DC & AC Excitations)

Superposition, Thevenin's, Norton's, Milliman's, Reciprocity, Compensation, Maximum Power Transfer, Tellegen's theorems; Problem solving for the network consisting of independent and dependent sources; Concept of Duality and Dual networks.

Unit-III: Transient analysis in DC and AC Circuits

Initial Conditions; Analysis of R-L, R-C and R-L-C circuits with DC and AC excitations using differential equations and Laplace transforms; Numerical Problems.

Unit-IV: Two-Port Networks

Basic Definitions; Z-parameters; Y-parameters; Transmission line (ABCD) parameters; h-parameters; Relationship between parameter sets; Series, Parallel and Cascade connections of two port networks; Problem solving for the network consisting of independent and dependent sources.

Unit-V: Passive Filters

Classification of filters; Analysis and Design of low pass, high pass, band pass and band stop filters (Constant-k & m-derived); Low Pass and High Pass Filters with RC and RL Circuits; Band Pass and Band Stop Filters with RLC Circuit.

Text Books:

- 1. Engineering Circuit Analysis by William Hayt and Jack E. Kemmerley, McGraw Hill Company,6th edition,Jan 2005
- 2. Network Analysis by Van Valkenburg, Prentice-Hall of India Private Ltd, revised 3rd edition, 15 April 2019
- 3. Circuit Theory (Analysis and Synthesis) by A.Chakrabarthi, DhanpatRai& Co.,7th revised edition,1 Jan 2018
- Network Analysis and Synthesis by Ravish R Singh, Mc Graw Hill Education (I) Pvt. Ltd., 2nd edition, 1 may 2019

Reference Books:

- 1. Network Theory-Analysis and Synthesis by Smarajit Ghosh, PHI Publishers, 9th edition, Aug 2015
- 2. Network Theory by N.C. Jagan, C. Lakshminarayana, Anshan Publications, 2nd edition September 30, 2005
- 3. Fundamentals of Electrical Circuits by Charles K. Alexander and Mathew N.O. Sadiku, McGraw Hill Education (India), 5th edition, 1st july 2013
- Network Analysis by C.L.Wadhwa, New Age International Publishers., 3rd edition, 1 Aug 2018
- 5. Electrical Circuit Analysis by Sudhakar A. & Shyammohan S. Palli, McGraw Hill Publication, 5th edition 1 july 2017
- 6. Introductory Circuit Analysis by Robert L Boylestad, Pearson Publications,12th edition,1st Jan 2013
- 7. https://nptel.ac.in/courses/108/105/108105159/

Semester	III SEM	L	Т	Р	C	Course Code
Regulation	V20	3	-	-	3	V20EET05
Name of the Course	Electro Magnetic Fields					
Branch	EEE					

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

CO No.	Course Outcome	Knowledge Level
CO1	Compute the electric field and potential due to different configurations of static charges and electric dipole.	К3
CO2	Calculate the capacitance of various configurations and understand the concept of conduction and convection current densities.	К3
CO3	Apply the Biot-Savart's law and Amperes Circuital Law for finding MFI for different cables and develop the Maxwell equations.	К3
CO4	Determine the magnetic forces, torque produced by currents in magnetic fields, self-inductance of solenoid and toroid.	К3
CO5	Calculate the induced E.M.F's and understand the concept of fields varying with time.	К3

Unit-I: Electrostatics

Electrostatic Fields; Coulomb's Law; Electric Field Intensity (EFI) - EFI due to a line and a surface charges; Work done in moving a point charge in an electrostatic field; Electric Potential - Properties of potential function, Potential gradient; Guass's law; Maxwell's first law, div(D)=pv; Laplace's and Poison's equations; Electric dipole - Potential and EFI due to an electric dipole, Torque on an Electric dipole placed in an electric field.

Unit-II: Conductors, Dielectrics and Capacitance Conductors & Dielectrics

Conductors - Behavior of conductors in an electric field; Dielectrics - Polarization; Electric boundary conditions.

Capacitance: Capacitance of parallel plates, spherical and coaxial cables with composite dielectrics; Energy density in a static electric field; Current density - Conduction and Convection current densities; Ohm's law in point form, Equation of continuity.

Unit-II: Magneto Statics

Introduction; Biot-Savart's law; Magnetic Field Intensity (MFI) - MFI due to a straight current carrying filament, circular, square and solenoidal current carrying wires; Maxwell's second Equation i.e, div(B)=0.

Ampere's circuital law - MFI due to an infinite sheet of current, long filament current carrying conductor, Pointform of Ampere's circuital law; Maxwell's third equation i.e, Curl (H)=J.

Unit-IV: Forces in Magnetic fields and Inductance

Magnetic force; Behavior of charges moving in magnetic field; Lorentz force equation; Force on a current carrying element placed in a magnetic field; Force on a straight and a long current carrying conductor placed in a magnetic field; Force between two straight long and parallel current carrying conductors; Magnetic dipole - a differential current loop as a magnetic dipole, Torque on a current loop placed in a magnetic field; Inductance: Basic expressions for self and mutual inductances, self-inductance of a solenoid and toroid.

Unit-V: Time Varying Fields

Introduction; Integral and point forms of faraday's laws of electromagnetic induction; statically and dynamically induced EMFs; Maxwell's fourth equation, Curl (E) = $-\partial B/\partial t$; Modification of Maxwell's equations for time varying fields; Simple problems.

Text Books:

- 1. Engineering Electromagnetics by William H. Hayt& John. A. Buck Mc. Graw-Hill Companies, 7th Editon.2006.
- 2. Electromagnetic Fields by R MeenaKumari, R Subhasri, New Age International, 2nd edition, Jan 2007.
- 3. Elements of Electromagnetics by Matthew N.O. Sadiku, Oxford University Press, 4th edition, 1 Jan 2006

Reference Books:

- 1. Introduction to Electro Dynamics by D J Griffiths, Prentice-Hall of India Pvt. Ltd, 4th edition, 1st Jan 2015
- Electromagnetic Field Theory by Yaduvir Singh, Pearson., 1st edition 23 April 2011
- 3. Fundamentals of Engineering Electromagnetics by Sunil Bhooshan, Oxford higher education., 1st edition 30 june 2012
- 4. https://nptel.ac.in/courses/108/106/108106073/
| Semester | III SEM | L | Т | Р | C | Course Code |
|--------------------|-------------------------|---|---|---|---|-------------|
| Regulation | V20 | 3 | - | - | 3 | V20EET06 |
| Name of the Course | Electrical Machines – I | | | | | |
| Branch | EEE | | | | | |

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

CO No.	Course Outcome	Knowledge Level
C01	Asses the performance of a DC Machines	К3
CO2	Understand the torque production mechanism and control the speed of DC Machines	K2
CO3	Asses the performance of single phase transformers	K3
CO4	Calculate the regulation, losses and efficiency of single phase transformers	К3
CO5	Understand the parallel transforms, control voltages with tap changing methods and achieve three phase to two phase transformation	K2

Unit-I: Introduction and Performance of DC machines

Construction and principle of operation of DC machine; EMF equation of DC generator; Classification of DC machines based on excitation; Magnetization Characteristics of DC shunt generator, DC machine acts as a motor - back-emf and Torque, Armature Reaction and Commutation; Characteristics of separately-excited, shunt, series and compound motors; losses and efficiency of a DC machine; Applications of DC motors

Unit-II: Starting, Speed Control and Testing of D.C. Machines

Necessity of Starter - Working of 3-Point and 4-Point Starters; Speed Control of DC shunt motor by armature voltage and field flux control; Testing of DC machines - Brake Test, Swinburne's method, Hopkinson's Test, Retardation Test; Simple Numerical Problems.

Unit-III: Single-phase Transformers

Types, Constructional details, Principle of operation, EMF Equation of a $1-\Phi$ Transformer; Transformer operation on No-Load and On-Load for lagging, leading and unity power factors loads and their phasor diagrams; Transformer equivalent circuit; Transformer Regulation, Losses and efficiency; effect of variation of supply frequency and voltage on losses; All day efficiency.

Unit-IV: Testing of Single-phase Transformers

O.C. and S.C. tests; Sumpner's test; Separation of losses of a $1-\Phi$ transformer; Parallel operation with equal voltage ratios; Auto Transformer - equivalent circuit, comparison with two winding transformers.

Unit-V:-3-Phase Transformers

Poly-phase connections, Y/Y, Y/ Δ , Δ /Y, Δ / Δ and open- Δ ; Scott Connection; Three winding Transformer: Determination of Zp, Zs and Zt; Off-load and Onload tap changers.

Text Books:

- 1. Electrical Machines by P.S. Bhimbra, Khanna Publishers.7th edition 1st Jan 1977
- Theory & Performance of Electrical Machines by J. B. Guptha. S. K. Kataria& Sons. 15th edition 2015

Reference Books:

- 1. Electrical Machines by D. P.Kothari, I .J .Nagarth, Mc Graw Hill Publications, 5thedition 23 june 2017
- 2. Electrical Machines by R. K. Rajput, Lakshmi publications, 5th edition, 1st Jan 2016
- 3. Electrical Machinery by Abijith Chakrabarthi and Sudhipta Debnath, McGraw Hill Education 1st edition 9th Feb 2015
- 4. Electrical Machinery Fundamentals by Stephen J Chapman, McGraw Hill education 4th edition 1st July 2017
- 5. Electric Machines by Mulukutla S. Sarma & Mukeshk. Pathak, CENGAGE Learning., 1st edition 1st November 2009
- 6. Electric Machinery by A. E. Fitzgerald, Charles kingsley, Stephen D. Umans, TMH 6th edition 16th Aug 2002
- 7. https://nptel.ac.in/courses/108/105/108105155/

Semester	III SEM	L	Т	Р	С	Course Code
Regulation	V20	3	-	-	3	V20ECT06
Name of the Course	Analog Electronics					
Branch	EEE					

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

CO No.	Course Outcome	Knowledge Level
CO1	Explain the working principle of diode and Diode rectifier circuits with and without Filters	K2
CO2	Sketch V-I characteristics of BJT and FET in different configurations	КЗ
CO3	Construct wave shaping circuits for various applications	КЗ
CO4	Construct circuits for different applications using ICs	K3
CO5	Explain the operation of Data Converters using IC 741 OP-AMP	K2

UNIT-I Junction Diode Characteristics:

p-n junction diode, current components in PN junction Diode, diode current equation, V-I Characteristics, Diode resistances, Breakdown mechanisms, Zener Diode.

Rectifiers: Basic Rectifier setup, half wave rectifier, full wave rectifier, bridge rectifier, derivations of characteristics of rectifiers, Filters- Inductor filter, Capacitor filter, derivation for ripple factor in each case, Zener diode as Voltage Regulator.

UNIT-II Transistor Characteristics:

BJT: Junction transistor, transistor current components, transistor equation, transistor configurations and characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, punch through/ reach through, transistor as an amplifier.

FET: FET types, construction, operation, characteristics, parameters, MOSFET-types, construction, operation, characteristics, comparison between JFET and MOSFET.

UNIT-III Wave shaping circuits:

Response of high pass and low pass RC circuits to step, pulse, Square inputs. High pass RC circuit as differentiator, low pass RC circuit as integrator. Series and shunt clippers, clipping at two independent levels, Positive and Negative Clampers.

UNIT-IV Integrated Circuits and applications:

Op-amp Block Diagram, Ideal Op-amp, Equivalent Circuit, Ideal voltage transfer curve, open loop op-amp configurations. Inverting and non-inverting amplifiers, summing, scaling, averaging amplifier, integrator and differentiator, 555 timer functional block diagram, A stable and Monostable multivibrators.

UNIT-V Data Converters:

Weighted resistor DAC, R-2R ladder DAC. Flash Type ADC; counter type ADC, Successive approximation ADC, Dual slope ADC, Specifications of DAC&ADC.

Text Books:

- 1. Integrated Electronics- J. Millman and C.C. Halkias, TMH
- 2. Electronic Devices and Circuits- Salivahanan, N.Suresh Kumar, A. Vallavaraj, TMH
- 3. Pulse, Digital and Switching Waveforms J. Millman and H. Taub, TMH
- 4. Linear Integrated Circuits D. Roy Choudhury, 4th edition, New Age International (p) Ltd.
- 5. Op-Amps & Linear Integrated Circuits Ramakanth A. Gayakwad, 3rd edition, PHI.

Reference Books:

- 1. Electronic Devices and Circuits Theory Robert L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall.
- 2. Pulse & Digital Circuits-BN Yoga Narasimhan, 2000,SriMaruthi Publishers, Bangalore.
- 3. Operational Amplifiers & Linear Integrated Circuits –Sanjay Sharma; SKKataria & Sons;2nd Edition,2010

Semester	III SEM	L	Т	Р	C	Course Code
Regulation	V20	0	0	3	1.5	V20EEL04
Name of the Course	Electrical Circuits Laboratory					
Branch	EEE					

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

CO No.	Course Outcome	Knowledge Level
C01	Compute response in the electrical circuits using various Network theorems	К3
CO2	Sketch Locus Diagrams of RL and RC Series Circuits	K2
CO3	Find parameters of the circuit under resonance conditions	К3
CO4	Determine two port network parameters	К3
C05	Calculate 3phase power and choke coil parameters	К3

Any 10 experiments are to be conducted

- 1. Verification of KVL and KCL
- 2. Verification of Thevenin's and Norton's Theorems
- 3. Verification of Superposition and Reciprocity Theorem
- 4. Verification of Compensation and Millmann's Theorems.
- 5. Verification of Maximum Power Transfer Theorem.
- 6. Locus Diagrams of RL and RC Series Circuits.
- 7. Time Response of first order RC and second order RLC Networks.
- 8. Series and Parallel Resonance
- 9. Determination of Z and Y parameters.
- 10. Determination of Transmission and hybrid parameters.
- 11. Determine the Parameters of a choke coil
- 12. Measurement of 3-phase Power by two Wattmeter Method for unbalanced loads

Semester	III SEM	L	Т	Р	C	Course Code
Regulation	V20	0	0	3	1.5	V20ECL03
Name of the Course	Analog Electronics Lab					
Branch	EEE					

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

CO No.	Course Outcome	Knowledge Level
CO1	Interpret the Characteristics of various semiconductor devices.	K2
CO2	Examine the Performance of Rectifiers with and without Filters.	К3
CO3	Construct circuit for linear wave shaping circuits.	K3
CO4	Construct circuits for verifying linear and nonlinear applications using IC741op-amp And IC 555 timer.	К3
CO5	Verify the Characteristics of 4 bit Digital to Analog Converter.	К3

Any 10 experiments are to be conducted

- 1. PN Junction diode characteristics
- Rectifiers with and without filters
 Part A: Half Wave Rectifier, Part B: Full Wave Rectifier
- Zener diode Characteristics
 Part A: V-I characteristics, Part B: Zener diode as Voltage Regulator
- BJT Characteristics (CE Configuration)
 Part A: Input characteristics, Part B: Input characteristics
- JFET Characteristics (CS Configuration)
 Part A: Drain characteristics, Part B: Transfer characteristics
- Linear Wave Shaping
 Part A: High Pass RC Circuit, Part B: Low Pass RC Circuit
- Non-linear Wave Shaping Clippers
 Part A: Unbiased Clippers, Part B: Biased Clippers
- Non-linear Wave Shaping Clampers
 Part A: Unbiased Clampers, Part B: Biased Clampers
- 9. Summing, Scaling, Averaging amplifiers using IC 741.
- 10. Differentiator and Integrator Circuits using IC 741.
- 11. A stable Multi vibrator using IC 555
- 12. 4 bit Digital to Analog to Digital Converter

Semester	III SEM	L	Т	Р	С	Course Code
Regulation	V20	0	1	3	1.5	V20CSL31
Name of the Course	Data Structures Lab					
Branches	Common to ECE, EEE,ECT, CIVIL and MECH					

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

CO No.	Course Outcome	Knowledge Level
CO1	Construct Sorting and searching methods.	K3
CO2	Implement programs using Singly Linked Lists, Double Linked List.	К3
CO3	Construct Basic Data Structures, Stacks, Queues and Applications.	К3
CO4	Construct Binary search tree.	K3
CO5	Implement various graph operations and shortest path algorithm.	К3

List of Experiments

1. Bubble sort, Insertion sort, Selection sort, Quick sort, Merge sort.

Programs to implement the following sorting techniques

a) Selection sort	b) Quick sort	c) Merge sort
aj 8010001011 8010	S) Quien Sore	0, 1101 80 001

2. Linear search and Binary search.

Programs to implement the following searching methods

- a) Linear search b) Binary search.
- 3. Basic Terminology, Classification of Data Structures, Operation on Data Structures. **Arrays**: Representation of arrays Polynomial representation, Addition of two polynomials.

A Program to implement addition of two polynomials. (using arrays).

- 4. single linked list Representation of node, operations on single linked list,
- A Program to implement single linked list and its operations. (create, insert, delete, display, reverse list)
- 5. **Double linked list**: operations like insert delete and display.
- A Program to implement double linked list and its operations.
- 6. **Stacks:** Introduction, Array representation, Operations, linked list representation, operation on linked stacks
- A Program to implement stack operations using arrays.
- 7. **Queues:** Introduction, Array representation, linked list representation, operation on queues, types of queues
- A Program to implement queue operations using arrays.

8. Applications of Stacks

A Program to convert infix expression to postfix expression.

9. Introduction, Terminology, Representation of Trees, types of trees, **Binary Trees:** Properties of Binary Trees, Tree Traversals. **Binary Search Tree:** Introduction, Creation, insertion, delete, display.

A Program to implement Binary search Tree and its operations.

- **10. Graphs:** Introduction, Terminology, **Graph Traversal techniques**: Depth First Search, Breadth First Search
- A Program to implement graph traversal algorithms (BFS & DFS).

Text Books:

- 1. Data Structures, algorithms and applications in C++, Sartaj Sahni, Universities press, Second Edition.
- 2. Fundamentals of Data Structures in C++, Ellis Horowitz, Sartaj Sahni and Dinesh Mehta, 2nd Edition, Universities Press (India) Pvt. Ltd.

Reference Books:

- 1. An Introduction to Data Structures with Application, Jean-Paul Tremblay, Paul Sorenson, Second Edition.
- 2. Fundamentals of Data Structures and algorithms by C V Sastry, Rakesh Nayak, Ch. Raja Ramesh, IK Publications, new Delhi.
- 3. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
- 4. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

Semester	III SEM	L	Т	Р	С	Course Code
Regulation	V20	-	3	-	MNC	V20ENT02
Name of the Course	Professional Communication Skills - I					
Branches	Common to All Branches					

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

CO No.	Course Outcome	Knowledge Level
CO1	Use vocabulary in regular chores of life with accuracy, make meaningful sentences, and describe people and their traits vividly.	K3
CO2	Distinguish between places of pilgrimage and holiday spots; describe incidents, things and process; and frame questions, statements and expressions.	K4
CO3	Demonstrate their knowledge of idioms which are similar to those of native speakers while speaking and writing and use phrases clearly and precisely to articulate their views that compare and contrast Indianisms with native expressions and avoid common errors.	K3
CO4	Employ the vocabulary of netizens with ease and walk through the letters and emails for effective official correspondence and infer the accurate meaning of the homophones that are often confusing.	K3
CO5	Summarize their profile; introduce themselves as well as others by incorporating their accomplishments and Sketch stories and anecdotes in an interesting and engaging manner that arouses curiosity of the audience.	K5

Unit – I

Building Vocabulary for Daily Activities

Names: Things- Kitchen Utensils - Occupation- tools - spices- vegetables -

flowers - sciences of study - Professions.

Framing Questions – statements – expressions related to the Vocabulary taught

People: Describing people - Physical characteristics,-Mental attributes – various professions

Framing Questions – statements – expressions related to the Vocabulary taught

Activity: Related to the topics learnt in Unit – 1

Unit – II

Building Vocabulary for Places, Things & Process
Places: Describing favourite place – famous place- Places of Pilgrimage
Things: Describing a thing- Describe an incident or an event
Process: Describe a process –Recipe – experiment –Entrance test application
Framing Questions – statements – expressions related to the Vocabulary taught
Activity: Related to the topics learnt in Unit – II

Unit – III

Native Expressions – Idioms and Phrases – in day to day activities for different occasions - Usage written & spoken –
Phrases with as—as expressions – used to compare & contrast
Common Mistakes- in spoken & written
Indianisms- Most often used expressions – accepted in India – found place in Dictionary
Activity: Related to the topics learnt in Unit – III

Unit -IV

Net Vocabulary: Acronyms and abbreviations that are most often used Homophones: Words often confused – Spelling & Pronunciation Letter Writing: Formal & Informal- Letters for all occasions Email Writing: Business mails – project status mails – informative mails Activity: Related to the topics learnt in Unit – IV

Unit -V

Self-Introduction: Basic information - Academic and personal - interests– strengths and weaknesses – goal.

Profile Building:Resume writing – CV Building – TypesStorytelling With Creativity:Reading and Narrating a story – narratinganecdotes

Activity: Related to the topics learnt in Unit – V

References:

- 1. Lewis Norman, Word Power Made Easy (2008). Goyal Publishers & Distributors Pvt. Ltd.
- 2. Sunita Mishra & C.Muralikrishna, Communication Skills for Engineers (2006). Dorling Kindersley (India) Pvt. Ltd., licensees of Pearson Education in South Asia.
- Chaturvedi PD & Chaturvedi Mukesh, Business Communication (2006). Dorling Kindersley (India) Pvt. Ltd., licensees of Pearson Education in South Asia.
- 4. Joshi Manik, Popular English Idioms and Phrases: English Idiomatic Expressions (2013).
- 5. Joshi Manik, Homonyms, Homophones and Homographs: Vocabulary Building (2014).
- 6. Gupta S.C. A Handbook for Letter Writing (2018). Arihant Publishers
- 7. Lisa McGrimmon, The Resume Writing Guide: A Step-by-Step Workbook for Creating a Winning Resume (2013). CareerChoiceGuide; 2nd edition.
- 8. Sawhney, Clifford. Improve your Word Power (2013). V&S Publishers

Web References: (NET Vocabulary)

- 1. <u>https://www.grammarly.com/blog/texting-abbreviations/</u>
- 2. <u>https://www.slicktext.com/blog/2019/02/text-abbreviations-guide/</u>
- 3. <u>https://www.webopedia.com/reference/text-abbreviations/</u>

Semester	IV SEM	L	Т	Р	С	Course Code
Regulation	V20	3	-	I	3	V20EET07
Name of the Course	Signals and Systems					
Branch	EEE					

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand and estimate various types of signals and systems.	K2
CO2	Understand the basic principles of Sampling Theorem.	K2
CO3	Understand the characteristics of LTI Systems	K2
CO4	Understand the concepts of Cross-Correlation and Auto-Correlation of Functions	K2
CO5	Apply the concept of ROC for Laplace Transform and Z transform, Inverse Z transforms.	K3

Unit-I: Introduction

Definition of Signals and Systems, Classification of Signals, Classification of Systems, Operations on signals: time-shifting, time-scaling, amplitudeshifting, amplitude-scaling. Problems on classification and characteristics of Signals and Systems. Complex exponential and sinusoidal signals, Singularity functions and related functions: impulse function, step function signum function and ramp function. Analogy between vectors and signals, orthogonal signal space, Signal approximation using orthogonal functions, mean square error, closed or complete set of orthogonal functions, Orthogonality in complex functions.

Unit–II: Sampling theorem

Graphical and analytical proof for Band Limited Signals, impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling – Aliasing, Introduction to Band Pass sampling.

Unit-III: Linear Time Invariant (LTI) System

Linear- nonlinear, Time variant-invariant, casual - non-casual, staticdynamic, stable-unstable, invertible. Convolution sum and convolution integral using graphical methods for different signals (Time domain).

Unit-IV: Cross-Correlation And Auto-Correlation of Functions

Properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function. Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

Unit –V: Transforms

Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Distinction between Laplace, Fourier and Z transforms. Region of convergence in Z-Transform, constraints on ROC for various classes of signals, Inverse Z-transform, properties of Z-transforms.

Text Books:

- 1. Signals, Systems & Communications B.P. Lathi, BS Publications, 2008.
- 2. Signals and Systems A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn, 1996.
- 3. Signals & Systems- Narayan Iyer and K Satya Prasad, Cenage Publications, 1st Edition 2011.

Reference Books:

- 1. Signals & Systems Simon Haykin and Van Veen, Wiley, 2nd Edition, 2017.
- Principles of Linear Systems and Signals BP Lathi, Oxford University Press, 2015
- Signals and Systems K Raja Rajeswari, B Visweswara Rao, PHI, 2nd Edition 2014
- 4. Fundamentals of Signals and Systems- Michel J. Robert, MGH International Edition, 2008.
- 5. Signals and Systems T K Rawat , Oxford University press, 2011

NPTEL Link : https://nptel.ac.in/courses/117/101/117101055/

Semester	IV SEM	L	Т	Р	C	Course Code
Regulation	V20	3	-	-	3	V20EET08
Name of the Course	Electrical Machines – II					
Branch	EEE					

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

CO No.	Course Outcome	Knowledge Level
CO1	Explain the operation and performance of three phase induction motor	K2
CO2	Assess the torque-speed relation, performance of induction motor and induction generator	КЗ
CO3	Explain the torque production mechanism and starting of single phase induction motors	K2
CO4	Asses the performance of synchronous generators by determining its voltage regulation	КЗ
CO5	Explain the operation and performance of Synchronous Motors	K2

Unit-I: 3-Phase Induction Motors

Construction details of cage and wound rotor machines; Production of rotating magnetic field; Principle of operation; Rotor EMF, Rotor frequency, Rotor Current and p.f. at standstill and during running conditions; Rotor power input; rotor copper losses; Mechanical power developed and their interrelationship; Equivalent circuit; Phasor diagram.

Unit-II: Characteristics, starting and testing methods of Induction Motors

Torque equation; expressions for maximum torque and starting torque; torque-slip characteristics; double cage and deep bar rotors construction; crawling and cogging; speed control of induction motor with V/f method; no-load and blocked rotor tests (construction of circle diagram for predetermination of performance parameters); methods of starting, soft starters; induction generator operation (Qualitative treatment only).

Unit-III: Single Phase Motors

Constructional features and its equivalent circuit; Problem of starting – Double revolving field theory; Starting methods; shaded pole motors; AC Series motor.

Unit-IV: Alternators

Constructional features of non-salient and salient pole type alternator; Armature windings – Distributed and concentrated windings; Distribution, Pitch and Winding factors; E.M.F equation; Improvements of waveform and armature reaction; Voltage regulation by synchronous impedance method, MMF method and Potier triangle method; Phasor diagrams; Two reaction analysis of salient pole machine and phasor diagram; Parallel operation of alternators, Numerical problems.

Unit-VI: Synchronous Motors

Principle and theory of operation of Synchronous Motor; Phasor diagram; Starting torque; Variation of current and power factor with excitation; Synchronous condenser; Mathematical Analysis for power developed; Hunting and its suppression; Methods of starting.

Text Books:

- 1. Electrical Machines by P.S. Bhimbra, Khanna Publishers , Edition-2,2021
- 2. Theory & Performance of Electrical Machines by J. B. Guptha. S. K. Kataria & Sons, Edition-2,2013
- 3. Electrical Machinery Fundamentals by Stephen J Chapman McGraw Hill education 5th edition 2011

Reference Books:

- 1. Electrical Machines by D. P. Kothari, I .J .Nagarth, McGrawHill Publications, 5th edition,2017
- 2. Electrical Machines by R. K .Rajput, Lakshmi publications, 5th edition, 2016
- 3. Electrical Machinery by Abijith Chakrabarthi and Sudhipta Debnath, McGraw Hill education 2015
- 4. Electric Machines by Mulukutla S. Sarma & Mukeshk .Pathak, CENGAGE Learning.
- 5. Electric Machinery by A.E.Fitzgerald, Charles kingsley, Stephen D.Umans, TMH

NPTEL Link : https://nptel.ac.in/courses/108/105/108105131/

Semester	IV SEM	L	Т	Р	С	Course Code
Regulation	V20	3	-	-	3	V20EET09
Name of the Course	e Electrical and Electronic Measurements					
Branch	EEE					

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

CO No.	Course Outcome	Knowledge Level
CO1	Identify the proper instrument for measurement of AC or DC voltages and currents	K2
CO2	Choose the suitable instrument for the measurement of power and energy.	K3
CO3	Compute the electrical parameters by using appropriate bridge.	K3
CO4	Calculate different magnetic parameters by using magnetic instruments and Understand the operation of potentiometer.	K3
CO5	Understand the operation of various digital instruments.	K2

Unit-I: Electromechanical Indicating Instruments

Classification of measuring instruments; Construction and principle of operation of PMMC, MI instruments; Extension of instrument ranges using shunts, multipliers; Numerical Problems.

Instrument Transformers: Ratio and Phase angle errors (Derivation & Phasor Diagram) and their applications in the extension of instrument ranges, Numerical Problems.

Unit-II: Power and Energy Measurement

Single phase dynamometer wattmeter (LPF and UPF), expression for deflecting and control torques; Type of P.F. Meters; Single phase induction type energy meter, Driving and braking torques, errors and compensations, testing by phantom loading using R.S.S. meter; Numerical Problems.

Unit-III: Measurement of Parameters

Measurement of Resistance: wheat stone's bridge and its Sensitivity; Ohm meter; Kelvin's double bridge; Loss of charge method; Earth resistance measurement by fall of potential method and megger.

Measurement of inductance & Q-Factor: Maxwell's bridge; Hay's bridge; Anderson's bridge.

Measurement of capacitance and loss angle: Desauty's Bridge; Schering Bridge.

Unit-IV: Magnetic Measurements & Potentiometers

Magnetic Measurements: Constructional details of Flux meter; Determination of B–H Loop: Methods of reversals and Step-by-Step method; Core loss measurements by Maxwell's and Campbell's Bridges, D.C. & A.C. Crompton's potentiometer and their applications.

Unit-V: Electronic Instruments

Introduction; Digital Voltmeters (DVM); Ramp type DVM; Integrating type DVM; Successive-approximation DVM; Q- Meter, Digital frequency meter, Digital Tachometer; Measurement of phase difference & Frequency by using lissajous patterns in CRO; Electronic Multi meter.

Text Books:

- 1. A course in Electrical& Electronic Measurement and Instrumentation by A. K. Sawhney, Dhapat Rai& Co. 2015
- 2. Electronic Instruments by H.S. Kalsi, Tata Mc-Graw hill. 7th edition 2017

Reference Books:

- 1. Electrical and Electronic Measurements and instrumentation by R. K. Rajput, S.Chand. 2016
- 2. Digital Instrumentation by A.J. Bouwens, Tata Mc-Graw hill.
- 3. Modern Electronic instrumentation & Measuring instruments by A.D. Heltric & W.C. Copper, Wheeler Publication. 2015
- 4. Instrument transducers by H.K.P. Neubert, Oxford University press.
- 5. Electrical Measurements by Forest K. Harris, John Wiley and Sons.
- 6. **NPTEL Link** : https://nptel.ac.in/courses/108/105/108105153/

Semester	IV SEM	L	Т	Р	С	Course Code
Regulation	V20	3	-	-	3	V20EET10
Name of the Course	rse Electrical Power Generation & Transmission					
Branch	EEE					

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

CO No.	Course Outcome	Knowledge Level
CO1	Understand the working of conventional power generating stations	K2
CO2	Calculate various factors of load, insulation resistance and power factor of the cables.	КЗ
CO3	Compute the resistance, inductance and capacitance of transmission lines	K3
CO4	Determine the various transmission line parameters	КЗ
CO5	Calculate the corona loss, sag and tension in transmission lines	КЗ

Unit-I: Power Generating Stations

Introduction to renewable and non-renewable energy sources - general layout of a thermal power plant and its Components-General layout of Nuclear power plant -Nuclear fission and Chain Reaction –General Layout of Hydel power plant and Description of its main components- General Layout of Solar and wind Power plants.

Unit-II: Economic Aspects of Power Generation, Tariffs and Cables

Load curve- load duration and integrated load duration curves- discussion on economic aspects: connected load, maximum demand, and demand factor. Different Tariff methods. Construction of cables, Types of Cables, Calculation of insulation resistance and power factor of the cable.

Unit-III: Transmission Line Parameters

Conductor materials: Types of conductors – Calculation of resistance for solid conductors – Calculation of inductance for single phase– Single and double circuit lines–Concept of GMR and GMD–Symmetrical and asymmetrical conductor configuration with and without transposition–Bundled conductors-Numerical Problems–Calculation of capacitance for 2 wire– Effect of ground on capacitance – Capacitance calculations for symmetrical and asymmetrical for single phase–Numerical Problems.

Unit-IV: Modeling of Transmission Lines

Classification of Transmission Lines: Short, medium and their model representations –Nominal-T–Nominal-Pie and A, B, C, D Constants for symmetrical and Asymmetrical Networks— Evaluation of A,B,C,D Constants–regulation and efficiency-Numerical problems-Surge Impedance –Surge Impedance loading-Wavelengths and Velocity of Propagation.

Unit-V: Sag and Tension Calculations and Overhead Line Insulators

Skin and Proximity effects – Ferranti effect – Charging Current –Shunt Compensation –Corona – Description of the phenomenon–Factors affecting corona- Sag and Tension calculations with equal and unequal heights of towers–Effect of Wind and Ice on weight of Conductor–Numerical Problems

Text Books:

- 1. Generation, Distribution and Utilization of Electric Energy by C.L.Wadhawa, New age International (P) Limited, Publishers
- 2. Thermal Engineering by Rajput, Lakshmi publications
- 3. Electrical Power Systems by C.L.Wadhwa, 6th Edition, New Age International Publishers.

Reference Books:

- 1. Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar and Chakrabarti, DhanpatRai& Co. Pvt. Ltd
- 2. A Course in Power Systems by J. B. Gupta, S K Kataria& Sons Publishers. 2013
- 3. Principles of Power Systems by V.K Mehta and Rohit Mehta, S. Chand Publishers. 2nd Edition 2005
- 4. Electrical Power Systems by P.S.R. Murthy, B.S.Publications, 2017
- 5. **NPTEL Link :** https://nptel.ac.in/courses/108/102/108102047/

Semester	IV SEM	L	Т	Р	С	Course Code
Regulation	V20	3	-	-	3	V20MBT51
Name of the Course	Managerial Economics & Financial Analysis					
Branches	Common to All Engineering Branches					

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

CO No.	Course Outcome	Knowledge Level
CO1	Understand the basic concepts of managerial economics, demand, elasticity of demand and methods of demand forecasting.	K2
CO2	Interpret production concept, least cost combinations and various costs concepts in decision making.	K3
CO3	Differentiate various Markets and Pricing methods along with Business Cycles	K2
CO4	Prepare financial statements and its analysis.	K3
CO5	Assess various investment project proposals with the help of Capital Budgeting techniques for decision making.	K3

Unit-I

Introduction to Managerial Economics and demand Analysis: Definition of Managerial Economics and Scope-Managerial Economics and its relation with other subjects-Concept of Demand-Types-Determinants-Law of Demand its Exceptions-Elasticity of Demand-Types and Measurement- Demand forecasting and its Measuring Methods.

Unit-II

Production and Cost Analysis: Production function-Iso-quants and Iso-cost-Law of Variable proportions- Cobb-Douglas Production function-Economies of Scale-Cost Concepts- Opportunity Cost-Fixed vs Variable Costs-Explicit Costs vs Implicit Costs- Cost Volume Profit analysis- Determination of Break-Even Point- BEP Chart (Simple Problems).

Unit-III

Introduction To Markets, Pricing Policies & forms of Organizations and Business Cycles: Market Structures: Perfect Competition, Monopoly, Monopolistic and Oligopoly – Features – Price, Out-put Determination – Methods of Pricing: Evolution of Business Forms - Features of Sole Trader – Partnership – Joint Stock Company – State/Public Enterprises. Business Cycles – Meaning and Features – Phases of Business Cycle.

Unit-IV

Introduction to Accounting & Financing Analysis: Introduction to Double Entry System – Preparation of Financial Statements- Trading Account, Profit & Loss Account and Balance Sheet - Ratio Analysis – (Simple Problems).

Unit-V

Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Need for Capital Budgeting-Traditional and Modern Methods.

Text Books:

- Dr. N. AppaRao, Dr. P. Vijay Kumar: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi – 2011
- Dr. A. R. Aryasri Managerial Economics and Financial Analysis, TMH 2011
- 3. Prof. J.V.Prabhakararao, Prof. P. Venkatarao. 'Managerial Economics and Financial Analysis', Ravindra Publication.

References:

- 1. Dr. B. Kuberudu and Dr. T. V. Ramana: Managerial Economics & Financial Analysis, Himalaya Publishing House, 2014.
- 2. V. Maheswari: Managerial Economics, Sultan Chand.2014
- 3. Suma Damodaran: Managerial Economics, Oxford 2011.
- 4. VanithaAgarwal: Managerial Economics, Pearson Publications 2011.
- 5. Sanjay Dhameja: Financial Accounting for Managers, Pearson
- 6. Maheswari: Financial Accounting, Vikas Publications.
- S. A. Siddiqui& A. S. Siddiqui: Managerial Economics and Financial Analysis, New Age International Publishers, 2012
- 8. Ramesh Singh, Indian Economy, 7th Edn., TMH201
- Pankaj Tandon A Text Book of Microeconomic Theory, Sage Publishers, 2015
- 10. Shailaja Gajjala and Usha Munipalle, Univerties press, 201

Semester	IV SEM	L	Т	Р	С	Course Code
Regulation	V20	0	1	3	1.5	V20CSL32
Name of the Course	Python Programming Lab					
Branches	Common to ECE, EEE,ECT, CIVIL and MECH					

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

CO No.	Course Outcome	Knowledge Level
CO1	Demonstrate Basic Python Programs	K3
CO2	Construct control structures in python	K3
CO3	Demonstrate functions and packages.	K3
CO4	Construct python programs using structured data types.	КЗ
CO5	Demonstrate Text Files	K3

Basics of python programming: Features of python – History of Python - The Future of Python installation and execution - Data types – Identifiers - variables – type conversions- Literal Constants – Numbers – Strings. I/O statements. Operators and expressions, operator precedence – expression evaluation.

Exercise 1 - Basics

a) A sample Python Script using command prompt, Python Command Line and IDLE

b) A program to purposefully raise an Indentation Error and correct it

Exercise 2 - Operations

a) A program to compute distance between two points taking input from the user (Pythagorean Theorem)

b) A program on add.py that takes 2 numbers as command line arguments and prints its sum.

Decision Control statements: conditional (if), alternative (if-else), chained conditional (if-elif-else); **Iteration**: while loop, for loop, nested for loop, range function, break, continue and pass statements.

Exercise - 3 Control Flow

a) A Program to implement for checking whether the given number is a even number or not.

b) A program to construct reverse the digits of a given number and add it to the original, If the sum is not a palindrome repeat this procedure.

c) A program using a while loop that asks the user for a number, and prints a countdown from that number to zero.

Exercise 4 - Control Flow – Continued

a) A program to construct the following pattern, using a nested for loop.

b) By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.

Functions and modules : Introduction - Function Definition - Function Call - argument types- Scope and Lifetime - The return statement - More on Defining Functions - Lambda Functions or Anonymous Functions.

Exercise - 5 – Problem Solving using Functions

a) Find mean, median, mode for the given set of numbers passed as arguments to a function

b) Develop a function nearly equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.

c) Develop a Recursive Function to find the Factorial of a given number.

d) Develop function to compute gcd, lcm of two numbers. Each function shouldn't exceed one line.

Lists: list operations, list slices, list methods, mutability, cloning lists, list parameters. **Tuples**: tuple assignment, tuple as return value. **Set**: Set Creation, Set Operations. **Dictionaries**: Creation, operations; comprehension, operations on strings.

Exercise - 6 Structured Data types

a) a program to count the number of strings where the string length is 2 or more and the first and last character are same from a given list of strings.b) a program to develop unzip a list of tuples into individual lists and convert

them into dictionary.

Exercise – 7 Structured Data types Continued

a) A program to count the numbers of characters in the string and store them in a dictionary data structure

b) a program to use split and join methods in the string and trace a birthday with a dictionary data structure.

Documentation Strings- Modules - Packages

Exercise - 8- Modules

a) Install packages requests, flask and explore them using (pip)

b) A program to implement a script that imports requests and fetch content from the page. Eg. (Wiki)

c) Develop a simple script that serves a simple HTTP Response and a simple HTML Page

Introduction - Types of files - Text files - reading and writing files

Exercise - 9 Files

a) a program to count frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file?

b) a program to compute the number of characters, words and lines in a file.

Classes, Methods, Constructor, Inheritance, Overriding Methods, Data hiding

Exercise - 10 OOP

a) Class variables and instance variable and illustration of self-variablei) Robotii) ATM Machine

Text Books:

- 1. "Python Programming using problem solving Approach" ReemaThareja, Oxford University Press 2017.
- 2. Python with Machine Learning by A.Krishna Mohan, Karunakar & T.Murali Mohan by S. Chand Publisher-2018.

Semester	IV SEM	L	Т	Р	C	Course Code
Regulation	V20	0	0	3	1.5	V20EEL05
Name of the Course	Electrical Machines-I Lab					
Branch	EEE					

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

CO No.	Course Outcome	Knowledge Level
CO1	Sketch the magnetizing characteristics of DC shunt generator	КЗ
CO2	Determine and predetermine the performance of DC machines	КЗ
CO3	Apply different methods to control the speed of the DC motors	КЗ
CO4	Assess the performance of transformers	K3
CO5	Convert three phase supply to two phase	K2

Any 10 of the following experiments are to be conducted

- 1. Magnetization characteristics of DC shunt generator: Determination of critical field resistance and critical speed.
- 2. Brake test on DC shunt motor. Determination of performance curves.
- 3. Hopkinson's test on DC shunt machines. Predetermination of efficiency.
- 4. Swinburne's test and Predetermination of efficiencies as Generator and Motor.
- 5. Speed control of DC shunt motor by Field and armature Control.
- 6. Retardation test on DC shunt motor. Determination of losses at rated speed.
- 7. Separation of losses in DC shunts motor.
- 8. OC & SC test on single phase transformer.
- 9. Sumner's test on single phase transformers.
- 10. Scott connection of transformers.
- 11. Parallel operation of Single phase Transformers.
- 12. Separation of core losses of a single phase transformer.
- 13. Heat run test on a bank of 3 Nos. of single phase Delta connected transformers.

Semester	IV SEM	L	Т	Р	C	Course Code
Regulation	V20	0	0	3	1.5	V20EEL06
Name of the Course	Electrical Measurements Laboratory					
Branch	EEE					

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

CO No.	Course Outcome	Knowledge Level
CO1	Calibrate voltmeters, ammeters, single phase energy meter	КЗ
CO2	Measure the electrical parameters using Anderson, Schering& Kelvin's double Bridges.	K5
CO3	Apply various methods to calculate powers and choke coil parameters	КЗ
CO4	Calibrate dynamometer and LPF Wattmeters	K3
CO5	Measure the Dielectric Strength of transformer oil	K3

Any 10 experiments are to be conducted

- 1. Calibration and Testing of single phase energy Meter
- 2. Calibration of PMMC ammeter and voltmeter using Crompton D.C. Potentiometer
- 3. Calibration of AC voltmeter and measurement of choke parameters using AC Potentiometer in polar form.
- 4. Calibration of dynamometer wattmeter by using phantom loading.
- 5. Calibration of LPF wattmeter by using direct loading.
- 6. Capacitance Measurement using Schering Bridge
- 7. Inductance Measurement using Anderson Bridge.
- 8. Measurement of 3 phase power with single wattmeter and using two C.Ts
- 9. Measurement of single phase Power by using 3 Voltmeter and 3 Ammeter method.
- 10. Measurement of resistance using Kelvin's double Bridge.
- 11. Dielectric oil testing using H.T test Kit.
- 12. Measurement of 3 phase reactive power with single wattmeter for balanced loading.
- 13. Demonstration of Electronic Meters used by electrical field engineers

Semester	IV SEM	L	Т	Р	С	Course Code
Regulation	V20	-	2+2	-	MNC	V20ENT03
Name of the Course	Professional Communication Skills - II					
Branches	Common to all Branches					

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

CO No.	Course Outcome	Knowledge Level
CO1	Demonstrate grammatical competence, analyze noun and pronoun dispositions, classify various kinds of verbs, adjectives and adverbs and identify errors in sentences; distinguish the subtle meanings of various words in different contexts, recognize similar words as well as words with contrast meanings and use them appropriately. (K3)	K2
CO2	Organize individual words into one whole sentence using new vocabulary and focus on the error analysis of prepositions and conjunctions, build conversations which befit the situations and develop pre-reading strategies to improve comprehension skills. Distinguish and acquire knowledge of using words of the same category in a sentence and learn new words that promote communicative finesse. Find errors in sentences where the modifiers are misplaced and put them at the appropriate place, use hit pair words and send an email that is concise and lucid.	K3
CO3	Recognize the easiest and best possible way of solving problems in the area of Number and Letter Series, Analogy, Classification, Coding & Decoding Symbols, Ranking and Analytical Reasoning.	K4
CO4	Investigate the different types of logics involved in Mirror and Water Images, Logical Reasoning & Arithmetic Reasoning.	K4
CO5	Find the common traps in the questions and errors likely to be made from the concepts of Blood Relations, Directions, Average, Clock and Calendar, Data Sufficiency, Permutations- Combinations and Probability.	КЗ

Unit – I

Error Analysis: Nouns & Pronouns – Singular & Plural – Kinds of Nouns & Pronouns- Collective Nouns - Personal and Reflexive Pronouns. Subject – Verb agreement. Adjectives – Adverbs – role of modifiers – place of Adjectives– Adverbs of frequency.

Vocabulary: Word Power Made Easy Sessions 15- 30, Antonyms and Synonyms and One word substitutes

Expansion of Proverbs: Meaning – interpretation – explanation.

Unit – II

Error Analysis: Prepositions - kinds of prepositions –appropriate use - conjunctions –sub- ordinating– coordinating.

Role Play: Day to day situations - practical approach – real life experiences.

Reading Comprehension: Reading as a skill – quick reading - analyzing – answering - Skimming – scanning - summarizing – problem solving.

Error Analysis: Parallel grammatical forms – same grammatical structures. Dangling modifiers – misplacement of modifiers – arrangement.

Sentence Improvement: Better choice – error-free sentences – effective – syntax.

Email Writing: Format – method of exchanging – technicalities.

Unit – III

Number And Letter Series, Coding & Decoding, Analogy, Classification Ranking.

Problems of how to find the next number in the series, Finding the missing number and related sums, Sums related to Classification, Sums related to letter series, Relation between number series and letter series, Finding odd one out from groups, Identify the rank in different places.

UNIT-IV

Problems on Ages& Numbers, Mirror and Water Images, Logical Reasoning & Arithmetic Reasoning.

Definition and concept of Venn Diagram – its applications. Statements – Affirmations, Denials and Contradictions. Sums related to Ages & numbers.

Problems on ages with different logics. Identifying the images of water and Mirror.

UNIT-V

Blood Relations, Directions, Average, Clock And Calendar, Data Sufficiency, Permutations- Combinations And Probability.(K3)

Deriving the formula to find the angle between hands for the given time, History of calendar-, finding the day for the given date, Problems related to directions. Difference between words Permutation and Combinations – Various cases - Real Time Scenarios. Concept of Probability – - Conjunctions – Rules & Cases of Probability.

References:

- 1. Verma Shalini. Common Errors In English (2016).S Chand & Company
- 2. Sharon Weiner Green M.A & Ira K. Wolf Ph.D.Barron's GRE (2015). Barrons Educational Series
- 3. Paul D.S. Advanced English Grammar with Answers (2007) Published by Cambridge University Press..
- 4. Work book -1 on Aptitude Prepared by T & P cell, Sri Vasavi Engineering College.
- 5. Kundan & Tyra. Magical Book on Quicker Maths(20013). Published by Tyra & Kundan
- 6. Kundan & Tyra. Practice Book on Quicker Maths (2009). Published by Tyra & Kundan
- 7. R.S. Agarwal .Non Verbal Reasoning. Sultan Chand Publications

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Department of Electrical & Electronics Engineering (NBA Accredited)

Semester	IV SEM (ECE & ECT); V SEM (EEE)	L	Т	Р	С	Course Code
Regulation	V20	3	-	-	3	V20EET11
Name of the Course	Control Systems					
Branches	EEE, ECE & ECT					

Course Outcomes

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

CO No.	Course Outcome	Knowledge Level
CO1	Determine the mathematical modelling of physical systems	(K3)
CO2	Calculation of Time Domain Specification of first and second order systems and understand the effect of Controllers	(K3)
CO3	Investigate the stability of closed loop systems using Routh's stability criterion and root locus method.	(K3)
CO4	Find the stability of control systems using frequency response approaches.	(K3)
CO5	Analyze physical systems using state space approach.	(K4)

Unit - I: Mathematical Modeling of Control Systems

Classification of control systems, Open Loop and closed loop control systems and their differences, Feed-Back Characteristics, transfer function of linear system, Differential equations of electrical networks, Translational and Rotational mechanical systems, Transfer Function of DC Servo motor - AC Servo motor- Synchro, transmitter and receiver - Block diagram algebra – Representation by Signal flow graph - Reduction using Mason's gain formula.

Unit-II: Time Response Analysis

Standard test signals - Time response of first and second order systems - Time domain specifications - Steady state errors and error constants – Effects of various controllers

Unit -III: Stability And Root Locus Technique

The concept of stability – Routh's stability criterion –limitations of Routh's stability –Root locus concept - construction of root loci

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Unit-IV: Frequency Response Analysis

Introduction to Frequency domain specifications-Bode diagrams- transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots, Polar Plots, Nyquist Stability criterion. Effects of various controllers.

Unit-V: State Space Analysis of LTI Systems

Concepts of state, state variables and state model, state space representation of transfer function, Diagonalization- Solving the time invariant state equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability.

Text Books:

- 1. Control Systems principles and design, M. Gopal, Tata McGraw Hill education Pvt Ltd., 4th Edition, 2014.
- 2. Automatic control systems, Benjamin C. Kuo, Prentice Hall of India, 2ndEdition, 2014.

Reference Books:

- 1. Modern Control Engineering, Kotsuhiko Ogata, Prentice Hall of India, 2002.
- 2. Control Systems, ManikDhanesh N, Cengage Publications, 2012.
- 3. Control Systems Engineering, I.J.Nagarath and M.Gopal, Newage International Publications, 5th Edition, 2007.
- 4. Control Systems Engineering, S.Palani, Tata McGraw Hill Publications, 2009.
- 5. https://nptel.ac.in/courses/107/106/107106081/

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Annexure II

Approved Syllabi for the courses offered in V to VIII semesters B. Tech

EEE under V20 Regulation.

Semester	V SEM	L	Т	Р	С	Course Code
Regulation	V20	3	-	-	3	V20EET12
Name of the Course	Switchgear & Protection					
Branches	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C01	Understand the arc interruption phenomenon in oil, air, vacuum, SF6 gas type circuit breakers.	(K2)
CO2	Extract the constructional features and working of different types of electromagnetic relays.	(K2)
CO3	Choose suitable relay for different type of protective schemes.	(K3)
CO4	Apply suitable protective scheme for generators and transformers against different faults.	(K3)
C05	Choose suitable protective scheme for the protection of feeders & bus bars, digital relays and the concept of grounding.	(K3)

UNIT-I: CIRCUIT BREAKERS

Miniature Circuit Breaker(MCB)– Elementary principles of arc interruption– Restriking Voltage and Recovery voltages– Restriking phenomenon - RRRV– Average and Max. RRRV– Current chopping and Resistance switching– Introduction to oil circuit breakers– Description and operation of Air Blast– Vacuum and SF6 circuit breakers– CB ratings and specifications– Concept of Auto reclosing.

UNIT-II: ELECTROMAGNETIC PROTECTION

Relay connection – Balanced beam type attracted armature relay - induction disc and induction cup relays–Torque equation - Relays classification–Instantaneous– DMT and IDMT types.



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UNIT-III: APPLICATIONS OF RELAYS

Over current and under voltage relays– Directional relays– Differential relays and percentage differential relays– Universal torque equation– Distance relays: Impedance– Reactance– Mho Characteristics of distance relays and comparison.

UNIT-IV:

GENERATOR PROTECTION

Protection of generators against stator faults – Rotor faults and abnormal conditions – Numerical examples.

TRANSFORMER PROTECTION

Percentage differential protection – Design of CT's ratio– Buchholz relay protection– Numerical examples.

UNIT-V: FEEDER AND BUS BAR PROTECTION

Protection of lines: Over current Protection schemes – PSM,TMS - Numerical examples -Carrier current and three zone distance relay using impedance relays–Protection of bus bars by using Differential protection.

DIGITAL RELAYS

Micro Processor based digital relays.

NEUTRAL GROUNDING

Effects of ungrounded neutral on system performance– Methods of neutral grounding: Solid–resistance–Reactance–Arcing grounds and grounding Practices.

TEXT BOOKS:

- 1. Power System Protection and Switchgear by Badri Ram and D. N Viswakarma, TMH Publications, 2007
- 2. Power System Protection and Switchgear by B. Ravindranath, M. Chander, New Age International, 1977
- 3. Power system protection- Static Relays with microprocessor applications by T. S. Madhava Rao, TMH, 2017

REFERENCE BOOKS:

- 1. Fundamentals of Power System Protection by Paithankar and S. R. Bhide., PHI, 2003.
- 2. Art & Science of Protective Relaying by C R Mason, Wiley Eastern Ltd, 1956.
- 3. Protection and Switch Gear by Bhavesh Bhalja, R.P. Maheshwari, Nilesh G.Chothani, Oxford University Press, 2013
- 4. https://onlinecourses.nptel.ac.in/noc21_ee110/
- 5. https://nptel.ac.in/courses/108101039

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Semester	V SEM	L	Т	Р	С	Course Code
Regulation	V20	3	-	-	3	V20EET13
Name of the Course	Power Electronics					
Branches	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C01	Illustrate the characteristics of various power semiconductor devices and different firing circuits of SCR.	(K3)
CO2	Operate various 1- φ AC-DC Controlled rectifiers for R and RL Loads and compare their performance.	(K3)
CO3	Explain the operation of 3- φ full converter and dual converter.	(K2)
CO4	Explain the operation of AC voltage controller, 1- φ cyclo-converter and high frequency dc-dc converters.	(K2)
C05	Apply PWM techniques for voltage control and harmonic mitigation.	(K3)

UNIT - I: Power Semi-Conductor Devices

Power transistors- Basic structure and working of power MOSFET and power IGBT. Characteristics of power MOSFET and power IGBT-Silicon controlled rectifiers (SCR's)-Basic theory of operation of SCR-Static & Dynamic characteristics of SCR- Turn on and turn off methods of SCR-Snubber circuit Design.

UNIT - II: Single Phase - Phase Controlled Rectifiers and Harmonic Analysis

Half wave converters with R, RL and RLE loads- Derivation of average output voltage and output current- Effect of freewheeling diode for RL load. Fully controlled converters with R, RL and RLE loads-Derivation of output voltage and current - Effect of source Inductance. Semi Converters (Half Controlled) operation with R, RL and RLE loads - Harmonic analysis for input/source current waveform in a system with a large load inductance -Calculation of input power factor.

UNIT-III: Three Phase - Phase Controlled Rectifiers

Three Phase Half wave and Full wave converters with R and RL loads-Semi converter (Half Controlled) with R and RL loads- Derivation of average and rms output voltages-



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Line commutated Inverter operation-Dual converters with non-circulating and circulating currents.

UNIT - IV: AC-AC and DC-DC Converters

Single phase AC voltage controller with R and RL load- Single phase Bridge type Cyclo converter with R and RL load (Principle of operation) -High frequency DC-DC converters: Buck Converter operation, Time ratio control and current limit control strategies-Voltage and current waveforms-Derivation of output voltage-Boost converter operation-Voltage and current waveforms-Derivation of output voltage - Buck-Boost converter operation - Voltage and current waveforms.

UNIT - V: DC-AC Inverters

Single phase half bridge and full bridge inverters - Three phase Inverters (1200 and 1800 modes of operation) - PWM techniques- Single Pulse, Multiple Pulse and Sinusoidal PWM, amplitude and frequency modulation Indices -Harmonic analysis.

TEXT BOOKS:

- 1. Power Electronics: Circuits, Devices and Applications by M. H. Rashid, Prentice Hall of India, 2nd edition, 1998
- 2. Power Electronics by P.S. Bhimbra, Khanna Publishers, 2014
- 3. Power Electronics: converters, applications & design -by Nedmohan, Tore M. Undeland, Robbins by Wiley India Pvt. Ltd., 2018
- 4. Power Electronics: Essentials & Applications by L. Umanand, Wiley, Pvt. Limited, India, 2009

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- 1. Elements of Power Electronics–Philip T. Krein, Oxford, 2015.
- 2. Power Electronics by M. D. Singh, Tata McGraw Hill India, 2006
- 3. Thyristorised Power Controllers by G. K. Dubey, S. R. Doradla, A. Joshi and R. M. K.Sinha, New Age International (P) Limited Publishers, 1996.
- 4. Power Electronics handbook by Muhammad H.Rashid, Elsevier, 2018.
- 5. Power Converter Circuits -by William Shepherd, Li zhang, CRC Taylor & Francis Group, 2017
- 6. https://nptel.ac.in/courses/108105066
- 7. https://nptel.ac.in/courses/108102145

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Semester	V SEM	L	Т	Р	С	Course Code
Regulation	V20	3	-	-	3	V20EET14
Name of the Course	Utilization of Electrical Energy (Professional Elective –I)					
Branches	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No	Course Outcome	Knowledge		
CO NO.	course outcome	Level		
C01	Choose a suitable motor for electric drives and industrial	(K3)		
	applications			
C02	Select appropriate heating and welding techniques for different			
	applications			
CO3	Recognise lightning system for particular inputs and constraints.	(K2)		
CO4	Illustrate the speed-time characteristics of traction motors.	(K3)		
CO5	Estimate the energy consumption levels at various modes of	(K2)		
	operation.			

UNIT – I: SELECTION OF MOTORS

Choice of motor, type of electric drives, starting and running characteristics – Speed control – Temperature rise – Applications of electric drives – Types of industrial loads – Continuous, Intermittent and variable loads – Load equalization.

UNIT - II: ELECTRIC HEATING AND WELDING

Advantages and methods of electric heating and welding –Resistance heating, induction heating and dielectric heating. Classification - Resistance welding and types - Arc welding and types–Electric welding equipment–Comparison between AC and DC Welding

UNIT – III: ILLUMINATION

Basic terms used in illumination – Laws of illumination – MHCP and MSCP– Sources of light: Working of Filament lamps, Arc lamps and Discharge lamps.

Basic principles of light control – Types of lighting schemes – Street, Flood and LED lighting – Lumen or flux method of lighting calculation – Numerical Examples.



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UNIT – IV: ELECTRIC TRACTION – I

Review of existing electric traction systems in India – System of electric traction and track electrification– Special features of traction motor – Mechanics of train movement – Speed-time curves for different services – Trapezoidal and quadrilateral speed time curves.

UNIT – V: ELECTRIC TRACTION – II

Calculations of tractive effort– power –Specific energy consumption for given run–Effect of varying acceleration and braking retardation–Adhesive weight and braking, retardation adhesive weight and coefficient of adhesion.

TEXT BOOKS:

- 1. Utilization of Electric Energy by E. Openshaw Taylor, SI Edition, Orient Longman, 1971.
- 2. Art and Science of Utilization of Electrical Energy by H. Partab, Dhanpat Rai & Sons, 2006.

REFERENCE BOOKS:

- Utilization of Electrical Power including Electric drives and Electric traction by N. V. Suryanarayana, New Age International (P) Limited, Publishers, 1996.
- 2. Generation, Distribution and Utilization of electrical Energy by C.L. Wadhwa, New Age International (P) Limited, Publishers, 1997.
- 3. <u>https://www.governmentpolytechnicnayagarh.org/upload/ueet(Pm).pdf</u>,

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Semester	V SEM	L	Т	Р	С	Course Code
Regulation	V20	3	-	-	3	V20EET15
Name of the Course	Renewable Energy Systems (Professional Elective –I)					ve –I)
Branches	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C01	Understand the solar radiation and calculate geometric angle.	(K2)
CO2	Understand the working of solar thermal collectors.	(K2)
<u> </u>	Understand the working of solar photo voltaic systems and develop	(K2)
03	the maximum power point techniques.	
CO4	Understand the wind energy conversion systems, Betz coefficient	(K2)
L04	and tip speed ratio.	(RZ)
C05	Understand the basic principle and working of tidal, fuel cell and	(K2)
005	geothermal energy systems.	(112)

UNIT-I: FUNDAMENTALS OF ENERGY SYSTEMS AND SOLAR ENERGY CONSERVATION PRINCIPLE

Energy scenario (world and India) – various forms of renewable energy - Solar radiation: Outside earth's atmosphere – Earth surface – Analysis of solar radiation data – Geometry – Radiation on tilted surfaces – Numerical problems.

UNIT-II: SOLAR THERMAL SYSTEMS

Liquid flat plate collectors: Performance analysis –Transmissivity– Absorptivity product collector efficiency factor – Numerical problems. Introduction to solar air heaters – Concentrating collectors, solar pond and solar still – solar thermal plants.

UNIT-III: SOLAR PHOTOVOLTAIC SYSTEMS

Solar photovoltaic cell, module, array – construction – Efficiency of solar cells – Developing technologies – Cell I-V characteristics – Equivalent circuit of solar cell – Series



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resistance – Shunt resistance – Applications and systems - System design: storage sizing – PV system sizing – Maximum power point techniques: Perturb and observe (P&O) technique.

UNIT-IV: WIND ENERGY

Sources of wind energy - Wind patterns – Types of turbines –Horizontal axis and vertical axis machines - Kinetic energy of wind – Betz coefficient – Tip–speed ratio – Efficiency – Power output of wind turbine – Selection of generator (synchronous, induction) – Maximum power point tracking – wind farms.

UNIT-V: TIDAL, FUEL CELL AND GEOTHERMAL ENERGY SYSTEMS

Tidal power – Basics – Kinetic energy equation – Turbines for tidal power - Numerical problems – Wave power – Basics – Kinetic energy equation – Wave power devices. Fuel classification, Fuel cell: Classification of fuel for fuel cells – Fuel cell voltage– Efficiency – V-I characteristics. Geothermal: Classification – Dry rock and hot acquifer – Energy analysis – Geothermal based electric power generation.

TEXT BOOKS:

- 1. Solar Energy: Principles of Thermal Collection and Storage, S. P. Sukhatme and J. K. Nayak, TMH, New Delhi, 3rd Edition, 2013.
- 2. Renewable Energy Resources, John Twidell and Tony Weir, Taylor and Francis second edition, 2013.

REFERENCE BOOKS:

- 1. Energy Science: Principles, Technologies and Impacts, John Andrews and Nick Jelly, Oxford University Press, 2nd edition, 2013.
- Renewable Energy- Edited by Godfrey Boyle-oxford university.press,3rd edition, 2013.
- 3. Handbook of renewable technology Ahmed and Zobaa, Ramesh C Bansal, World scientific, Singapore, 2011.
- 4. Renewable Energy Technologies /Ramesh & Kumar /Narosa.
- 5. Renewable energy technologies A practical guide for beginners Chetong Singh Solanki, PHI, 2008.
- 6. Non conventional energy source –B.H.khan- TMH-2nd edition, 2017.
- 7. https://archive.nptel.ac.in/courses/115/105/115105127/
- 8. https://mrcet.com/downloads/digital_notes/ECE/III%20Year/INSTRUMENTAT ION%20ENGINEERING.pdf

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Semester	V SEM	L	Т	Р	С	Course Code
Regulation	V20	3	-	-	3	V20EET16
Name of the Course	INSTRUMENTATION (Professional Elective –I)					
Branches	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C01	Illustrate various types of signals and their characteristics.	(K3)
CO2	Explain different types of transducers with applications.	(K2)
CO3	Compute various parameters of non-electrical quantities.	(K3)
CO4	Understand the principles of digital voltmeters and CRO.	(K2)
CO5	Explain various types of signal analyzers.	(K2)

UNIT-I:

Signals and their representation

Measuring Systems, Performance Characteristics, – Static characteristics – Dynamic Characteristics – Errors in Measurement – Gross Errors – Systematic Errors – Statistical analysis of random errors – Signal and their representation – Standard test, periodic, aperiodic, modulated signal – Sampled data pulse modulation and pulse code modulation.

UNIT-II:

Transducers

Definition of transducers – Classification of transducers – Advantages of Electrical transducers – Characteristics and choice of transducers – Principle operation of resistor, inductor, LVDT and capacitor transducers – LVDT Applications – Strain gauge and its principle of operation – Guage factor – Thermistors – Thermocouples – Synchros – Piezoelectric transducers – Photo diodes.

UNIT-III:

Measurement of Non-Electrical Quantities

Measurement of strain – Gauge Sensitivity – Displacement – Velocity – Angular Velocity – Acceleration – Force – Torque – Measurement of Temperature, Pressure, Vacuum, Flow, Liquid level.

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UNIT-IV:

Digital Voltmeters and Oscilloscopes

Digital voltmeters –dual–Slope integration continuous balance type – Microprocessor based ramp type, Cathode ray oscilloscope – Time base generator – Horizontal amplifier and vertical amplifier – Sampling oscilloscope – Analog and digital type data logger – Transient recorder.

UNIT-V:

Signal Analyzers

Wave Analyzers – Frequency selective analyzers – Heterodyne – Application of Wave analyzers – Harmonic Analyzers – Total Harmonic distortion – Spectrum analyzers – Basic spectrum analyzers – Spectral displays – Vector impedance meter – Q meter – Peak reading and RMS voltmeters.

Text Books:

- 1. Electronic Instrumentation-by H.S.Kalsi Tata MCGraw-Hill Edition, 1995.
- 2. A course in Electrical and Electronic Measurements and Instrumentation, A.K.Sawhney, Dhanpatrai&Co, 2015

Reference Books:

- 1. Measurement and Instrumentation theory and application, Alan S.Morris and RezaLangari, Elsevier, 2020
- 2. Measurements Systems, Applications and Design by D O Doeblin, 1990.
- 3. Principles of Measurement and Instrumentation by A.S Morris, Pearson/Prentice Hall of India, 3rd edition 2012 Elsevier.
- 4. Modern Electronic Instrumentation and Measurement techniques by A.DHelfrickandW.D.Cooper, Pearson/Prentice Hall of Indi, 2015
- 5. Transducers and Instrumentation by D.V.S Murthy, Prentice Hall of India, 2nd edition, October-2011.

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Semester	V SEM	L	Т	Р	C	Course Code
Regulation	V20	3	-	-	3	V20EET17
Name of the Course Energy Audit & Demand Side Management (Professional Elective –I)						
Branches	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C01	Describe the concepts and procedures for Energy Audit & Management.	(K2)
CO2	Understand the necessity of Energy efficient lighting systems.	(K2)
C03	Understand the operation of Energy instruments and their use in energy audit.	(K2)
CO4	Explain Energy Conservation measures in HVAC system	(K2)
C05	Apply various economic aspects of Energy systems and life cycle costing analysis for various system	(K3)

UNIT-I: BASIC PRINCIPLES OF ENERGY AUDIT AND MANAGEMENT ENERGY AUDIT

Definitions – Concept – Types of audit – Energy index – Cost index – Pie charts –Sankey diagrams – Load profiles – Energy conservation schemes and energy saving potential – Numerical problems – Principles of energy management – Initiating, planning, controlling, promoting, monitoring, reporting – Energy manager – Qualities and functions – Language.

UNIT-II: LIGHTING MODIFICATION OF EXISTING SYSTEMS – REPLACEMENT OF EXISTING SYSTEMS – PRIORITIES:

Definition of terms and units – Luminous efficiency – Polar curve – Calculation of illumination level – Illumination of inclined surface to beam – Luminance or brightness – Types of lamps – Electric lighting fittings (luminaries) –Flood lighting – White light LED – Energy conservation measures.



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UNIT-III: POWER FACTOR IMPROVEMENT AND ENERGY INSTRUMENTS

Power factor – Methods of improvement – Location of capacitors – Power factor with non linear loads – Effect of harmonics on Power factor – Numerical problems. Energy Instruments – Watt-hour meter – Data loggers – Thermocouples – Pyrometers – Lux meters – Tong testers – Power analyzer.

UNIT-IV: SPACE HEATING AND VENTILATION

Ventilation – Air–Conditioning (HVAC) and Water Heating: Introduction – Heating of buildings – Transfer of Heat–Space heating methods – Ventilation and air–conditioning – Insulation–Electric water heating systems – Energy conservation methods.

UNIT-V FINANCIAL ANALYSIS AND COMPUTATION OF ECONOMIC ASPECTS

Economics Analysis – Depreciation Methods – Time value of money – Rate of return – Present worth method – Replacement analysis – Life cycle costing analysis – Energy efficient motors (basic concepts) – Economics of energy efficient motors and systems. Need of investment, appraisal and criteria - Calculation of simple payback period–Return on investment – Net present value -Numerical examples.

TEXT BOOKS:

- 1. Hand Book of Energy Audit by Sonal Desai- Tata McGraw hill, 2015.
- 2. Energy efficient electric motors by John .C. Andreas, Marcel Dekker Inc Ltd–2nd edition, 1995.

REFERENCE BOOKS:

- 1. Energy management by W.R. Murphy & G. Mckay Butter worth, Elsevier publications, 2012.
- 2. Electric Energy Utilization and Conservation by S C Tripathy, Tata McGraw hill publishing company Ltd. New Delhi, 1991.
- 3. Energy management by Paul o' Callaghan, Mc–Graw Hill Book company–1st edition, 1998.
- 4. Energy management hand book by W.C.Turner, John wiley and sons, 6th Edition, 2006.
- 5. Energy management and conservation –k v Sharma and pvenkataseshaiah-I K International Publishing House pvt.ltd,2011.
- http://www.energymanagertraining.com/download/Gazette_of_IndiaPartIISecI-37_25-08-2010.pdf

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Semester	V SEM	L	Т	Р	С	Course Code
Regulation	V20	-	-	3	1.5	V20EEL07
Name of the Course	Course Electrical Machines Lab - II					
Branches	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C01	Pre-determine the performance parameters and sketch the performance characteristics of 3-phase induction motor by conducting different tests.	(K3)
CO2	Pre-determine the performance parameters of cylindrical pole synchronous machine by conducting OC and SC tests.	(K3)
CO3	Determine the direct and quadrature axis reactance by conducting slip test.	(K3)
CO4	Determine V and inverted V curves through synchronization of synchronous machine to mains.	(K3)
C05	Calculate the equivalent circuit parameters of a 1-phase transformer by conducting OC and SC Tests.	(K3)

The following experiments are required to be conducted as compulsory experiments:

- 1. Brake test on three phase Induction Motor
- 2. No-load & Blocked rotor tests on three phase Squirrel Cage Induction motor
- 3. Load test on three phase slip ring induction motor
- 4. No-load & Blocked rotor tests on three phase Slip Ring Induction motor
- 5. Regulation of a three -phase alternator by synchronous impedance &m.m.f. Methods
- 6. Regulation of three–phase alternator by Potier triangle method
- 7. V and Inverted V curves of a three—phase synchronous motor.
- 8. Determination of Xd and Xq of a salient pole synchronous machine
- 9. Equivalent circuit of single phase induction motor
- 10. Speed control of induction motor by V/f method.
- 11. Determination of efficiency of three phase alternator by loading with three phase induction motor.
- 12. Power factor improvement of single phase induction motor by using capacitors and load test on single phase induction motor.

13. Heat run test on a bank of 3 Nos. of single phase Delta connected transformers.

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Semester	V SEM	L	Т	Р	С	Course Code
Regulation	V20	-	-	3	1.5	V20EEL08
Name of the Course	ourse Control Systems Lab					
Branches	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C01	Find time response of given control system model.	(K3)
CO2	Analyze the performance and working of Magnetic amplifier, D.C. servo motors, A.C. Servo motors and synchronous motors.	(K4)
CO3	Analyze PID controllers for given control system model.	(K4)
C04	Analyze lead, lag and lead-lag systems in control system	(K4)
C05	Determine the transfer function of D.C. motor and D.C Generator.	(K4)

Any 10 of the following experiments are to be conducted:

- 1. Time response of Second order system
- 2. Characteristics of Synchros
- 3. Programmable logic controller characteristics of stepper motor
- 4. Effect of feedback on DC servo motor
- 5. Effect of P, PD, PI, PID Controller on a second order systems
- 6. Lag and lead compensation Magnitude and phase plot
- 7. DC position control system
- 8. Transfer function of DC motor
- 9. Temperature controller using PID
- 10. Characteristics of magnetic amplifiers
- 11. Characteristics of AC servo motor
- 12. Characteristics of DC servo motor
- 13. Potentiometer as an error detector



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S.No	Course Code	Course Name	L	Т	Р	С
1	V20ENT04	Professional Communication Skills - III		2+2	-	MNC

	After successful completion of the course, the students will be able to	Knowl edge Level
C01	Distinguish the subtle meanings of various words in different contexts, recognize similar words as well as words with contrast meanings and use them appropriately. Express writer's tone and relevant ideas using different types of writing skills and prepare resume to showcase skills and accomplishments. Organize thoughts in the discussions and express views without reticence. Develop the ability to write different types of essays in a structured way, maintaining cohesion and logic	K4
CO2	Identify the central theme and arrange the scrambled sentences into a meaningful passage. Draft emails with appropriate subject-lines and relevant content. Compare different pairs of words, recognize the relationship between the head words and the options to siphon correct analogy Choose an appropriate word to make a sentence meaningful. Infer the meaning of the picture by thinking out of the box and speak without inhibitions and face interviews with aplomb.	K2
CO3	Analyze appropriate methods of logical thinking on Ratio and Proportion, Partnership, LCM and HCF, Number System, Areas & Volumes.	K4
CO4	Demonstrate problem solving skills through the concepts of Percentages, Profit and loss, Simple Interest & Compound Interest and Allegation.	К3
CO5	Calculate the end results of Cubes, Dice and Data Analysis, Time & Work, Time & Distance, Race & Games.	K4

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SYLLABUS

UNIT – I

VOCABULARY - MODEL RESUMES & SPEAKING

500 words (PIC-VOC) -Meaning – contextual Usage - Prefix – Suffix – Root words. Resume writing-Model Resume-Introducing different formats-Tailoring resume as per job description. Paragraph writing- Essay writing- Types of Essays- Strategies - Cause and effect signals - support signals - contrast signals. Watch a video and respond

Group Discussion – Types of GD – Dos & Don'ts, JAM, Presentation Skills, Designing Advertisements

UNIT – II

GRAMMAR, WRITING & SPEAKING SKILLS

Tenses – Simple – Continuous – perfect – perfect continuous - voice – Active & Passive -Para jumbles - Strategies - Directional words - central theme-Email writing- Types --Dos and Don'ts-

VERBAL ABILITY- ANALOGIES- INTERVIEW SKILLS- CREATIVE THINKING

ANALOGIES: Strategies - Recognize common relationship types. Synonyms – Antonyms -Create a general sentence - Use the correct part of speech - Beware of homonyms. Equalizing the sentences- scrambled sentences. Interview Skills - Personal Interview -Skype Interview – Telephone Interview – Mock Interviews. Creative thinking – Picture Interpretation -Creative writing

UNIT – III

Ratio & Proportion, Partnership, LCM & HCF and Areas & Volumes

Introducing the concept of ratio in three different methods, a method to compute and compare two ratios - The effect of increase or decrease of a quantity on the ratio -The meaning of proportion and Problems related to Ratio and Proportion. Improve problem solving skills through LCM & Hcf.

UNIT – IV

Percentages, Profit and Loss, Simple and Compound Interest, Allegation & **Mixtures**

Definition of Simple and Compound Interest. Formulas of Applications - Difference between Simple and Compound interest – Rate of Increase or Decrease Population – Expected values of Maturity. Calculate percentages on different situations, using in profit and loss. Identifying difference between Cost price, Selling Price and Marked Price, Finding Discounts, using the method of allegation.

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(12 hrs)

(12 hrs)

(12 hrs)

(12 hrs)

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UNIT – V

(12 hrs)

Time, Work and Distance, Cubes, Dice and Data Analysis

Men- Days -work –completion- Capability Ratio among Men, Women and Children – Application of time in Pipes and Cistern. Work Progress in positive and negative effects. Relation among Time, Speed and Distance – Concepts of Relative speed and Average Speed – Ideas about Boats and Streams and Races of Games. Calculate the end results of Cubes and Dice.

References

- Dr.Sujani Tata et al., Pic Voc (2015) Published by Sri Vasavi Engineering College
- Lewis Norman, Word Power Made Easy (2008). Goyal Publishers & Distributors Pvt. Ltd.
- Dr.Shalini Verma, Reetesh Anand, Word Power Made Handy(2017). S Chand Publications.
- <u>R S Aggarwal, Objective General English (2017). S Chand Publications.</u>
- Sunita Mishra & C.Muralikrishna, Communication Skills for Engineers (2006).
 Dorling Kindersley (India) Pvt. Ltd., licensees of Pearson Education in South Asia.
- Charles W Hanson. Resume: Writing 2020 The Ultimate Guide to Writing a Resume that Lands YOU the Job! (2019).
- Raymond Murphy. Essential Grammar in Use (1985).Cambridge University Press
- Seely John. The Oxford Guide to Writing & Speaking (2004). Oxford University Press.
- Sain, T.S. & Gupta. , 2010, Interviews and Group Discussions, Upkar's Publications.
- Training & Placement cell, 2020, Workbook -1 on Aptitude, Sri Vasavi Engineering College.
- M Tyra, 2013, Magical Book on Quicker maths, BSC Publications.
- K Kundan & M Tyra, 2009, Practice Book on Quicker Maths, BSC Publications.
- Sultan Chand Publications
- Dr. RS. Agarwal, 2017, A modern approach to verbal & on verbal reasoning, Sultan Chand Publications.

Web References:

- https://www.indiabix.com/
- https://www.campusgate.co.in/
- https://www.questionpaper.org/

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Department of Electrical & Electronics Engineering (NBA Accredited)

Semester	VI SEM	L	Т	Р	С	Course Code
Regulation	V20	3	1	-	3	V20EET18
Name of the Course	Power System Analysis					
Branches	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C01	Compute Y _{BUS} matrix for a power system network.	(K3)
CO2	Find the load flow solution of a power system network using load flow methods.	(K3)
CO3	Develop the Z _{BUS} for a power system network and calculate the fault currents for symmetrical faults.	(K3)
CO4	Compute the sequence components of currents for unbalanced power system network.	(K3)
C05	Understand the concepts of power system stability.	(K2)

UNIT -I: PER UNIT REPRESENTATION & TOPOLOGY

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

UNIT -II: POWER FLOW STUDIES

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

UNIT -III: ZBUS FORMULATION and SYMMETRICAL FAULT ANALYSIS

ZBUS FORMULATION



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Formation of Z_{BUS}: Partial network– Algorithm for the Modification of Z_{BUS} Matrix for addition element for the following cases: Addition of element from a new bus to reference– Addition of element from a new bus to an old bus– Addition of element between an old bus to reference and Addition of element between two old busses (Derivations and Numerical Problems).

SYMMETRICAL FAULT ANALYSIS

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

UNIT -IV: SYMMETRICAL COMPONENTS & FAULT ANALYSIS

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

UNIT – V: POWER SYSTEM STABILITY ANALYSIS

Elementary concepts of Steady state– Dynamic and Transient Stabilities– Description of Steady State Stability Power Limit–Transfer Reactance–Synchronizing Power Coefficient – Power Angle Curve and Determination of Steady State Stability –Derivation of Swing Equation–Determination of Transient Stability by Equal Area Criterion–Applications of Equal Area Criterion–Methods to improve steady state and transient stability.

TEXT BOOKS:

- 1. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill, 1994.
- 2. Modern Power system Analysis by I. J. Nagrath& D. P. Kothari: Tata McGraw– Hill Publishing Company, 2nd edition,2011.

REFERENCE BOOKS:

- 1. Power System Analysis by A.R.Bergen, Prentice Hall, Inc, 1999.
- 2. Power System Analysis by HadiSaadat TMH Edition, 2002.
- 3. Power System Analysis by B.R.Gupta, Wheeler Publications, 1998.
- 4. Power System Analysis and Design by J.Duncan Glover, M.S.Sarma, T.J.Overbye Cengage Learning publications, 2017.

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Department of Electrical & Electronics Engineering (NBA Accredited)

Semester	VI SEM	L	Т	Р	С	Course Code
Regulation	V20	3	-	-	3	V20EET19
Name of the Course	Electrical Drives					
Branches	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C01	Understand the fundamentals concepts of an electric drive and different electric braking methods.	(K2)
CO2	Operate Chopper fed DC motor drives in various quadrants.	(K4)
CO3	Understand the closed loop operation of chopper fed dc motor drive.	(K2)
CO4	Compute the change in speed of $3-\varphi$ induction motor with variable voltage and v/f control	(K3)
C05	Illustrate the speed control mechanism of synchronous motors	(K3)

UNIT - I: Fundamentals of Electric Drives

Electric drive – Fundamental torque equation – Load torque components – Nature and classification of load torques – Steady state stability – Load equalization– Four quadrant operation of drive (hoist control) – Braking methods: Dynamic – Plugging – Regenerative methods.

UNIT - II: Controlled Converter Fed DC Motor Drives

Single phase half and fully controlled converter fed separately and self-excited DC motor drive – three phase fully controlled converter fed separately excited DC motor drive-Output voltage and current waveforms – Speed-torque expressions – Speed-torque characteristics – Principle of operation of dual converters and dual converter fed DC motor drives -Numerical problems.

UNIT - III: DC-DC Converters Fed DC Motor Drives

Single quadrant – Two quadrant and four quadrant DC-DC converter fed separately excited and self-excited DC motors – Continuous current operation– Output voltage and



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current waveforms – Speed-torque expressions – Speed-torque characteristics –Four quadrant operation – Closed loop operation (qualitative treatment only).

UNIT - IV: Control of Induction Motor Drives

Stator side control: Stator voltage control using 3-phase AC voltage regulators – Waveforms –Speed torque characteristics– Variable Voltage Variable Frequency control of induction motor by PWM voltage source inverter – Closed loop v/f control of induction motor drives (qualitative treatment only).

Rotor side control: Static rotor resistance control – Slip power recovery schemes – Static Scherbius drive – Static Kramer drive – Performance and speed torque characteristics – Advantages –Applications.

UNIT - V: Control of Synchronous Motor Drives

Separate control & self-control of synchronous motors – Operation of self-controlled synchronous motors byVSI– Closed Loop control operation of synchronous motor drives (qualitative treatment only).–Variable frequency control–Pulse width modulation.

TEXT BOOKS

- 1. Power Semiconductor Controlled Drives by G. K. Dubey, Prentice Hall, 1989.
- 2. Electric Motor Drives: Modeling, Analysis and Control by R. Krishnan, Prentice Hall, 2001.
- 3. Fundamentals of Electrical Drives by G. K. Dubey, CRC Press, 2002.
- 4. Power Semiconductor Drives, by S.B. Dewan, G.R. Slemon, A. Straughen, Wiley-India Edition, 2009.

REFERENCE BOOKS

- 1. Control of Electric Drives by W. Leonhard, Springer Science & Business Media, 2001.
- 2. Electric Motors and Drives Fundamentals, Types and Applications, by Austin Hughes and Bill Drury, Newnes, 203
- 3. Thyristor Control of Electric drives Vedam Subramanyam Tata McGraw Hill Publications, 1987
- 4. Power Electronic Circuits, Devices and applications by M.H. Rashid, PHI, 2013
- 5. Power Electronics handbook by Muhammad H. Rashid, Elsevier 2017
- 6. https://www.digimat.in/nptel/courses/video/108104140/L01.html
- 7. https://archive.nptel.ac.in/courses/108/104/108104140/,

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Semester	VI SEM	L	Т	Р	С	Course Code
Regulation	V20	4	-	-	3	V20EET20
Name of the Course	Microprocessors and Microcontrollers					
Branches	EEE					

Course Outcomes

CO No.	Course Outcome	Knowledge Level
C01	Understand the microprocessor capability in general.	(K2)
CO2	Explain the addressing modes of microprocessor.	(K2)
CO3	Understand the microcontroller capability.	(K2)
CO4	Develop microprocessor and microcontroller programmes.	(K3)
COF	Connect microprocessor and microcontroller with other electronic	(VA)
CO5	devices.	(14)

UNIT-I: Introduction to Microprocessor Architecture

Introduction and evolution of Microprocessors – Architecture of 8086–Register Organization of 8086–Memory organization of 8086–General bus operation of 8086–Introduction to80286–80386 and 80486 and Pentium.

UNIT-II: Minimum and Maximum Mode Operations

Instruction set, Addressing modes– Minimum and Maximum mode operations of 8086–8086Control signal interfacing–Read and write cycle timing diagrams.

UNIT-III:I/O Interface

8255 PPI– Architecture of 8255–Modes of operation– Interfacing I/O devices to 8086 using 8255–Interfacing A to D converters– Interfacing D to A converters– Stepper motor interfacing– Static memory interfacing with 8086–DMA controller (8257)–Architecture–Interfacing 8257 DMA controller– Programmable Interrupt Controller (8259)–Command words and operating modes of 8259– Interfacing of 8259–Keyboard/display controller(8279)–Architecture–Modes of operation–Command words of 8279– Interfacing of 8279.

UNIT-IV: Introduction to 8051 Micro Controller

Overview of 8051 Micro Controller– Architecture– Register set–I/O ports and Memory Organization– Interrupts–Timers and Counters–Serial Communication.

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UNIT- V: PIC Architecture

Block diagram of basic PIC 18 micro controller, registers I/O ports.

Text Books:

- 1. Kenneth J Ayala, "The 8051 Micro Controller Architecture, Programming and Applications", Thomson Publishers, 2nd Edition.
- 2. PIC Microcontroller and Embedded Systems using Assembly and C for PIC 18, -Muhammad Ali Mazidi, RolindD. Mckinay, Danny causey -Pearson Publisher 21stImpression.

Reference Books:

- 1. R.S. Kaler, " A Text book of Microprocessors and Micro Controllers", I.K.International Publishing House Pvt. Ltd., 2015
- 2. Ajay V. Deshmukh, "Microcontrollers Theory and Applications", Tata McGraw– Hill Companies –2005.
- 3. Ajit Pal, "Microcontrollers Principles and Applications", PHI Learning Pvt Ltd,2011.
- 4. Microprocessors and Interfacing, Douglas V Hall, Mc–Graw Hill, 2nd Edition, 2017
- 5. Ray and Burchandi, "Advanced Micro Processors and Interfacing", Tata McGraw-Hill, 2013
- 6. https://www.digimat.in/nptel/courses/video/108105102/L01.html,
- 7. https://www.youtube.com/watch?v=liRPtvj7bFU
- 8. ,https://nptel.ac.in/courses/108107029

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Semester	VI SEM	L	Т	Р	С	Course Code
Regulation	V20	3	-	-	3	V20EET21
Name of the Course	Smart Grid Technologies (Professional Elective –II)					
Branches	EEE					

Course Outcomes:

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

CO No.	Course Outcome	Knowledge Level
C01	Understand concept of smart grid and its advantages over conventional grid.	K2
CO2	Explain the architecture of smart Grid.	K2
CO3	Illustrate the concept of Micro Grid and its integration.	K2
CO4	Understand the smart metering and measuring techniques.	K2
C05	Illustrate different communication technologies and power quality problems associated with smart grid.	K2

UNIT -I: INTRODUCTION TO SMART GRID

Introduction to Smart Grid - Need of Smart Grid, Working definitions of Smart Grid and Associated Concepts – Smart Grid Functions – Traditional Power Grid and Smart Grid – New Technologies for Smart Grid – Advantages –– Key Challenges for Smart Grid.

UNIT—II: SMART GRID ARCHITECTURE

Components and Architecture of Smart Grid Design – Review of the proposed architectures for Smart Grid-Geographic Information System(GIS)-The fundamental components of Smart Grid designs – Transmission Automation – Sub-Station Automation – Distribution Automation – Feeder Automation, Renewable Integration.

UNIT-III: DISTRIBUTION GENERATION

Introduction-necessity of DG– Concept of micro grid-Issues of interconnection-protection & control of micro grid – Storage Technologies – Smart Storages, Battery, SMES– Economic Issues.



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UNIT-IV: SMART METERS

Introduction to smart Meters-Phasor Measurement Unit (PMU)-Wide Area Measurement Systems (WAMS). Intelligent Electronic Devices (IED) & their application for monitoring & protection.

UNIT-V: COMMUNICATION TECHNOLOGY AND POWER QUALITY MANAGEMENT IN SMART GRID

Advanced Metering infrastructure (AMI) drivers and benefits-AMI protocols-Standards and initiatives-AMI needs in the smart grid, Home Area Network (HAN), Wide Area Network (WAN). Introduction to Power Quality, Power Quality Issues of Grid Connected Renewable Energy Sources, Voltage Control in Micro Grid System – Reactive Power Control in Smart Grid- Web based Power Quality Monitoring-Power Quality Audit.

TEXT BOOKS:

- 1. James Momoh, "Smart Grid :Fundamentals of Design and Analysis"-Wiley, IEEE Press,2012
- 2. Ali Keyhani, Mohammad N. Marwali, Min Dai —Integration of Green and Renewable Energy in Electric Power Systems, Wiley, 2019
- 3. JanakaEkanayake, KithsiriLiyanage, Jianzhong.Wu, AkihikoYokoyama, Nick Jenkins, "Smart Grid: Technology and Applications" Wiley, 2012.
- 4. A.G. Phadke and J.S. Thorp, "Synchronized Phasor Measurements and their Applications", Springer Edition, 2010

REFERENCE BOOKS:

- 1. Yang Xiao, "Communication and Networking in Smart Grids", CRC Press, 202
- 2. Wiley Blackwell 3.Peter S. Fox Penner, "Smart Power: Climate Changes, the Smart Grid, and the Future of Electric Utilities", Island Press; 1 edition 8 Jun 2010.
- 3. Stuart Borlase, "Smart Grids (Power Engineering)", CRC Press
- 4. <u>https://onlinecourses.nptel.ac.in/noc21_ee68/preview</u>
- 5. https://archive.nptel.ac.in/courses/108/107/108107113/

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Semester	VI SEM	L	Т	Р	С	Course Code
Regulation	V20	3	-	-	3	V20EET22
Name of the Course	Power Quality & Custom Power Devices (Professional Elective –II)					
Branches	EEE					

Course Outcomes:

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

CO No.	Course Outcome	Knowledge Level
C01	Identify the issue related to power quality in power systems	K2
CO2	Describe the problems of transient voltage variations in power systems	K2
CO3	Analyze the effects of harmonics and understand different mitigation	KA.
	techniques	КŦ
CO4	Identify the importance of custom power devices and their applications	K2
C05	Choose suitable custom power device to mitigate power quality problem	K2

Unit-I: INTRODUCTION TO POWER QUALITY

Overview of power quality, Concern about the power quality, General classes of power quality problems, Voltage unbalance, Waveform distortion, Voltage fluctuation, Power frequency variations, power quality terms, voltage sags, swells, flicker and Interruptions-sources of voltage and current interruptions, Nonlinear loads.

Unit-II: TRANSIENT VOLTAGE VARIATIONS

Sources of transient over voltages- principles of overvoltage protection, devices for over voltage protection, utility capacitor switching transients, utility lightning protection, load switching transient problems.

Unit-III: HARMONIC DISTORTION AND SOLUTIONS

Voltage distortion vs. Current distortion, Harmonics vs. Transients – power system quantities under non-sinusoidal conditions, Harmonic indices – Sources of harmonics, locating sources of harmonics, system response characteristics, Effect of harmonic distortion, inter harmonics, harmonic solutions.

Unit-IV: CUSTOM POWER DEVICES

Custom power and custom power devices, voltage source inverters, reactive power harmonic compensation devices, compensation of voltage interruptions and current interruptions, static series and shunt compensators, compensation in distribution systems, interaction with distribution equipment, installation considerations.

Unit-V: APPLICATION OF CUSTOM POWER DEVICES IN POWER SYSTEMS

Static and hybrid source transfer switches, solid state current limiter-solid state breaker. Department Vision:

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P-Q theory- control of P and Q, dynamic voltage restorer (DVR): operation and controlinterline power flow controller (IPFC): operation and control of unified power quality conditioner (UPQC); generalized power quality conditioner. **TEXTBOOKS**:

- 1. Electrical Power Systems Quality, Dugan R C, McGranaghan M F, Santoso S, and Beaty H W, Second Edition, McGraw-Hill, 2002.
- 2. Understanding Power Quality Problems: Voltage Sags and Interruptions, Bollen M H J, First Edition, IEEE Press; 2000.
- 3. Power Quality Enhancement Using Custom Power Devices Power Electronics and Power Systems, Gerard Ledwich, ArindamGhosh, Kluwer Academic Publishers, 2002.
- 4. Custom Power Devices An Introduction, Arindam Ghosh and Gerard Ledwich, Springer, 2002.

REFERENCE BOOKS:

- 1. Power Quality Primer, Kennedy B W, First Edition, McGraw-Hill, 2000.
- 2. Power System Harmonics, Arrillaga J and Watson N R, Second Edition, John Wiley & Sons, 2003.
- 3. Electric Power Quality control Techniques, W. E. Kazibwe and M. H. Sendaula, Van Nostrad Reinhold, New York.
- 4. Power Quality c.shankaran, CRC Press, 2001.
- 5. Harmonics and Power Systems –Franciso C.DE LA Rosa-CRC Press (Taylor & Francis).
- 6. Power Quality in Power systems and Electrical Machines-EwaldF.fuchs, Mohammad A.S. Masoum Elsevier.
- 7. Power Quality, C. Shankaran, CRC Press, 2001.
- 8. Instantaneous Power Theory and Application to Power Conditioning, H. Akagiet.al., IEEE Press, 2007.
- 9. A Review of Compensating Type Custom Power Devices for Power Quality Improvement, Yash Palet.al., Joint International Conference on Power System Technology and IEEE Power India Conference, POWERCON 2008.
- **10.**Guidebook on Custom Power Devices, Technical Report, Published by EPRI, Nov 2000
- 11. https://onlinecourses.nptel.ac.in/noc21_ee103/preview

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Semester	VI SEM	L	Т	Р	C	Course Code
Regulation	V20	3	-	-	3	V20EET23
Name of the Course	Modern Control Theory (Professional Elective –II)					
Branches	EEE					

Course Outcomes:

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

CO No.	Course Outcome	Knowledge Level
C01	Understand the concepts of State Space Analysis.	(K2)
CO2	Find the concepts of Controllability, Observability and development of pole placement techniques.	(K3)
CO3	Demonstrate the non-linear systems behaviour by describing function analysis.	(K3)
C04	Demonstrate the non-linear systems behaviour by phase-plane.	(K3)
C05	Compute the stability of linear and non-linear systems by Lypunov's Method.	(K3)

UNIT –I

State Variable Analysis: The concept of state – State Equations for Dynamic systems – State diagram--- - Linear Continuous time model for physical systems – Existence and Uniqueness of Solutions to Continuous – Time State Equations – Solutions – Linear Time Invariant Continuous – Time State Equations – State transition matrix and it's properties **UNIT – II**

State Variable Techniques: General concept of Controllability – General concept of Observability Controllability tests for Continuous &Time Invariant systems - Observability tests for Continuous &Time Invariant systems - Controllability and Observability of state model in Jordan Canonical form - Controllability and Observability Canonical forms of State model – State feedback controller design through pole assignment.

UNIT – III

Non Linear Systems – I: Introduction – Non Linear Systems – Types of Non – Linarites – Saturation – Dead – Zone – Backlash – Jump Phenomenon etc. - Singular Points – Introduction to Linearization of nonlinear systems, properties of Non Linear Systems –



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Describing function – describing function analysis of nonlinear systems- Stability analysis of Non – Linear systems through describing functions.

UNIT – IV

Non Linear Systems – II: Introduction to phase – plane analysis, Method of Isoclines for Constructing Trajectories, singular points, phase – plane analysis of nonlinear control systems.

UNIT – V

Stability Analysis Stability in the sense of Lyapunov, Lyapunov's stability and Lyapunov's instability theorems – Stability Analysis of the Linear Continuous time invariant systems by Lyapunov second method – Generation of Lyapunov functions – Variable gradient method – Krasooviski's method.

Text Books

- 1. M. Gopal, "Modern Control System Theory", New Age International 1984
- 2. Ogata. K, "Modern Control Engineering", Prentice Hall 1997

Reference Books

- 1. Hassan K. Klalil, "Nonlinear systems", Prentice Hall, 1996
- 2. Richard C. Dorf and Robert H. Bishop, "Modern control systems", 11th Edition, Pearson Edu, India, 2009
- 3. https://www.smartzworld.com/notes/modern-control-theory-pdf-vtu/

Department Vision:

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Department of Electrical & Electronics Engineering (NBA Accredited)

Semester	VI SEM	L	Т	Р	С	Course Code
Regulation	V20	3	-	-	3	V20EET24
Name of the Course	IoT Applications In Electrical Engineering (Professional Elective –II)					
Branches	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C01	Understand various fundamentals, architectures and technologies of Internet of Things.	(K2)
CO2	Discuss about various communication technologies used in the Internet of Things.	(K2)
CO3	Acquire knowledge on the various device connectivity methods using web and internet in the IoT environment.	(K2)
CO4	Explore various data acquisition methods, data handling using cloud for IoT applications.	(K3)
C05	Apply IoT to design Smart Home, Smart cities, and agriculture practices.	(K3)

UNIT-I: The Internet of Things

An Overview of Internet of Things (IoT) – IoT framework –Architecture – Technology behind IoT – Sources of the IoT – M2M Communication – Examples of IoT.

UNIT-II: Design Principles for Connected Devices

Introduction –IoT/M2M systems, Layers and Designs Standardization – Communication Technologies – Data Enrichment, Consolidation and Device Management at Gateway – Ease of designing and affordability.

UNIT-III: Design Principles for the Web Connectivity

Introduction – Web Communication protocols for Connected Devices - Message Communication protocols for Connected Devices – Web Connectivity for connected devices network.

Introduction to Internet Connectivity Principles, Internet connectivity, Internet based communication – IPaddressing in the IoT – Application Layer Protocols: HTTP, HTTPS, FTP, Telnet, WAP (Wireless Application Protocol).

UNIT-IV:



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Department of Electrical & Electronics Engineering (NBA Accredited)

Data Acquiring, Organizing, Processing and Analytics: Introduction – Data Acquiring and Storage –Organizing the Data – Analytics.

Data Collection, Storage and Computing Using a Cloud Platform: Introduction – Cloud computing paradigm for data collection, storage and computing – IoTas a service and Cloud Service Models – IoTcloudbased services using the Xively (Pachube/COSM), Nimbits and other platforms.

UNIT-V: Sensor Technology:

Actuator, Sensor data communication protocols, Radio Frequency Identification technology, Wireless Sensor Network Technology.

IoT application case studies: Smart Home, Smart Cities, Environment monitoring and Agriculture practices.

TEXT BOOKS:

 Internet of Things: Architecture, Design Principles, Raj Kamal, McGraw Hill Education (India) Pvt. Limited, 2017.

REFERENCES BOOKS:

1. Designing the Internet of Things, Adrian McEwen and Hakim Cassimally, Wiley, First

edition, 2013.

- 2. Getting Started with the Internet of Things, CunoPfister, O'reilly, 2011.
- 3. Internet of Things : A Hands-on Approach, Arshdeep Bahga, and Vijay Madisetti, 2014

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Semester	VI SEM	L	Т	Р	С	COURSE CODE
Regulation	V20	-	-	3	1.5	V20EEL09
Name of the Course	Power Systems Lab					
Branches	EEE					

Course Outcomes:

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

CO No.	Course Outcome	Knowledge Level
CO1	Calculate the sequence impedances of 3 - φ Transformer.	K4
CO2	Determine the power Angle Characteristics of $3-\varphi$ Alternator with infinite bus bars.	K4
CO3	Calculate the dielectric strength of Transformer oil.	K4
CO4	Explain load flow studies using G-S & N-R method.	K5
CO5	Assess load frequency control with & without controller and Evaluate economic load dispatch with & without losses.	К5

Any 10 of the Following experiments are to be conducted:

- 1. Sequence impedances of 3 phase Transformer.
- 2. Sequence impedances of 3 phase Alternator by Fault Analysis.
- 3. Sequence impedances of 3 phase Alternator by Direct method.
- 4. ABCD parameters of Transmission line.
- 5. Power Angle Characteristics of 3phase Alternator with infinite bus bars.
- 6. Dielectric strength of Transformer oil.
- 7. Calibration of Tong Tester.
- 8. Load flow studies using Gauss-Seidel method
- 9. Load flow studies using N-R method
- 10. Transient Stability Analysis
- 11. Load frequency control without controller
- 12. Load frequency control with controller
- 13. Economic load dispatch without losses
- 14. Economic load dispatch with losses.



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Semester	VI SEM	L	Т	Р	С	Course Code	
Regulation	V20	-	-	3	1.5	V20EEL10	
Name of the Course	Power Electronics & Simulation Lab						
Branches	EEE						

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C01	Sketch the characteristics of various power electronics devices and analyse the firing circuits.	(K4)
C02	Analyze the performance of $1-\varphi$ and 3 -phase full converter and $1-\varphi$ dual converter for resistive and inductive loads.	(K4)
C03	Experiment the 1- φ AC voltage controller and cyclo-converter with resistive and inductive loads.	(K4)
C04	Operate the DC-DC buck converter and boost converter.	(K3)
CO5	Analyze the performance of the 1- $arphi$ bridge and PWM inverter	(K4)

Any 10 of the Following Experiments are to be conducted

- 1. Study of Characteristics of Thyristor, MOSFET & IGBT.
- 2. Design and development of a firing circuit for Thyristor.
- 3. Single -Phase Half controlled converter with R and RL load
- 4. Single -Phase fully controlled bridge converter with R and RL loads
- 5. Single -Phase AC Voltage Regulator with R and RL Loads
- 6. Single -Phase square wave bridge inverter with R and RL Loads
- 7. Design and verification of voltages gain of Boost converter in Continuous Conduction Mode (CCM).
- 8. Simulation of transient response of RLC circuits a. Response to pulse input b. Response to step input C. Response to sinusoidal input.
- 9. Simulation of single-phase full converter using RLE loads, Experiment of single phase AC voltage controller using RL loads.



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- 10. Simulation of Boost and Buck converters.
- 11. Integrator and Differentiator circuits using op-amp.
- 12. Simulation of single phase inverter with PWM control.
- 13. Simulation of three phase full converter using MOSEFET and IGBTs.

Reference Books:

- 1. Simulation of power electronic circuit by MB patil, V. ramanarayan, V.T. Ranganathan Narosha, 2009.
- 2. Pspice for circuits and electronics using PSPICE-by M.H. Rashid, M/s PHI Publications.
- 3. Pspice A/D user's manual-Microsim, USA.

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Semester	VI SEM	L	Т	Р	C	Course Code	
Regulation	V20	-	-	3	1.5	V20EEL11	
Name of the Course	Microprocessors and Microcontrollers Lab						
Branches	EEE						

Course Outcomes:

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

CO No.	Course Outcome	Knowledge Level
C01	Understand assembly language program using 8086 based on arithmetic, logical, and shift operations.	(K2)
CO2	Connect 8086 with I/O and other devices.	(K3)
CO3	Operate Stepper motor control using microcontroller.	(K3)
C04	Understand the serial and parallel communication using 8051 microcontroller.	(K2)
CO5	Connect PIC18 with a DC motor.	(K3)

Any 10 of the following experiments are to be conducted:

Microprocessor 8086 & Microcontroller 8051 Introduction to MASM/TASM.

- 1. Arithmetic operation Multi byte addition and subtraction, multiplication and division Signed and unsigned arithmetic operation, ASCII Arithmetic operation.
- 2. Logic operations Shift and rotate Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
- 3. By using string operation and Instruction prefix: Move block, Reverse string Sorting,
- 4. Inserting, Deleting, Length of the string, String comparison.
- 5. Interfacing 8255–PPI
- 6. Interfacing 8259 Interrupt Controller.
- 7. Interfacing 8279 Keyboard Display.
- 8. Stepper motor control using 8253/8255.
- 9. Reading and Writing on a parallel port using 8051
- 10. Timer in different modes using 8051
- 11. Serial communication implementation using 8051
- 12. Understanding three memory areas of 00 FF Using 8051 external interrupts.
- 13. Interface PIC 18 with an opto-isolator
- 14. Interface PIC 18 with a DC motor

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Sem	VI Sem	L	Т	Р	С	COURSE CODE	
Regulation	V20	2	0	0	0	V20CEMC01	
Name of the							
Course	INTELLECTUAL PROPERTY RIGHTS & PATENTS						
Branch	Common for all						

Course Outcomes:

Upon successful completion of this course the student will be able to

- Describe the need of Intellectual Property Rights (K2)
- Generalize different issues regarding Copy Rights (K2)
- Employ the procedure for Patent registration and granting (K3)
- Discuss the importance of Trademark and its related issues (K2)
- Recognize the significance of Trade Secrets in Industry (K2)

SYLLABUS

UNIT I

Introduction to Intellectual Property Rights (IPR): Introduction to IPR, Evolutionary Past, Concept of IPR – Purpose of IPR, Types of IPR, WIPO -TRIPS, Nature of IPR, Patents, Trademarks, Copyrights, Neighboring Rights, Agenciesresponsible for IPR - Infringement, Use and Misuse of Intellectual Property Rights.

UNIT II

Copyrights: Introduction to Copyrights – Principles of Copyright Protection – Law Relating to Copyrights - Copyright Ownership – Transfer and Duration – Copyright Registration – Limitations – Infringement of Copyright – Relief and Remedy – Semiconductor Chip Protection Act.

UNIT III

Patents: Introduction to Patents - Laws Relating to Patents in India – Patent Requirements – Product Patent and Process Patent - Patent Registration and Granting of Patent -Exclusive Rights – Limitations - Ownership and Transfer – Revocation of Patent – Patent Appellate Board - Infringement of Patent – Compulsory Licensing – Software Protection and Computer related Innovations.

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UNIT IV

Trademarks: Introduction to Trademarks – Laws Relating to Trademarks – Functions of Trademark – – Trade Mark Registration – Trade Mark Maintenance – Transfer of rights – Deceptive Similarities - Likelihood of Confusion - Dilution of Ownership – Trademarks Claims and Infringement – Remedies – Passing OffAction.

UNIT V

Trade Secrets: Introduction to Trade Secrets – General Principles - Laws Relating to Trade Secrets - Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreements – Breach of Contract –Law of Unfair Competition – Trade Secret Litigation – Applying State Law, Cyber Law and Cyber Crime

Text Books:

- Intellectual Property Rights (Patents & Cyber Law), Dr. A. Srinivas.Oxford University Press, New Delhi.
- PrabhuddhaGanguli: Intellectual Property Rights, Tata Mc-Graw –Hill,New Delhi
- 3. R.Radha Krishnan, S.Balasubramanian: Intellectual Property Rights, Excel Books. New Delhi.

References:

- 1. Deborah E.Bouchoux: Intellectual Property, Cengage Learning, NewDelhi.
- 2. Richard Stim: Intellectual Property, Cengage Learning, New Delhi.
- 3. Kompal Bansal &Parishit Bansal Fundamentals of IPR for Engineers, B. S. Publications (Press).
- 4. Cyber Law Texts & Cases, South-Western's Special Topics Collections.
- 5. M.Ashok Kumar and MohdIqbal Ali: Intellectual Property Rights, SerialsPub.



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Semester	VII SEM	L	Т	Р	С	Course Code
Regulation	V20	3	-	-	3	V20EET25
Name of the Course	Extra High Voltage AC Transmission (Professional Elective –III)					
Branches	EEE					

Course Outcomes:

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

CO No.	Course Outcome	Knowledge Level
C01	Calculate the parameters of EHV line modeling.	(K3)
CO2	Find electric field and interference characteristics of EHVAC system.	(K3)
C03	Understand the corona loss formulation and radio interference to 3- $arphi$ Induction machines.	(K2)
C04	Understand the Lightning phenomenon and methods of Lightning Protection	(K2)
C05	Understand the over-voltage phenomenon and methods to limit over-voltage EHVAC systems.	(K2)

UNIT-I: Introduction to EHV AC Transmission:

Calculations of line and ground parameters: Properties of bundled conductors, inductance and capacitance calculations line parameters for modes of propagation resistance and inductance of ground returns, equivalent circuit of line model.

UNIT-II: Voltage Gradients of Conductors:

Electrostatics, Field of Sphere, Field of Line Charges and their Charge-Potential Relations for Multi-Conductor, Surface Voltage Gradient on Conductors, Examples of Conductors and Maximum Gradients on Actual Lines, Gradient Factors and Their Use, Distribution of Voltage Gradient on Sub-conductors of Bundle.

UNIT-III: Corona and Radio interference:

Corona loss formula factors affecting corona. Audible noise, its characteristics, limits for audio noise, relation between $1-\varphi$ and $3-\varphi$ AN level, radio interference, limits for radio interference fields, CIGRE formula.



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UNIT-IV: Lightning Protection

Lightning Strokes to Lines, Mechanism, General Principles of the Lightning Protection Problem, Tower Footing Resistance, Insulator Flashover and Withstand Voltages, Lightning Arresters, Insulation Coordination Based on Lightning

UNIT-V: Over Voltage in EHV Systems:

Switching surges, causes of switching surge over voltages, recovery voltage, restriking transients, over voltages caused by interruption of low inductance currents, line energization transients, Ferro-resonance over voltages, lightning over voltages, protection against switching surges, VFTO in GIS, insulation coordination, design example

TEXT BOOKS:

- 1. Rakesh Das Begamudre, "Extra High Voltage AC Transmission Engineering", Fourth Edition, New Age International publishers, 2014.
- 2. Allen J Wood & Bruce Wollenberg, "Power Generation Operation & Control, Third Edition, 2016.

REFERENCEBOOKS:

- 1. Turan Gonen, "Electric Power Transmission System Engineering Analysis and Design", CRCPress, Third Edition, 2014
- 2. Md. Abdus Salam, Quazi M. Rahman "Power Systems Grounding" Springer publishers, 2016
- 3. A Chakraborti, D.P. Kothari and A.K. Mukhopadyay: Performance, Operation and Control of EHV Power Transmission Systems, T.M.H. (Pub) 1992.

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Semester	VII SEM	L	Т	Р	C	Course Code
Regulation	V20	3	-	-	3	V20EET26
Name of the Course	Power System Operation and Control (Professional Elective –III)					
Branches	EEE					

Course Outcomes:

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

CO No.	Course Outcome	Knowledge Level
C01	Analyze the optimal scheduling of power generating thermal units.	K4
CO2	Compute optimal hydro and thermal scheduling and predict the optimal unit commitment problem.	КЗ
CO3	Calculate the transfer function of single area and two area load frequency control.	K4
CO4	Evaluate the steady state response of single area load control with PI controller.	К5
C05	Assess the reactive power control and compensation of transmission lines.	К3

UNIT-I:

ECONOMIC OPERATION OF POWER SYSTEMS

Optimal operation of Generators in Thermal power stations, Heat rate curve, Cost Curve, Incremental fuel and Production costs, Input–output characteristics, Optimum generation allocation with line losses neglected, Optimum generation allocation including the effect of transmission line losses, Loss Coefficients, General transmission line loss formula.

UNIT-II:

HYDROTHERMAL SCHEDULING

Optimal scheduling of Hydrothermal System: Hydroelectric power plant models, Scheduling problems, Short term hydrothermal scheduling problem.

UNIT COMMITMENT

Optimal unit commitment problem, Need for unit commitment, Constraints in unit commitment, Cost function formulation, Solution methods, Priority ordering, Dynamic programming.



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UNIT-III:

LOAD FREQUENCY CONTROL-I

Modeling of steam turbine, Generator, Mathematical modeling of speed governing system– Transfer function – Modeling of Hydro turbine –Necessity of keeping frequency constant–Definitions of Control area – Single area control system – Block diagram representation of an isolated power system – Steady state analysis – Dynamic response – Uncontrolled case. Proportional plus Integral control of single area and its block diagram representation – Steady state response.

UNIT-IV:

LOAD FREQUENCY CONTROL-II

Block diagram development of Load Frequency Control of two area system uncontrolled case and controlled case. Tie-line bias control. Load Frequency Control and Economic dispatch control.

UNIT-V:

REACTIVE POWER CONTROL

Overview of Reactive Power control – Reactive Power compensation in transmission systems– Advantages and disadvantages of different types of compensating equipment for transmission systems – Load compensation – Specifications of load compensator – Uncompensated and compensated transmission lines: Shunt and series compensation – Need for FACTS controllers.

TEXT BOOKS:

- 1. Electric Energy systems Theory by O.I.Elgerd, Tata McGraw–hill Publishing Company Ltd., Second edition, 2016
- 2. Power System stability & control, Prabha Kundur, TMH, 2011
- 3. Modern Power System Analysis by I.J.Nagrath & D.P.Kothari Tata Mc Graw Hill Publishing Company Ltd, 2nd editionEnergy management by Paul o' Callaghan, Mc–Graw Hill Bookcompany–1st edition, 1998.

REFERENCE BOOKS:

- 1. Power System Analysis and Design by J.Duncan Glover and M.S.Sarma, THOMPSON, 3rd Edition.
- 2. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill 2003
- 3. Power System Analysis by Hadi Saadat TMH Edition.

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Semester	VII SEM	L	Т	Р	С	Course Code
Regulation	V20	3	-	-	3	V20EET27
Name of the Course	Digital Control Systems (Professional Elective –III)					III)
Branches	EEE					

Course Outcomes:

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

CO No.	Course Outcome	Knowledge Level
C01	Solve difference equations and determine pulse transfer functions.	КЗ
CO2	Analyse a discrete time system using state space model.	КЗ
CO3	Determine the stability of a discrete time system.	K4
CO4	Design a controller for discrete time system using conventional methods.	K4
CO5	Design a controller for discrete time system using state feedback.	K4

UNIT-I: SIGNAL PROCESSING AND Z-TRANSFORMS

Introduction to analog and digital control systems – Advantages of digital systems – Typical examples – Signals and processing – Sample and hold devices – Sampling theorem and data reconstruction – Digital to Analog conversion and Analog to Digital conversion Frequency domain characteristics of zero order hold.

Z-Transform and theorems, finding inverse and method for solving difference equations; Pulse transforms function, block diagram analysis of sampled – data systems.

UNIT-II: STATE SPACE ANALYSIS

State Space Representation of discrete time systems, Pulse Transfer Function Matrix solving discrete time state space equations, State transition matrix and it's Properties, Methods for Computation of State Transition Matrix, Discretization of continuous time state – space equations- Concepts of controllability and observability-Tests (without-proof).

UNIT-III: STABILITY ANALYSIS

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 stability test – Stability Analysis by use of the Bilinear Transformation and Routh Stability criterion.



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UNIT – IV: DESIGN OF DISCRETE TIME CONTROL SYSTEM BY CONVENTIONAL METHODS

Transient and steady – State response Analysis – Design based on the frequency response method –Bilinear Transformation and Design using frequency response in the w–plane for lag and led compensators and digital PID controllers.

UNIT-V: STATE FEEDBACK CONTROLLERS AND OBSERVERS

Design of state feedback controller through pole placement – Necessary and sufficient conditions, Ackerman'sformula.

TEXT BOOKS:

- 1. K. Ogata, "Discrete–Time Control systems", Pearson Education/PHI, 2nd Edition.
- 2. M.Gopal, "Digital Control and State Variable Methods", TMH, 4th Edition.

REFERENCE BOOKS:

1. Kuo, "Digital Control Systems", Oxford University Press, 2nd Edition, 2003.

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Department of Electrical & Electronics Engineering (NBA Accredited)

Semester	VII SEM	L	Т	Р	С	Course Code
Regulation	V20	3	-	-	3	V20EET28
Name of the Course	se Electrical Machine Modeling & Analysis (Professional Elective –III)					sional Elective –III)
Branches	EEE					

Course Outcomes:

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

CO No.	Course Outcome	Knowledge Level
C01	Analyze Kron's primitive Machine.	(K4)
CO2	Develop modeling of dc machine.	(K3)
CO3	Explain Linear transformation and mathematical modeling concepts to 3-phase Induction machines.	(K5)
C04	Develop control strategies based on dynamic modeling of 3-ph Induction machines and 3-phase synchronous machine.	(K3)
C05	Analyze BLDC Machine and switched reluctance machine based on mathematical modeling of BLDCM and SRM.	(K4)

UNIT – I: BASIC CONCEPTS OF MODELING

Basic Two-pole Machine representation of Commutator machines, 3-phase synchronous machine with and without damper bars and 3-phase induction machine, Kron's primitive Machine-voltage, current and Torque equations.

UNIT – II: DC MACHINE MODELING

Mathematical model of separately excited D.C motor – Steady State analysis-Transient State analysis-Sudden application of Inertia Load-Transfer function of Separately excited D.C Motor- Mathematical model of D.C Series motor, Shunt motor.

UNIT- III: REFERENCE FRAME THEORY & MODELING OF THREE PHASE INDUCTION MACHINE

Linear transformation, Power equivalence, generalized model in arbitrary reference frame -Electromagnetic torque-Derivation of commonly used Induction machine models-Stator reference frame model-Rotor reference frame model-Synchronously rotating reference frame model-state space model with flux linkages as variables.

UNIT -IV: MODELING OF SYNCHRONOUS MACHINE

Synchronous machine inductances–voltage equations in the rotor's dq0 reference frame electromagnetic torque-current in terms of flux linkages-three synchronous machine model.

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UNIT -V: MODELING OF SPECIAL MACHINES

Modeling of PM Synchronous motor, modeling of BLDC motor, modeling of Switched Reluctance motor.

TEXT BOOKS:

- 1. Generalized theory of Electrical Machinery–P.S. Bimbra-Khanna Publishers.
- 2. Electric Motor Drives-Modeling, Analysis &control-R. Krishnan-Pearson Publications-1st edition- 2002.

REFERENCEBOOKS:

- 1. Analysis of Electrical Machinery and Drive systems– P.C. Krause, Oleg Wasynczuk, Scott D. Sudh off Second Edition-IEEE Press.
- 2. Dynamic simulation of Electric machinery using Matlab / Simulink–Chee Mun Ong -PHI.
- 3. Modern Power Electronics and AC Drives-B.K.Bose PHI- 2005

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Department of Electrical & Electronics Engineering (NBA Accredited)

Semester	VII SEM	L	Т	Р	С	Course Code
Regulation	V20	3	-	-	3	V20EET29
Name of the Course	High Voltage Engineering (Professional Elective –IV)					e –IV)
Branches	EEE					

Course Outcomes:

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

CO No.	Course Outcome	Knowledge Level		
C01	Understand the performance of high voltages with regard to	K 2		
01	different configurations of electrode systems.	KZ		
C02	Understand the theory of breakdown and withstand phenomena of	ИЭ		
	all types of dielectric materials.	κz		
C02	Explain various methods available for generation and measurement	V2		
0.05	of high DC, AC and Impulse voltages and currents.	KZ		
CO4	Choose suitable method for measuring the dielectric property of a	W2		
L04	material used for HV equipment.	K3		
COL	Illustrate the testing techniques for various equipments used in HV	V 2		
05	engineering.	ĸΖ		

UNIT–I

INTRODUCTION TO HIGH VOLTAGE TECHNOLOGY

Electric Field Stresses – Uniform and non–uniform field configuration of electrodes – Estimation and control of electric Stress – Numerical methods for electric field computation.

UNIT-II

BREAK DOWN PHENOMENON IN GASEOUS, LIQUID AND SOLID INSULATION

Gases as insulating media – Collision process – Ionization process – Townsend's criteria of breakdown in gases – Paschen's law – Liquid as Insulator – Pure and commercial liquids – Breakdown in pure and commercial liquid – Intrinsic breakdown – Electromechanical breakdown – Thermal breakdown –Breakdown of solid dielectrics, composite dielectrics used in practice.

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UNIT-III

GENERATION OF HIGH VOLTAGES AND HIGH CURRENTS

Generation of high DC voltages – Generation of high alternating voltages – Generation of impulse voltages and currents – Tripping and control of impulse generators.

MEASUREMENT OF HIGH VOLTAGES AND HIGH CURRENTS

Measurement of high AC, DC and Impulse voltages – Voltages and measurement of high currents – Direct, alternating and Impulse.

UNIT-IV

NON-DESTRUCTIVE TESTING OF MATERIAL AND ELECTRICAL APPARATUS

Measurement of DC resistivity – Measurement of dielectric constant and loss factor – Partial discharge measurements.

UNIT-V

HIGH VOLTAGE TESTING OF ELECTRICAL APPARATUS

Testing of insulators and bushings – Testing of isolators and circuit breakers – Testing of cables – Testing of transformers – Testing of surge arresters – Radio interference measurements.

Text Books:

- 1. High Voltage Engineering: Fundamentals by E.Kuffel, W.S.Zaengl, J.Kuffel by Elsevier, 2nd Edition, 2000
- 2. High Voltage Engineering and Technology by Ryan, IET Publishers, 2001.

Reference Books:

- 1. High Voltage Engineering by M.S.Naidu and V. Kamaraju TMH Publications, 3rd Edition, 2013
- 2. High Voltage Engineering by C.L.Wadhwa, New Age Internationals (P) Limited, 1997.
- 3. High Voltage Insulation Engineering by RavindraArora, Wolfgang Mosch, New Age International (P)Limited,1995



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Department of Electrical & Electronics Engineering (NBA Accredited)

Semester	VII SEM	L	Т	Р	C	Course Code
Regulation	V20	3	-	-	3	V20EET30
Name of the Course	Electrical Distribution Systems (Professional Elective –IV)					ective –IV)
Branches	EEE					

Course Outcomes:

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

CO No.	Course Outcome	Knowledge Level
C01	Understand various factors of distribution system	K2
CO2	Construct the distribution substation and feeders	КЗ
C03	Calculate the voltage drop and power loss calculations on Distribution System	К3
CO4	Understand the distribution system protection and its coordination.	K2
C05	Understand the effect of compensation for power factor improvement, voltage control on distribution system.	К2

UNIT I: GENERAL CONCEPTS

Introduction to distribution systems, Load modeling and characteristics, Coincidence factor, Contribution factor loss factor, Relationship between the load factor and loss factor, Classification of loads (Residential, commercial, Agricultural and Industrial).

UNIT II: SUBSTATIONS

Location of substations: Rating of distribution substation, Service area with 'n' primary feeders, Benefits and methods of optimal location of substations.

DISTRIBUTION FEEDERS

Design Considerations of distribution feeders: Radial and loop types of primary feeders, Voltage levels, Feeder loading, Basic design practice of the secondary distribution system.

UNIT III: SYSTEM ANALYSIS

Voltage drops and power–loss calculations: Derivation for voltage drop and power loss in lines, uniformly distributed loads and non-uniformly distributed loads, Numerical problems, three phase balanced primary lines.

UNIT IV:



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PROTECTION

Objectives of distribution system protection, Types of common faults and procedure for fault calculations for distribution system, Protective devices: Principle of operation of fuses, Circuit reclosures, Line sectionalizes and circuit breakers.

CO-ORDINATION

Co-ordination of protective devices: General coordination procedure, Various types of coordinated operation of protective devices, Residual Current Circuit Breaker.

UNIT V:

COMPENSATION FOR POWER FACTOR IMPROVEMENT

Capacitive compensation for power factor control, Different types of power capacitors, shunt and series capacitors, Effect of shunt capacitors (Fixed and switched), Power factor correction, Capacitor allocation, Economic justification, Procedure to determine the best capacitor location, Numerical problems.

VOLTAGE CONTROL

Equipment for voltage control, Effect of series capacitors, Effect of AVB/AVR, Line drop compensation

TEXT BOOK:

1. "Electric Power Distribution system, Engineering" – by Turan Gonen, McGrawhill Book Company, 2007.

REFERENCE BOOKS:

- 1. Electrical Distribution Systems by Dale R.Patrick and Stephen W.Fardo, CRC press, 2021
- 2. Electric Power Distribution by A.S. Pabla, Tata McGraw–hill Publishing company, 4th edition, 1997.
- 3. Electrical Power Distribution Systems by V.Kamaraju, Right Publishers, 2017

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Semester	V SEM	L	Т	Р	С	Course Code
Regulation	V18	3	-	-	3	V18EET31
Name of the Course	Power System Reforms (Professional Elective –IV)					IV)
Branches	EEE					

Course Outcomes:

After successful completion of course the student will able to

CO No.	Course Outcome	Knowledge Level
C01	Understand fundamentals of power system deregulation and restructuring.	К2
CO2	Compute Available Transfer Capability (ATC).	K3
CO3	Apply methods to reduce congestion.	КЗ
CO4	Compute electricity pricing in deregulated environment.	КЗ
CO5	Understand importance of ancillary services.	K2

UNIT-I: Basic Issues in Electric Utilities

Introduction – Restructuring models – Independent system operator (ISO) – Power Exchange – Market operations – Market Power – Stranded cost – Transmission Pricing – Congestion Pricing.

UNIT-II: Overview of OASIS

Structure of OASIS – Posting of Information – Transfer capability on OASIS – Definitions of Transfer capability – Transfer Capability Issues – ATC calculations – TTC calculations – TRM calculations – CBM calculations – Methods to calculate ATC.

UNIT-III: Congestion Management

Introduction to congestion management –Effects of congestion – Methods to relieve congestion – Non market methods –Market Based methods –Management of Inter zonal/Intra zonal Congestion

UNIT-IV: Pricing of Electricity

Introduction – Electricity price volatility – Factors effecting volatility – Measuring Volatility – electricity price indexes – Construction of forward price curves – Short–time price forecasting – Factors impacting electricity prices – Forecasting Methods – Analysing forecasting errors – Impact of data pre-processing – Impact of training vectors.



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UNIT-V: Ancillary Services:

Introduction – Types of ancillary services – Reactive power as an ancillary service – Synchronous generators as ancillary service providers.

Text Books

- 1. Mohammad Shahidehpour, and Muwaffaqalomoush, "Restructured electrical Power systems" Marcel Dekker, Inc. 2001
- 2. Kankar Bhattacharya, Math H.J. Boller, JaapE.Daalder, 'Operation of Restructured Power System' Kluver Academic Publisher 2001

Reference Books

- 1. Loi Lei Lai; "Power system Restructuring and Deregulation", Jhon Wiley & Sons Ltd., England, 2001.
- 2. Electrical Power Distribution Case studies from Distribution reform, upgrades and Management (DRUM) Program, by USAID/India, TMH, 2012.

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Semester	VII SEM	L	Т	Р	С	Course Code
Regulation	V20	3	-	-	3	V20EET32
Name of the Course	Advanced Power Electronics (Professional Elective –IV)					tive –IV)
Branches	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C01	Analyze and design power converter configurations for specific applications	(K3)
CO2	Design power electronic converters to improve power quality	(K3)
CO3	Analyze and design resonant converters	(K3)
CO4	Develop power converter models under steady state and small signal conditions	(K3)
C05	Understand the designing of magnetic components for power converters	(K2moder)

UNIT-I: DC-DC CONVERTERS

Non-isolated DC-DC converters: buck, boost, buck-boost, CUK converters under continuous and discontinuous conduction operation - Isolated DC-DC converters: forward, fly-back, push-pull, half-bridge and full-bridge converters - Relationship between I/P and O/P voltages – design of filter inductor and capacitors.

UNIT-II: FRONT-END (AC-DC) CONVERTERS

Conventional methods of power factor improvements: Semi converter, extinction angle control, symmetrical angle control – active front-end converters-Single phase: Boost, voltage doubler and PWM rectifiers –voltage and current controlled three-phase PWM rectifiers

UNIT-III: RESONANT CONVERTERS

Introduction, Basic resonant circuit concepts, Classification - Load resonant converters, resonant switch converters, Zero voltage switching clamped voltage converters,

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Resonant DC link inverters High frequency link integral half cycle converters, Phase modulated resonant converters, Dual active bridge converters, High gain converters.

UNIT-IV: MODELLING OF DC-DC CONVERTERS

Basic ac modeling approach, State space averaging, Circuit averaging and averaged switch modeling, Canonical circuit modeling, Converter transfer functions for buck, boost and buck-boost topologies.

UNIT-V: DESIGN OF POWER CONVERTERS COMPONENTS

Design of magnetic components - design of transformer, design of inductor and current transformer - Selection of filter capacitors, Selection of ratings for devices, input filter design, Thermal design.

TEXT BOOKS:

- 1. Power Electronics-Circuits, Devices & Applications by M.H. Rashid, Pearson, 4thedition, 2013.
- 2. Power Electronics: Converters, Applications & Design by N. Mohan, T.M. Undeland, W.P. Robbins, J.Wiley& Sons, 3rd Edition, 2003.
- 3. Power Electronics by Daniel W. Hart, McGraw-Hill, 2011.

REFERENCES BOOKS:

- 1. Switching Power Supply Design by Abraham I. Pressman, Keith Billings & Taylor Morey, McGraw Hill International, 3rd Edition, 2009.
- 2. Fundamentals of Power Electronics by R.W. Erickson and Dragan Maksimonic, Springer, 2nd Edition, 2001.
- 3. Power Electronics: Essentials and Applications by Umanand. L, John Wiley India, 1st Edition, 2009.

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Semester	VII SEM	L	Т	Р	С	Course Code
Regulation	V20	3	-	-	3	V20EET33
Name of the Course	Special Electrical Machines (Professional Elective –V)					
Branches	EEE					

Course Outcomes:

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge
		Level
CO1	Describe the operation and characteristics of permanent magnet dc	(K2)
01	motor	
CO2	Understand the operation and control of stepper motors	(K2)
CO3	Understand the operation and control of switched reluctance motor	(K2)
CO4	Describe the operation and characteristics of brush less dc Motor	(K2)
CO5	Understand the construction and operation of linear induction motors	(K2)

UNIT I: PERMANENT MAGNET MATERIALS AND PMDC MOTORS

Introduction-classification of permanent magnet materials used in electrical machinesminor hysteresis loop and recoil line-Stator frames of conventional dc machines-Development of electronically commutated dc motor from conventional dc motor-Permanent-magnet materials and characteristics-B-H loop and demagnetization characteristics-Temperature effects: reversible and irreversible losses-high temperature effects-reversible losses Irreversible losses recoverable by magnetization-Mechanical properties, handling and magnetization-Application of permanent magnets in motorspower density-operating temperature range-severity of operation duty.

UNIT II: STEPPER MOTORS

Classification of stepper motors – Hybrid and Variable Reluctance Motor (VRM) -Construction and principle of hybrid type synchronous stepper motor – Different configuration for switching the phase windings control circuits for stepper motors – Open loop and closed loop control of 2-phase hybrid stepping motor. Construction and

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principle of operation of Variable Reluctance Motor (VRM) – Single stack and multiple stack – Open loop control of 3- phase VR Stepper Motor- Applications.

UNIT III: SWITCHED RELUCTANCE MOTORS

Construction – Comparison of conventional and switched reluctance motors – Design of stator and rotor pole arcs – Torque producing principle and torque expression – Different converter configurations for SRM – Drive and power circuits for SRM – Position sensing of rotor – Applications of SRM.

UNIT IV: PERMANENT MAGNET BRUSHLESS DC MOTOR

Types of constructions – Surface mounted and interior type permanent magnet – Principle of operation of BLDC motor. Torque and EMF equations – Torque speed characteristics – Performance and efficiency- Phasor Diagram – Comparison between square wave and sine wave permanent magnet motors - Applications.

UNIT V: LINEAR INDUCTION MOTORS (LIM)

Construction– principle of operation–Double sided LIM from rotating type Induction Motor – Schematic of LIM drive for traction – Development of one sided LIM with back iron equivalent circuit of LIM.

TEXT BOOKS:

- 1. Brushless Permanent Magnet and Reluctance Motor Drives, T.J.E. Miller, 1989, Oxford University press.
- 2. Special Electrical Machines, K. Venkataratnam, University press, 2009, New Delhi.

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Semester	VII SEM	L	Т	Р	C	Course Code
Regulation	V20	3	-	-	3	V20EET34
Nama of the Course	AI Techniques for Power Systems					
(Professional Elective –V)						
Branches	EEE					

Course Outcomes:

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

CO No.	Course Outcome	Knowledge Level
C01	Understand fundamentals concepts of artificial neural networks.	К2
CO2	Understand concepts of different algorithms ANN paradigms.	K2
CO3	Understand fundamentals of fuzzy set properties and membership functions, concept of evolutionary techniques	К2
CO4	Understand fundamentals of optimization techniques.	K2
CO5	Apply optimization techniques to power system applications.	K4

UNIT-I: ARTIFICIAL INTELLIGENCE

Artificial Neural Networks (ANN) – definition and fundamental concepts – Biological neural networks – Artificial neuron – typical architectures – biases and thresholds – learning/training laws and algorithms.

UNIT-II: ANN PARADIGMS

ADALINE – feed forward networks – Back Propagation algorithm-Radial Basis Function (RBF) network- Hopfield Neural Network.

UNIT- III: CLASSICAL AND FUZZY SETS

Introduction to classical sets- properties, Operations and relations; Fuzzy sets, Membership, Operations, Properties, Fuzzy relations, Membership functions.

EVOLUTIONARY TECHNIQUES

Introduction-concepts of genetic algorithms: Initialization-Selection-Genetic operators, Mutation- Evolutionary programming-Evolutionary techniques.

UNIT- IV: FUNDMENTALS OF OPTIMIZATION

Classification of optimization problems-Unconstrained and Constrained optimization-Particle swarm optimization.

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UNIT- V: APPLICATIONS OF AI

PSO based Economic load dispatch without losses, Load flow, and Load frequency control: Single area system using ANN.

TEXT BOOKS:

- 1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by Rajasekharan and pai PHI Publication, 2011.
- 2. Fuzzy logic with Fuzzy Applications T.J Ross Mc Graw Hill Inc, 1997.
- 3. NP Padhy, Artificial Intelligence and Intelligent Systems, Oxford University Press, 1st Edition, 2005.

REFERENCE BOOKS:

- 1. Goldberg D.E. "Genetic Algorithms in Search Optimization & Machine Learning", 13th Edition Addition Wesley Co., New York 1996.
- **2.** D.P.Kothari and J.S.Dhillon, "Power System Optimization", 2ndEdition, PHI learning private limited, 2010
- 3. <u>https://nptel.ac.in/content/storage2/courses/109101003/downloads/Lecture-notes/Lecture-19-20-21.pdf</u>

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Semester	VII SEM	L	Т	Р	C	Course Code
Regulation	V20	3	-	-	3	V20EET35
Name of the Course	Energy Storage and Battery Management (Professional Elective – V)					
Branches	EEE					

Course Outcomes:

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

CO No.	Course Outcome	Knowledge Level
C01	Use suitable energy storage system in real time applications.	К3
C02	Understand the role of electrical energy storage technologies in various aspects.	К2
CO3	Interpret the role of battery management system.	К3
C04	Illustrate the requirements of Battery Management System.	К3
C05	Understand the concepts of battery state of charge and state of health estimations.	К2

UNIT-I: INTRODUCTION TO ENERGY STORAGE

Necessity of energy storage system; classification of electrical energy storage (EES) systems; **mechanical**: pumped hydro storage (PHS), compressed air energy storage (CAES), flywheel energy storage (FES); **chemical**: hydrogen (H₂), synthetic natural gas (SNG); **electrical**: capacitor, super capacitor; **electrochemical**: secondary batteries, flow batteries; **electromagnetic**: superconducting magnetic energy storage (SMES); **thermal**: sensible heat, latent heat, cryogenic liquid air energy storage system, Carnot battery.

UNIT-II: NEEDSFOR ELECTRICAL ENERGY STORAGE

Emerging needs for EES, More renewable energy, less fossil fuel, Smart Grid uses, the roles of electrical energy storage technologies, the roles from the viewpoint of a utility, the roles from the viewpoint of consumers, the roles from the viewpoint of generators of renewable energy.

UNIT- III: INTRODUCTION TO BATTERY MANAGEMENT SYSTEM

Introduction to Battery Management System, Cells & Batteries, Nominal voltage and capacity, C rate, Energy and power, Cells connected in series, Cells connected in parallel, Electrochemical and lithium-ion cells, Rechargeable cell, Charging and Discharging Process, Overcharge and Undercharge, Modes of Charging.

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UNIT- IV: BATTERY MANAGEMENT SYSTEM REQUIREMENT

Introduction and BMS functionality, Battery pack topology, BMS Functionality, Voltage Sensing, Temperature Sensing, Current Sensing, BMS Functionality, High-voltage contactor control, Isolation sensing, Thermal control, Protection, Communication Interface, Range estimation, State-of charge estimation, Cell total energy and cell total power.

UNIT- V: BATTERY STATE OF CHARGE AND STATE OF HEALTH ESTIMATION, CELL BALANCING

Battery state of charge estimation (SOC), voltage-based methods to estimate SOC, Modelbased state estimation, Battery Health Estimation, Lithium-ion aging: Negative electrode, Lithium ion aging: Positive electrode, Cell Balancing, Causes of imbalance, Circuits for balancing

TEXT BOOKS:

- 1. "James M. Eyer, Joseph J. Iannucci and Garth P. Corey ", "Energy Storage Benefits and Market Analysis", Sandia National Laboratories, 1st edition, 2004.
- 2. The Electrical Energy Storage by IEC Market Strategy Board.

REFERENCE BOOK:

- 1. "Jim Eyer, Garth Corey", Energy Storage for the Electricity Grid: Benefits and Market Potential Assessment Guide, Report, Sandia National Laboratories, Feb 2010.
- 2. Plett, Gregory L. Battery management systems, Volume I: Battery modeling. Artech House, 1st edition, 2015.
- 3. Plett, Gregory L. Battery management systems, Volume II: Equivalent-circuit methods. Artech House, 1st edition, 2015.
- 4. Bergveld, H.J., Kruijt, W.S., Notten, P.H.L "Battery Management Systems -Design by Modelling" Philips Research Book Series 2002.
- 5. https://nptel.ac.in/content/storage2/courses/108103009/download/M9.pdf.

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Semester	VII SEM	L	Т	P	C	Course Code	
Regulation	V20	3	-	-	3	V20EET36	
Nome of the Course	Hybrid Electric Vehicles						
Name of the Course	(Professional Elective – V)						
Branches	EEE						

Course Outcomes:

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

CO No.	Course Outcome	Knowledge Level	
CO1	Differentiate between Electric vehicles and Hybrid	к2	
LUI	Electric Vehicles	KZ	
CO2	Discriminate between various Drive-Train Topologies	K2	
CO3	Identify different motors used for hybrid electric vehicles.	K2	
CO4	Explain the Sizing of Drive Train	K2	
COL	Illustrate different batteries and other energy storage	K3	
CO5	systems.	K3	

UNIT-I: Introduction

Fundamentals of vehicles, components of conventional vehicle and propulsion load; Drive cycles and drive terrain; Concept of electric vehicle and hybrid electric vehicle; History of hybrid vehicles, advantages and applications of Electric and Hybrid Electric Vehicles, principle of magnetic levitation, different Motors suitable for of Electric and Hybrid Electric Vehicles.

UNIT-II: Hybridization of Automobile

Architectures of HEVs, series and parallel HEVs, complex HEVs. Plug-in hybrid vehicle, constituents of PHEV, comparison of HEV and PHEV; Fuel Cell vehicles and its constituents.

UNIT-III: Plug-in Hybrid Electric Vehicle

PHEVs and EREVs blended PHEVs, PHEV Architectures, equivalent electric range of blended PHEVs; Fuel economy of PHEVs, power management of PHEVs, end-of-life battery for electric power grid support, vehicle to grid technology, PHEV battery charging.

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UNIT-IV: Power Converters in HEVs

Rectifiers used in HEVs, voltage ripples; Buck converter used in HEVs, non-isolated bidirectional DC-DC converter, voltage source inverter, current source inverter, isolated bidirectional DC-DC converter, PWM rectifier in HEVs, EV and PHEV battery chargers.

UNIT- V: Battery and Storage Systems

Energy Storage Parameters; Lead–Acid Batteries; Lithium-ion batteries-Ultra capacitors; Flywheels - Superconducting Magnetic Storage System; Pumped Hydroelectric Energy Storage; Compressed Air Energy Storage - Storage Heat; Energy Storage as an Economic Resource.

TEXT BOOKS:

- 1. Ali Emadi, Advanced Electric Drive Vehicles, CRC Press, 1st edition, 2014.
- 2. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 1st edition, 2003.

REFERENCE BOOKS:

- 1. Mehrdad Ehsani, Yimin Gao, Ali Emadi, "Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: fundamentals, theory, and design, 2nd edition, 2009.
- 2. Sandeep Dhameja, "Electric Vehicle Battery Systems", Newnes, 1st edition, 2001.
- 3. http://nptel.ac.in/courses/108103009/

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Semester	VII	L	Т	Р	С	Course Code
Regulation	V20	0	0	6	3	V20EEL12
Name of the Course	Advanced Electrical Simulation Lab					
Branches	EEE					

Course Outcomes:

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

CO No.	Course Outcome	Knowledge Level
C01	Construct the Electrical circuits using MultiSim & LT Spice.	K2
CO2	Analyze the LTI systems & State space model using MATLAB.	K4
CO3	Construct the Inverters, Series RLC circuits, Op-amp circuits using Or CAD.	К2
CO4	Design the power electronic converters using PLECS.	K4
CO5	Operate Electrical Drives using different controllers.	K3

Any 20 of the following experiments are to be conducted: MultiSim & LT Spice:

- 1. Verification of KVL and KCL.
- 2. Verification of Thevenin's and Norton's Theorems.
- 3. Verification of Superposition and Reciprocity Theorem.
- 4. Verification of Compensation and Millmann's Theorems.
- 5. Verification of Maximum Power Transfer Theorem.

MATLAB:

- 6. Stability analysis (Bode) of Linear Time Invariant system.
- 7. Stability analysis (Root Locus) of Linear Time Invariant System.
- 8. Stability analysis (Nyquist) of Linear Time Invariant system.
- 9. State space model for classical transfer function.
- 10. Simulation of DC separately excited motor using transfer function.
- 11. Speed control of BLDC based electric drive using MATLAB/Simulink.

ORCAD:

- 12. Transient Analysis of Series RLC circuits.
- 13. Simulate an Op-amp based Integrator and Differentiator circuits.
- 14. Modelling of transformer and Lossy Transmission Line.
- 15. Analysis of Single Phase inverter with PWM control.

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16. Analysis of Three Phase inverter with PWM control.

PLECS:

17. Analysis of RC circuits.

- 18. Design the small signal transfer functions for a buck converter.
- 19. Simulation of diode-clamped inverter.
- 20. Calculation of losses for a unipolar PWM inverter.
- 21. Design of PID controller for converter.

Hardware Implementation:

- 22. Operation of Buck converter using Aurdino.
- 23. Operation of Single-Phase H-Bridge Inverter using FPGA and Xilinx.

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VII SEMESTER	Regulation V20	L 3	Т 0	P 0	С 3

UNIVERSAL HUMAN VALUES-2: UNDERSTANDING HARMONY

Course objective: To develop a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence, to understand (or developing clarity) of the harmony in the human being, family, society and nature/existence, to strengthen self-reflection and to develop the commitment and courage to act.

UNIT-1:

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

- 1) Purpose and motivation for the course, recapitulation from Universal Human Values-I
- 2) Self-Exploration–what is it? Its content and process; 'Natural Acceptance' and ExperientialValidation- as the process for self-exploration
- 3) Continuous Happiness and Prosperity- A look at basic Human Aspirations
- 4) Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority
- 5) Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario

Method to fulfill the above human aspirations: understanding and living in harmony at various levels. Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking.

UNIT- 2:

Understanding Harmony in the Human Being - Harmony in Myself!

- 1) Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
- 2) Understanding the needs of Self ('I') and 'Body' happiness and physical facility
- 3) Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
- 4) Understanding the characteristics and activities of 'I' and harmony in 'I'
- 5) Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
- 6) Programs to ensure Sanyam and Health. 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.



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UNIT-3:

Understanding Harmony in the Family and Society- Harmony in Human Relationship

- 1) Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfillment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
- 2) Understanding the meaning of Trust; Difference between intention and competence
- 3) Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
- 4) Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
- 5) Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family. 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 - Whole existence as Coexistence

- 1) Understanding the harmony in the Nature
- 2) Interconnectedness and mutual fulfilment among the four orders of nature recyclability and selfregulation in nature
- 3) Understanding Existence as Co-existence of mutually interacting units in allpervasive space
- 4) Holistic perception of harmony at all levels of existence. 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 etc.

UNIT-5:

Implications of the above Holistic Understanding of Harmony on Professional Ethics

- 1) Natural acceptance of human values
- 2) Definitiveness of Ethical Human Conduct
- 3) Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
- 4) Competence in professional ethics: a. Ability to utilize the professional competence for augmentinguniversal 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.

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- 5) Case studies of typical holistic technologies, management models and production systems
- 6) 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
- 7) 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.

TEXT BOOKS:

1) Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

REFERENCE BOOKS:

- 1) Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
- 2) Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
- 3) The Story of Stuff (Book).
- 4) The Story of My Experiments with Truth by Mohandas Karamchand Gandhi
- 5) Small is Beautiful E. F Schumacher.
- 6) Slow is Beautiful Cecile Andrews.
- 7) Economy of Permanence J C Kumarappa.
- 8) Bharat Mein Angreji Raj PanditSunderlal.
- 9) Rediscovering India by Dharampal.
- 10) Hind Swaraj or Indian Home Rule by Mohandas K. Gandhi.
- 11) India Wins Freedom Maulana Abdul Kalam Azad.
- 12) Vivekananda Romain Rolland (English).
- 13) Gandhi Romain Rolland (English).

Course outcome: Students will be able to discuss a holistic perspective based on selfexploration about themselves (human being), family, society and nature/existence, to explain (or developing clarity) of the harmony in the human being, family, society and nature/existence, to strengthen self-reflection and to judge the commitment and courage to act.

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Open Elective Courses(V20 Regulation)

List of Open Elective Courses Courses offfered to Other Branch

<u>Students</u>

S. No	Course Code	Name of the Course	Department Offered
1	V20ECTOE1	Internet of Things	
2	V20ECTOE2	Communication Systems	
3	V20ECTOE3	Principles of Image Processing	Floctropics &
4	V20ECTOE4	Medical Electronics	Communication
5	V20ECTOE5	Principles of Wireless Comm.	Engineering
6	V20ECTOE6	Basics of VLSI Design	
7	V20ECTOE7	Concepts of Embedded Systems	



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Semester	V/VI/VII	L	Т	Р	C	Course Code	
Regulation	V20	2	0	2	3	V20ECTOE1	
Name of the Course	Internet of Things (Open Elective)						
Branch	Except ECE						

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Describe M2M and IOT Technologies. **(K2) CO-2:** Identify the layers and protocols in IOT. **(K2)**

CO-3: Describe various communication technologies used in IOT. **(K2)**

CO-4: Demonstrate various hardware components required for IOT applications.

(K2)

CO-5: Identify the cloud technologies & explain the applications of IoT. (K2)

UNIT I – INTRODUCTION

Introduction from M2M to IoT - An Architectural Overview, building architecture, Main design principles and needed capabilities, An IoT architecture outline, M2M and IoT Technology Fundamentals - Devices and gateways

UNIT II – IOT PROTOCOLS

Functionality of Layers in IoT –Study of protocols - Wireless HART, Z-Wave, 6LoWPAN, RPL, CoAP, MQTT.

UNIT III - COMMUNICATION TECHNOLOGIES IN IOT

IoT Connectivity – IEEE 802.15.4, Wi-Fi, Bluetooth, Zigbee, LPWAN, 5G Era.

UNIT IV - SYSTEM HARDWARE

Sensors, Actuators, Radio Frequency Identification, Introduction to EmbeddedDevices for IoT - RASPBERRY PI.



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UNIT V – Cloud Computing & Case Studies

Data Collection, Storage and Computing Using a Cloud Platform for IoT Applications/Services. Real-time applications of IoT - Smart and Connected Cities, Agriculture.

TEXTBOOKS:

- 1. "From Machine-to-Machine to the Internet of Things: Introduction to a New Age ofIntelligence" Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle , 1st Edition, Academic Press, 2014.
- 2. IOT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, Cisco Press 800 East 96th Street Indianapolis, USA.
- 3. "Internet of Things (A Hands-on- Approach)", Vijay Madisetti and ArshdeepBahga, 1st Edition, VPT, 2014.

REFERENCE BOOKS:

- 1. From Internet of Things to Smart Cities: Enabling Technologies edited byHongjian Sun, Chao Wang, Bashar I. Ahmad, CRC Press -2018.
- 2. "Architecting the Internet of Things", Bernd Scholz-Reiter, Florian Michahelles, ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer.
- 3. IOT (Internet of Things) Programming: A Simple and Fast Way of Learning IOT, David Etter.



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Semester	V/VI/VII	L	Т	Р	С	Course Code	
Regulation	V20	2	0	2	3	V20ECTOE2	
Name of the Course	Communication Systems (Open Elective)						
Branch	Except ECE						

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Demonstrate the fundamentals of communication systems **(K2)**

CO-2: Compare the various analog modulation and demodulation schemes **(K2) CO-3:** Compare the various digital modulation and demodulation schemes **(K2)CO-4:** Explain the wireless communication system concepts **(K2)**

CO-5: Outline the satellite & Optical communication system principles **(K2)**

Unit-I

Fundamentals of Communication systems: Block diagram of communication system; types of communications-analog and digital; Noise–types of noise, sources of noise, and noise figure.

Unit-II

Fundamentals of Analog Communication: Need for modulation; Types of analog modulation techniques (AM, FM & PM). Sampling theorem, Nyquist criteria, introduction to PAM, PWM and PPM.

Unit-III

Fundamentals of Digital Communication: Advantages; Working principle of PCM; introduction to digital modulation techniques-ASK, FSK, &PSK.

UNIT-IV:

Fundamentals of Wireless Communication: Evolution of mobile communications, Mobile Radio System around the world, Comparison of Common wireless system, Concepts of 1G, 2G, 3G, 4G., Introduction to 5G.



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Unit-V

Fundamentals of Satellite & Optical communication: Brief history of Satellite systems; Principles, architecture. Fundamentals of Optical Communication: Evolution of fiber optic system, Elements of an Optical Fiber Transmission link and Reception link.

Textbooks:

- 1. Principles of Communications by H. Taub and D. Schilling, TMH, 2003.
- 2. Wireless Networks: Applications and Protocols by T. S. Rappaport, PearsonEducation
- 3. Satellite Communications by Timothy Pratt, Charles Bostian and Jeremy Allnutt,WSE, Wiley Publications, 2nd Edition, 2003.
- 4. Optical Fiber Communication by Gerd Kaiser (TMH)

References:

1. Electronic Communication Systems by Kennedy and Davis, TMH, 4th edition,2004.

2. Wireless Communication and Networks: 3G and Beyond by I. SahaMisra, TMHEducation.

3. Satellite Communications: Design Principles by M. Richharia, B S publications, 2nd

Edition, 2003.



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Department of Electrical & Electronics Engineering (NBA Accredited)

Semester	V/VI/VII	L	Т	Р	С	Course Code	
Regulation	V20	2	0	2	3	V20ECTOE3	
Name of the Course	Principles of Image Processing (Open Elective)						
Branch	Except ECE						

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student willbe able to:

CO1. Understand the different Transforms Techniques & their use in Image Processing Applications. **(K2)**

CO2. Describe Spatial and frequency domain filtering like smoothing and sharpening operations on Images. **(K2)**

CO3. Describe Restoration operations/techniques on Images. **(K2)**

CO4. Describe the Image compression Techniques and Image segmentation.

(K2)CO5. Explain the different color Image Processing Techniques. (K2)

UNIT-1 Introduction

Introduction: Introduction to Image Processing, Fundamental steps in digital image processing, components of an image processing system, some basic relationships between pixels, an introduction to the mathematical tools used in digital image processing.

Image Transforms: Discrete Fourier transform (DFT) and Discrete Cosine transform.

UNIT-2 Image Enhancement Techniques

Intensity Transformations and Spatial Filtering: Some basic intensity transformation functions, histogram processing, fundamentals of spatial filtering, smoothing spatial filters and sharpening spatial filters.

Filtering in the Frequency Domain:image smoothing using frequency domain filters, Image Sharpening using frequency domain filters.

UNIT-3 Image Restoration

Image Restoration : A model of the image degradation / Restoration process, Noise models, restoration in the presence of noise only-Spatial Filtering.



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Estimating the image degradation function, Inverse filtering, Minimum mean square error (Wiener) filtering.

UNIT-4 Image compression and Segmentation

Image compression: Fundamentals, Basic compression methods: Huffman coding, Arithmetic coding, LZW coding **a**nd subband coding.

Image segmentation: Fundamentals, point, line, edge detection, thresholding, based segmentation and simple morphological operations Erosion and

dilation, opening and closing.

UNIT-5 Color image processing

Color image processing: color fundamentals, color models, pseudo color image processing, basics of full color image processing, color transformations, smoothing and sharpening.

Text Books

- 1. R. C. Gonzalez and R. E. Woods, Digital Image Processing, 3rd edition, PrenticeHall, 2008.
- 2. Jayaraman, S. Esakkirajan, and T. Veerakumar," Digital Image Processing", Tata McGraw Hill Education, 2011.

Reference Books

 Anil K.Jain, "Fundamentals of Digital Image Processing", PrenticeHall of India, 9th Edition, Indian Reprint, 2002.

B.Chanda, D.Dutta Majumder, "Digital Image Processing and

Analysis", PHI, 2009.



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Semester	V/VI/VII	L	Т	Р	С	Course Code	
Regulation	V20	2	0	2	3	V20ECTOE4	
Name of the Course	Medical Electronics (Open Elective)						
Branch	Except ECE						

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Explain the basics concepts of Bio-Medical Instrumentation. **(K2) CO2:** Explain the concepts of electrode theory, classification of Electrodes and Transducers used in Bio-Medical Applications. **(K2)**

CO3: Explain the Anatomy and Physiology of Cardiovascular system and Illustrate the application of Bio-Medical Instruments to measure the Physiological parameters of Cardiovascular System **(K2)**

CO4: Discuss the elements used for Patient's Health care &monitoring. **(K2) CO5:** Classify different types of monitors, discuss the principals of recorders and

Illustrate the methods of accident preventions (K2)

UNIT-I:

INTRODUCTION TO BIOMEDICAL INSTRUMENTATION: Age of Biomedical Engineer ing, Development of Biomedical Instrumentation, Man Instrumentation System, Components of the Man-Instrument System, Physiological System of the Body, Problems Encountered in Measuring a Living System, Sources of Bioelectric Potentials, Muscle, Bioelectric Potentials, Sources of Bioelectric Potentials, Restingand Action Potentials, Bioelectric Potentials-ECG, EEG and EMG,

UNIT-II:

ELECTRODES AND TRANSDUCERS: Introduction, Electrode Theory, Bio potential Electrodes, Examples of Electrodes, Basic Transducer Principles, Active Transducers, Passive Transducers, Transducers for Biomedical Applications, Pulse Sensors, Respiration Sensor, Transducers with Digital Output.



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UNIT-III:

CARDIOVASCULAR SYSTEM AND MEASUREMENTS: The Heart and Cardiovascular System, Electrocardiography, Blood Pressure Measurement, Measurement of Blood Flow and Cardiac Output, Measurement of Heart Sounds, Plethysmography.

UNIT-IV:

PATIENT CARE ANDMONITORING: Elements of Intensive- Care Monitoring, Patient Monitoring Displays, Diagnosis, Calibration and Repair ability of Patient-Monitoring Equipment, Other Instrumentation for Monitoring Patients, Organization of the Hospital for Patient-Care Monitoring, Pacemakers, Defibrillators.

UNIT-V:

DIAGNOSTIC TECHNIQUES AND BIO-TELEMETRY: Principles of Ultrasonic Measurement, Ultrasonic Imaging, Ultrasonic Applications of Therapeutic Uses, Ultrasonic Diagnosis, X-Rayand Radio-Isotope Instrumentations, CAT Scan, Emission Computerized Tomography, MRI, Introduction to Biotelemetry, Physiological Parameters Adaptable to Biotelemetry, The Components of Biotelemetry System, Implantable Units, Telemetry for ECG Measurements during Exercise, Telemetry for Emergency Patient Monitoring

Text Books:

- 1. Bio-Medical Electronics and Instrumentation, OnkarN.Pandey, RakeshKumar, KatsonBooks.
- 2. Bio-Medical Instrumentation, Cromewell, Wiebell, Pfeiffer

References:

- 1. "Hand Book of Bio-Medical Instrumentation", Khandapur. McGrawHill
- 2. "Introduction to Bio- Medical Equipment Technology", 4thEdition, Joseph J.Carr, John M.Brown, Pearson Publications.



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Semester	V/VI/VII	L	Т	Р	С	Course Code
Regulation	V20	2	0	2	3	V20ECTOE5
Name of the Course	Principles of Wireless Communication (Open Elective)					
Branch	ECE					

<u>Syllabus Details</u>

Course Outcomes: After Successful completion of the Course, the student willbe able to:

CO1: Discuss the cellular system evolution of mobile radio

systems **[K2]CO2:** Illustrate the basic cellular concepts.

[K2]

CO3: Explain the Various Propagation models. [K2]

CO4: Discuss the need of modulation, diversity and equalization in cellular & MobileCommunication. **[K2]**

CO5: Demonstrate the knowledge about GSM architecture, &upcoming technologieslike 3G, 4G etc. **[K2]**

UNIT-I: Introduction of Wireless Communication History and evolution of mobile radio systems: Types of mobile wireless services/systems, WLL, Paging, Satellite systems.

UNIT-II: Cellular Concepts and System Design Fundamentals: Cellular concept and frequency reuse, channel assignment, handoff strategies, cell splitting, cell sectoring.

UNIT-III: Mobile radio Propagation Models: Radio wave propagation issues in personal wireless systems, Propagation models, Multipath fading.

UNIT-IV: Overview analog and digital modulation techniques Need For Modulation.

UNIT-V: Digital cellular networks: GSM architecture, GSM Services, multiple accessschemes; FDMA, TDMA, CDMA, OFDMA; Higher Generation Cellular Standards: 3G System architecture (UMTS), 4G SystemArchitecture, Introduction to 5G.



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Text Books

- 1. Theodore S. Rappaport, —wireless communications Principles and Practices||, PHI, 2005
- 2. Jochen Schiller, —Mobile Communications||, Pearson Education, second edition,2009.

Reference Book

- 1. Lee W.C.Y, –Mobile communication Engineering
- 2. Theory and Applications ||, 2/e McGraw-Hill, New York, 2003
- 3. Andreas F. Molisch, —Wideband Wireless Digital Communication ||, PearsonEducation 2001.


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Department of Electrical & Electronics Engineering (NBA Accredited)

Semester	V/VI/VII	L	Т	Р	С	Course Code	
Regulation	V20	2	0	2	3	V20ECTOE6	
Name of the Course	Basic of VLSI Design (Open Elective)						
Branch	ECE						

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student willbe able to:

CO1. Identify the CMOS layout levels, and the design layers used in the processsequence. **(K2)**

CO2. Describe the general steps required for processing of CMOS integrated circuits. **(K2)**

CO3. Outline static CMOS combinational and sequential logic at the transistorlevel. **(K1)**

CO4. Demonstrate different logic styles such as complementary CMOS logic, pass-Transistor Logic, dynamic logic, etc. **(K3)**

CO5. Interpret the need for testability and testing methods in VLSI. **(K3)**

UNIT-I:

Moore's law, speed power performance, n-MOS fabrication, CMOS fabrication: n-

well, well processes, Bi-CMOS, Comparison of bipolar and CMOS. Basic Electrical Properties of MOS And Bi-CMOS Circuits: Drain to source current versus voltage characteristics, threshold voltage, trans conductance.

<u>UNIT-II:</u>

Basic Electrical Properties of MOS And Bi-CMOS Circuits: n-MOS inverter, Determination of pull up to pull down ratio: n-MOS inverter driven through one or more pass transistors, alternative forms of pull up, CMOS inverter, Bi-CMOS inverters, latch up.

Basic Circuit Concepts: Sheet resistance, area capacitance calculation, Delay unit, inverter delay, estimation of CMOS inverter delay, super buffers, Bi-CMOS drivers.

<u>UNIT-III:</u>

MOS and Bi-CMOS Circuit Design Processes: MOS layers, stick diagrams, n-MOS design style, CMOS design style Design rules and layout & Scaling of



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MOS Circuits: λ - based design rules, scaling factors for device parameters

UNIT-IV:

Subsystem Design and Layout-1: Switch logic pass transistor, Gate logic inverter, NAND gates, NOR gates, pseudo n-MOS, Dynamic CMOS Examples of structured design: Parity generator, Bus arbitration, multiplexers, logic function block, code converter. UNIT-V:

Subsystem Design and Layout-2: Clocked sequential circuits, dynamic shiftregisters, bus lines, General considerations, 4-bit arithmetic processes, 4-bit shifter, Regularity- Definition & Computation Practical aspects and testability: Some thoughts of performance, optimization and CAD tools for design and simulation.

<u>Text Books:</u>

1. "Basic VLSI Design", Douglas A Pucknell, Kamran Eshraghian, 3rd Edition, Prentice Hall of India publication, 2005.

- "CMOS Digital Integrated Circuits, Analysis And Design", Sung Mo (Steve)Kang,Yusuf Leblebici, Tata McGraw Hill, 3rd Edition, 2003.
- 2. "VLSI Technology", S.M. Sze, 2nd edition, Tata McGraw Hill, 2003.

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Semester	V/VI/VII	L	Т	Р	С	Course Code	
Regulation	V20	2	0	2	3	V20ECTOE7	
Name of the Course	Concepts of Embedded Systems (Open Elective)						
Branch	ECE						

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Describe the Basic Concepts of embedded systems- **(K2)**.

CO-2: Describe the characteristics of Application & Domain-Specific Embedded Systems - **(K2)**

CO-3: Explain the various elements of embedded hardware and their design principles- **(K2)**

CO-4: Explain various software design approaches in embedded environment-**(K2)**

CO-5: Discuss various tools used for Embedded system implementation andtesting - **(K2)**

UNIT I - INTRODUCTION TO EMBEDDED SYSTEMS:

Introduction to Embedded Systems, Classification of Embedded systems, Major application areas of embedded systems, Purpose of embedded Systems, The Typical embedded system - core of the embedded system, Difference between RISC and CISC, Types of Memories.

UNIT II - CHARACTERISTICS OF EMBEDDED SYSTEM:

Characteristics of an embedded system, Quality attributes of embedded systems, Application-specific and Domain-Specific examples of an embedded system.

UNIT III - EMBEDDED HARDWARE DESIGN:

Analog Electronic Components, Digital electronic components, I/O types and examples, Serial communication devices (I2C, SPI, USB), GPRS, Watchdog timer, Real time Clock, Sensors and Actuators.





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UNIT IV - EMBEDDED FIRMWARE DESIGN:

Embedded Firmware design approaches, Embedded Firmware development languages: Assembly level and High-level Programming Language, Advantages andDrawbacks of development languages, Concepts of C versus Embedded C and Compiler versusCross-compiler.

UNIT V - EMBEDDED SYSTEM IMPLEMENTATION AND TESTING:

The main software utility tools - IDE and CAD, Translation tools - Preprocessors, Interpreters, Compilers and Linkers, Debugging tools, Quality assurance and testing of the design, Testing on host machine.

Text Books:

- 1. Embedded Systems Architecture- By Tammy Noergaard, ElsevierPublications,2013
- 2. Embedded Systems-By Shibu.K.V-Tata McGraw Hill Education PrivateLimited,2013.

- 1. Embedded Systems: Architecture, Programming and Design by Raj Kamal, Tata McGraw-Hill Education, 2011.
- 2. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley Publications,2013. Embedded/Real Time Systems by KVKK Prasad by Dreamtech Publication



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Semester	V /VI/VII	L	Т	Р	С	Course Code			
Regulation	V20	3	0	0	3	V20MEOE1			
Name of the Course	Basic Mechanical Engineering Open Elective								
Branch	Mechanical Engineering								

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
C01	Discuss different types of materials, their properties and testing with applications.	К2
CO2	Interpret concepts of thermodynamics, Refrigeration, air conditioning and working of IC engines and air conditioners.	К2
CO3	Illustrate different manufacturing, joining, machining processes and machines with applications.	K2
CO4	Explain concepts of force, power transmission and power plants.	K2
CO5	Discuss the classification and working of pumps, turbines and gas turbines.	K2

UNIT – I

ENGINEERING MATERIALS AND PROCESSES:

ENGINEERING MATERIALS: Ferrous metals (Mild steel, Cast iron and its types, Stainless steel, High carbon steel), Nonferrous metals and alloys (Copper, Zinc, Aluminium, Tin, Nickel and their alloys).

Properties- Strength, Hardness, Toughness, Brittleness, Creep, Fatigue, Stiffness, Ductility, Malleability, Elasticity, Plasticity, Specific gravity, Viscosity, Thermal conductivity, Specific heat, Corrosion resistance.

UNIT – II

THERMAL SCIENCE:

THERMODYNAMICS: System, Surroundings, Thermodynamic equilibrium, Property, State, Path, Process, Cyclic process, Work, Heat, Energy, Enthalpy, Entropy, Internal energy, Laws of thermodynamics (Description only), Scales of temperature.

IC ENGINES: Classification, Carnot, Otto, Diesel Cycles with P-V and T-S diagrams, 2 and 4 stroke C.I and S.I engines, working, Hybrid engines, Indicated power, Brake power, efficiencies.

REFRIGERATION AND AIRCONDITIONING: Refrigerant and its types with





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applications, Unit of refrigeration, COP, working of vapour compression refrigeration.

UNIT – III

MANUFACTURING SCIENCE: Basic description of manufacturing processes-Casting, Forging, Rolling, Extrusion, Hot and cold working processes with applications.

METAL JOINING PROCESSES: Basic description with sketches-Rivetting, Arc welding, Gas welding, Soldering and Brazing with applications.

UNIT – IV

FORCE AND POWER TRANSMISSION:

FORCE SYSTEM AND ANALYSIS: Concepts of- Laws of motion, Free body diagrams, Resultant force, Equilibrium, Friction, laws of friction, Stress, types of stress, Strain, Poisson's ratio, Elastic constants, Moment, Moment of inertia, centroid, Torque.

POWER TRANSMISSION: Description of working with sketches-Belt, Chain drives, Gear trains with applications, Single plate clutches. Basic concepts of hydraulic and pneumatic power transmission.

UNIT – V

PUMPS AND PRIME MOVERS:

PUMPS: Classification of pumps, Description and working of- Reciprocating and centrifugal pumps with applications, priming, Multistage pumps., Discharge and coefficient of discharge.

PRIME MOVERS: Classification of hydraulic turbines, steam turbines, description and working of Pelton wheel and governing. Types of gas turbines andworking of gas turbines with applications.

TEXT BOOKS:

- 1. Thermal Engineering Rajput RK, Laxmi publications.
- 2. Elements of Mechanical Engineering-Sadhu singh, S.chand publications.
- 3. Basic Mechanical Engineering –Pravin kumar, Pearson publications.
- 4. Elements of Mechanical Engineering-N.M. Bhatt and J.R.Mehta, Mahajanpublishing house.

REFERENCE BOOKS:

- 1. Production Technology-P.C.Sharma
- 2. Thermal Engineering-PL Ballaney
- 3. Power Plant Engineering-Nagpal
- 4. Workshop Technology-Hajra choudhury

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Semester	V/VI/VII	L	Т	Р	С	Course Code	
Regulation	V20 3 0 0 3 V20MEOE2						
Name of the Course	Green Engineering Systems Open Elective						
Branch	Mechanical Engineering						

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
C01	Illustrate the concept of Solar Radiation, Collection, Storage and Applications	K2
CO2	Discuss the construction and working of wind energy and bio-energy conversion systems.	K2
CO3	Describe the construction and working of Geothermal and Ocean Energy conversion systems.	К2
CO4	Illustrate the principles of environmental impact of current manufacturing practices.	K2
C05	Discuss the features and benefits of green building materials and its applications.	K2

UNIT – I

INTRODUCTION: SOLAR RADIATION: Role and potential of new and renewablesources, the solar energy option, Environmental impact of solar power, structureof the sun, the solar constant, sun-earth relationships, instruments for measuring solar radiation and sun shine, Flat plate and concentrating collectors. **SOLAR ENERGY STORAGE AND APPLICATIONS:** Different Storage methods, solar ponds, solar applications- solar heating/cooling technique, solar distillation and drying, solar cookers, central power tower concept and solar chimney.

UNIT – II

WIND ENERGY: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, types of winds.

BIO-MASS: Principles of bio-conversion, anaerobic/aerobic digestion, types of bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, bio fuels, I.C. engine operation.

UNIT – III

GEOTHERMAL ENERGY: Resources, types of wells, methods of harnessing the energy, potential in India.





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OCEAN ENERGY: OTEC, Principles of utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT – IV

ENERGY EFFICIENT PROCESSES: Environmental impact of the current manufacturing practices and systems, benefits of green manufacturing systems, selection of recyclable and environment friendly materials in manufacturing, design and implementation of efficient and sustainable green production systems with examples like environmental friendly machining, vegetable based cutting fluids, zero waste manufacturing.

UNIT – V

GREEN BUILDINGS: Definition, features and benefits. Sustainable site selection and planning of buildings for maximum comfort. Environmental friendly building materials like bamboo, timber, rammed earth, hollow blocks, lime & lime pozzolana cement, agro materials and industrial waste, Ferro cement and Ferro- concrete, alternate roofing systems, paints to reduce heat gain of the buildings.

TEXT BOOKS:

- 1. Sukhatme S.P. and J.K.Nayak, Solar Energy Principles of Thermal Collectionand Storage, TMH.
- 2. Khan B.H., Non-Conventional Energy Resources, Tata McGraw Hill, New Delhi,2006.
- 3. Green Manufacturing Processes and Systems, Edited by J. Paulo Davim, Springer 2013.

REFERENCE BOOKS

- 1. Alternative Building Materials and Technologies / K.S Jagadeesh, B.V VenkataRama Reddy and K.S Nanjunda Ra.
- 2. Principles of Solar Energy / Frank Krieth & John F Kreider.
- 3. Non-Conventional Energy / Ashok V Desai /Wiley Eastern.
- 4. Renewable Energy Technologies /Ramesh & Kumar /Narosa
- 5. Renewable Energy Technologies/ G.D Roy

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Semester	V/VI/VII	L	Т	Р	С	Course Code		
Regulation	V20 3 0 0 3 V20MEOE							
Name of the Course	Computational Fluid Dynamics Open Elective							
Branch	Mechanical Engineering							

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
C01	Apply techniques in the numerical solution of fluid equations	K3
CO2	Apply numerical modeling and its role in the field of heat transfer and fluid flow.	КЗ
CO3	Develop methodologies used in CFD	К3
CO4	Compare various discretization methods and solving methodologies.	K4
CO5	Apply skills in the actual implementation of CFD methods (e.g. boundary conditions, different numerical schemes etc., Finite element methods in the application of CFD analysis to real life engineering designs.	К3

UNIT – I

ELEMENTARY DETAILS IN NUMERICAL TECHNIQUES: Number system and

errors, representation of integers, fractions, floating point arithmetic, loss of significance and error propagation, condition and instability, computational methods for error estimation, convergence of sequences.

UNIT – II

APPLIED NUMERICAL METHODS: Solution of a system of simultaneous linear algebraic equations, iterative schemes of matrix inversion, direct methods for matrix inversion, direct methods for banded matrices.

EQUATIONS GOVERNING FLUID FLOW AND HEAT TRANSFER:

Introduction, conservation of mass, Newton's second law of motion, expanded forms of Navier-stokes equations, conservation of energy principle, special formsof the Navier – stokes equations.

UNIT-III

Steady flow, dimensionless form of momentum and energy equations, stokes equation, conservative body force fields, stream function - vorticity





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formulation. Finite difference applications in heat conduction and convention – heat conduction, steady heat conduction in a rectangular geometry, transient eat conduction, finite difference application in convective heat transfer, closure.

UNIT – IV

Finite differences, discretization, consistency, stability, and fundamentals of fluid flow modelling: introduction, elementary finite difference quotients, implementation aspects of finite-difference equations, consistency, explicit and implicit methods.

UNIT – V

Introduction to first order wave equation, stability of hyperbolic and elliptic equations, fundamentals of fluid flow modelling, conservative property, the up wind scheme.

FINITEVOLUMEMETHOD: Approximation of surface integrals, volume integrals, interpolation and differentiation practices, upwind interpolation, linear interpolation and quadratic interpolation.

TEXTBOOKS:

- 1. Numerical heat transfer and fluid flow/Suhas V.Patankar- Butter worthPublishers.
- 2. Computational fluid dynamics Basics with applications -John. D.Anderson/McGraw Hill.

REFERENCEBOOKS:

- 1. Computational Fluid Flow and Heat Transfer/Niyogi, Pearson Publications.
- 2. Fundamentals of Computational Fluid Dynamics– Tapan K.Sengupta /Universities Press.
- 3. Computational fluid dynamics, 3rd edition/Wendt/Springer publishers

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Department of Electrical & Electronics Engineering (NBA Accredited)

Semester	V/VI/VII	L	Т	Р	С	Course Code	
Regulation	V20	3	0	0	3	V20MEOE4	
Name of the Course	Rapid Prototyping Open Elective						
Branch	Mechanical Engineering						

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
C01	Understand virtual prototyping and testing of technology	K2
CO2	Construct CAD modelling for rapid prototyping	КЗ
CO3	Examine different types of process in rapid prototyping	КЗ
CO4	Explain Rapid Manufacturing errors	K2
CO5	Express the applications of rapid prototyping	K2

UNIT – I

Introduction: Introduction to Prototyping, Traditional Prototyping Vs. Rapid Prototyping (RP), Classification of Rapid Manufacturing Processes: Additive, Subtractive, Formative, Generic RP process.

UNIT – II

CAD Modelling and Data Processing for RP: CAD model preparation, Data interfacing: formats (STL, SLC, CLI, RPI, LEAF, IGES, HP/GL, CT, STEP), conversation, validity checks, repair procedures; Part orientation and support generation, Support structure design, Model Slicing algorithms and contour dataorganization, direct and adaptive slicing, Tool path generation.

UNIT – III

RP Processes: Process Physics, Tooling, Process Analysis, Material and technological aspects, Applications, limitations and comparison of various rapid manufacturing processes. Photo polymerization (Stereo lithography (SL), Micro stereo lithography), Powder Bed Fusion (Selective laser Sintering (SLS), Electron Beam melting (EBM)), Extrusion-Based RP Systems (Fused Deposition Modelling (FDM)), 3D Printing, Sheet Lamination (Laminated Object Manufacturing (LOM), Ultrasonic Consolidation (UC)), Beam Deposition (Laser Engineered Net Shaping (LENS), Direct Metal Deposition (DMD)).





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UNIT – IV

Errors in RP Processes: Pre-processing, processing, post-processing errors, Partbuilding errors in SLA, SLS.

UNIT – V

Application of Rapid Prototyping and Technology: Functional models, pattern for investment and Vacuum casting, medical models, Art models, Engineering analysis models.

REFERENCE BOOKS:

- 1. Rapid Prototyping: Principles and Applications in Manufacturing. Chua C.K.,Leong K.F., Chu S. L., World Scientific.
- 2. Additive Manufacturing Technologies: Rapid Prototyping to Direct DigitalManufacturing. Gibson, Ian, Rosen, David, Stucker, Brent, Pearson
- 3. Rapid Prototyping: Principles and Applications in Manufacturing. Noorani R,John Wiley & Sons.
- 4. Rapid Prototyping and Engineering applications: A tool box for prototypedevelopment. Liou W.L., Liou F. W., CRC Press
- 5. Rapid Prototyping: Theory and practice. Kamrani A. K., Nasr E. A., Springer



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Department of Electrical & Electronics Engineering (NBA Accredited)

SEMESTER	V/VI/VII	L	Т	Р	С	Course Code	
Regulation	V20	3	0	0	3	V20MEOE5	
Name of the Course	Computer Aided Design Open Elective						
Branch	Mechanical Engineering						

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowle dge Level
C01	Explain the basic fundamentals of CAD tools	K2
CO2	Find the characteristics of curves, Representation and continuity requirements	К3
CO3	Illustrate the Geometric Transformations and demonstrate various types of surfaces and Representation.	К3
CO4	Differentiate between the methods of representing Solid Modelling.	K4
CO5	Apply the local and global properties for product development	КЗ

UNIT – I

CAD Introduction: Need of machine design, use of computer, computer fundamentals, computer aided design process, CAD configuration, and CAD tools, positive and negative points of CAD, CAD and CAM integration.

UNIT – II

DESIGN OF CURVES: Fundamental of Curve Design, Parametric Space of a Curve, Representation, Parametric cubic curve, Blending functions, Truncation, extension, and subdivision, composite curve: continuity requirements .

UNIT – III

GEOMETRIC TRANSFORMATIONS: Translation, Rotation, Scaling Symmetry and Reflection, Homogeneous Transformations. Orthographic Projections, Axonometric Projections, Oblique Projections, Perspective Transformation.

DESIGN OF SURFACES: Fundamental of Surface Design, Parametric Space of a Surface, Representation of a Surface patch, sixteen point form, Four Curve Form, Plane.

UNIT – IV

SOLID MODELLING: Solid Modelling fundamentals, topology and geometry.



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Department of Electrical & Electronics Engineering (NBA Accredited)

Geometric Modelling Method, Constructive Solid Geometry (CSG), Boundary Representation (Brep), Introduction to Wireframe, surface and solid modelling techniques. Introduction CAD data exchange format IGES, STEP

UNIT – V

GEOMETRIC PROPERTIES: Local and global properties of a curve, Local and global properties of a surface, Global properties of complex solids, Relational properties, intersections. Applications in Product Development and other areas.

REFERENCE BOOKS:

- 1. Geometric Modeling: Michael E. Mortenson, Third Edition, Industrial PressInc.2006.
- 2. Mathematical Elements of Computer Graphics, Rogers and Adams, McGrawHill. 1994
- 3. CAD CAM Theory and Prectice: I. Zeid, Tata-McGraw Hill, 2006
- 4. Computer-Aided Engineering Design, B Sahay and ASaxena, Springer, 2005.
- 5. Differential Geometry of Curves and Surfaces, Thomas F. Banchoff and Stephen T. Lovett, Thomas Banchoff-Stephen Lovett, 2010.
- 6. Computational Geometry for Design and Manufacture, I.D. Faux and M.J.Pratt, John Wiley, 1980.
- 7. Lectures on Classical Differential Geometry, Dirk J. Struick, Addison Wesley, 1980.

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Department of Electrical & Electronics Engineering (NBA Accredited)

SEMESTER	V/VI/VII	L	Т	Р	C	Course Code		
Regulation	V20	3	0	0	3	V20MEOE6		
Name of the Course	Mechatron Open Elec	Mechatronics Open Elective						
Branch	Mechanical Engineering							

Course Outcomes:

	After successful completion of the course, the student will be able to:	Knowledge Level
C01	Understand the elements of Mechatronics & levels and explain various types of sensors , transducers and Mechatronics design process	К2
CO2	Sketch and explain various types of solid state devices like Diode, BJT, MOSFET, etc.,	К3
CO3	Illustrate and explain basic principles of Hydraulic, pneumatic, electro hydraulic, electro hydraulic servo actuating systems.	КЗ
CO4	Illustrate and explain microprocessors, microcontrollers and PLC	КЗ
CO5	Sketch and explain System interfacing and data acquisition systems.	КЗ

UNIT – I

MECHATRONICS SYSTEMS – elements & levels of mechatronics system, Mechatronics design process, system, measurement systems, control systems, advantages and disadvantages of mechatronics systems. Sensors and transducers, types, displacement, velocity, force, acceleration, liquid flow, liquid level, temperature and light sensors.

UNIT–II

SOLID STATE ELECTRONIC DEVICES - PN junction diode, BJT, FET, Analog signal conditioning, operational amplifiers, filters.

UNIT-III

HYDRAULIC AND PNEUMATIC ACTUATING SYSTEMS - Fluid systems, Hydraulic systems, and pneumatic systems, components, control valves, electro- pneumatic, hydro-pneumatic, electro-hydraulic servo systems.

UNIT-IV

DIGITAL ELECTRONICS AND SYSTEMS - Digital logic control, microprocessors and micro controllers, programming, programmable logic controllers, PLCs versus computers, application of PLCs for control.





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UNIT–V

SYSTEM AND INTERFACING AND DATA ACQUISITION - Data

Acquisition Systems, Analog to Digital and Digital to Analog conversions; Digital SignalProcessing.

TEXT BOOKS:

1. MECHATRONICS Integrated Mechanical Electronics Systems/KP Ramachandran, GK Vijaya Raghavan & MS Balasundaram/WILEY India Edition

REFERENCE BOOKS:

- 1. Mechatronics /Smaili A, Mrad F/ Oxford Higher Education, Oxford UniversityPress
- 2. Mechatronics Source Book / Newton C Braga/Thomson Publications,Chennai.
- 3. Mechatronics N. Shanmugam / Anuradha Agencies Publishers.
- 4. Mechatronics System Design / Devdas shetty/Richard/Thomson.
- 5. Mechatronics/M.D.Singh/J.G.Joshi/PHI.
- 6. Mechatronics Electronic Control Systems in Mechanical and Electrical Engg.4th Edition / W. Bolton / Pearson, 2012
- 7. Mechatronics Principles and Application / Godfrey C. Onwubolu/Elsevier,Indian print

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Open Elective -I

	open meet					
Sem	V/VI/VII	L	Т	Р	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CEOE01
Name of the		DEHAR		TION	OF ST	TDUCTUDES
Course	KLI AIK AND I	LIIAD			01 31	INUCIONES
Branch	EXCEPT CE					

Course Outcomes:

Upon the successful completion of course students will be able to

- Develop various maintenance and repair strategies (K2)
- Evaluate the existing buildings through field investigations (K2)
- Understand and use the different techniques for structural rehabilitation and various techniques of repair (K2)
- Understand the importance of advanced concretes mixes(K2)
- Understand the importance of high performance concretes(K2)

SYLLABUS

UNIT I

Deterioration of Structures and diagnosis: Distress in Structures – Causes and Prevention. Mechanism of Damage – Types of Damage, Non Destructive Testing, Corrosion of Steel Reinforcement – Causes – Mechanism and Prevention. Damage of Structures due to Fire – Fire Rating of Structures – Inspection and Testing – Symptoms and Diagnosis of Distress – Damage assessment –

UNIT II

Materials for repair and rehabilitation: Admixtures- types of admixtures - purposes of using admixtures- chemical composition- Natural admixtures - Fibres- wraps- Glass and Carbon fibre wraps- Steel Plates

UNIT III

Strengthening and stabilization: Techniques- design considerations-Beam shear capacity strengthening - Shear Transfer strengthening-stress reduction techniques- Column strengthening-flexural strengthening - Connection stabilization and strengthening, Crack stabilization

UNIT IV

Special Concretes: Fibre reinforced concrete: Properties of constituent materials- Mechanical properties of fiber reinforced concrete- applications of fibre reinforced concretes-Light weight concrete- properties of light weight concrete- No fines concrete- design of light weight concrete- Flyash



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Department of Electrical & Electronics Engineering (NBA Accredited)

concrete -classification of flyash- Properties of flyash concrete

UNIT V

High performance concretes: Introduction- Development of high performance concretes- Materials of high performance concretes- Properties of high performance concretes- Self Consolidating concrete-properties-qualifications.

Text Books:

- 1. Maintenance and Repair of Civil Structures, B.L. Gupta and Amit Gupta, Standard Publications.
- 2. Concrete Technology by A.R. Santa Kumar, Oxford University press
- 3. Concrete technology by Neville and J J Brooks, Pearson publications, 2ndedition

- 1. Concrete technology by M S Shetty, S. Chand publications (2006).
- 2. Defects and Deterioration in Buildings, EF & N Spon, London
- 3. Non-Destructive Evaluation of Concrete Structures by Bungey SurreyUniversity Press
- 4. Concrete Repair and Maintenance Illustrated, RS Means Company IncW.H.Ranso, (1981)
- 5. Building Failures: Diagnosis and Avoidance, EF & N Spon, London, B.A.Richardson, (1991)

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Department of Electrical & Electronics Engineering (NBA Accredited)

Sem	V/VI/VII	L	Τ	Р	С	COURSE CODE	
Regulation	V20	3	0	0	3	V20CEOE02	
Name of the	CDOUND IMPROVEMENT TECHNIQUES						
Course	GROUND IMPROVEMENT TECHNIQUES						
Branch	EXCEPT CE						

Course Outcomes:

Upon successful completion of this course the student will be able to

- Employ the in-situ densification methods at ground surface and atdepth (K3)
- Relate the importance of dewatering and different methods of stabilization (K3)
- Illustrate the reinforced earth technology and soil nailing to obviate theproblems posed by conventional retaining walls (K3)
- Use the geosynthetics to improve the engineering performance of soils(K3)
- Select different techniques of grouting to solve the ground problems(K3)

SYLLABUS

UNIT I

In situ densification methods: In situ densification of granular soilsvibration at ground surface and at depth, impact at ground and at depth – in situ densification of cohesive soils – pre loading – vertical drains – sanddrains and geo drains – stone columns.

UNIT II

Dewatering: Sumps and interceptor ditches – single and multi-stage well points – vacuum well points – horizontal wells– electro osmosis **Stabilization of soils:** Methods of soil stabilization – mechanical – cement – lime – bitumen and polymer stabilization – use of industrial wastes like flyash and granulated blast furnace slag.

UNIT III

Reinforced earth: Principles – components of reinforced earth –stability checks – soil nailing



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UNIT IV

Geosynthetics: Geotextiles – types – functions, properties and applications – geogrids , geomembranes and gabions – properties and applications.

UNIT V

Grouting: Objectives of grouting – grouts and their applications – methods of grouting – stage of grouting.

Text Books:

- 1. Ground Improvement Techniques, Purushotham Raj, Laxmi Publications, New Delhi.
- 2. Ground Improvement Techniques, Nihar Ranjan Patro, Vikas Publishing House (p) limited , New Delhi.
- 3. An introduction to Soil Reinforcement and Geosynthetics, G. L. SivaKumar Babu, Universities Press.

- 1. Ground Improvement, M.P.Moseley, Blackie Academic and Professional, USA
- 2. Designing with Geosynethetics, R. M Koerner, Prentice Hall
- 3. Engineering Principles of Ground Modification by Manfred R. Hausmann, McGraw-Hill Inc.,



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Sem	V/VI/VII	L	Т	Р	С	COURSE CODE
Regulation	V20	3	0	0	3	V20CEOE03
Name of the			ППТИ			ντροι
Course		AL FUL				NIKUL
Branch	EXCEPT CE NG					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Describe the air pollution and its control methods (K2)
- Explain industrial waste water and ways to control it (K3)
- Generalize the solid, hazardous waste and control methods (K2)
- Illustrate the importance of Environmental sanitation methods (K2)
- Illustrate the importance of Sustainable development (K3)

SYLLABUS

UNIT I

Air Pollution: Air pollution Control Methods–Particulate control devices – Methods of Controlling Gaseous Emissions – Air quality standards. Noise Pollution: Noise standards, Measurement and control methods

UNIT II

Industrial wastewater Management: Strategies for pollution control – Volume and Strength reduction-Recirculation of industrial waste water – Effluent standards.

UNIT III

Solid Waste Management: Solid waste characteristics –on-site handling and collection – separation and processing -Solid waste disposal method **Hazardous Waste:** Characterization – Nuclear waste – Biomedical wastes –Electronic wastes – Chemical wastes – Treatment and management of hazardous waste-Disposal methods.

UNIT IV

Environmental Sanitation: Environmental Sanitation Methods for Hostels and Hotels, Hospitals, Swimming pools and public bathing places, social gatherings (melas and fares), Schools and Institutions, Rural Sanitation-low cost waste disposal methods.





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UNIT V

Sustainable Development: Definition- elements of sustainable developments-Indicators of sustainable development- Sustainability Strategies- sustainable development.

Text Books:

- 1. Environmental Engineering, by Ruth F. Weiner and Robin Matthews –4th Edition Elesevier, 2003.
- 2. Environmental Science and Engineering by J.G. Henry and G.W. Heinke Pearson Education.
- 3. Environmental Engineering by Mackenzie L Davis & David A Cornwell.McGraw Hill Publishing.

- 1. Solid Waste Engineering, Vesilind, P.A., Worrell, W., Reinhart, D., Cenage learning, New Delhi, 2004
- 2. Hazardous Waste Management, Charles A. Wentz, McGraw Hill Publication, 1995.

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Sem	V/VI/VII	L	Т	Р	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CEOE04
Name of the	DIIII DINC MAT			CONS	три	TION
Course		ERIALS		CONS	ΙΚΟ	LIIUN
Branch	EXCEPT CE					

Course Outcomes:

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

- Describe different building materials and their importance in building construction (K2)
- Relate various components of cement and lime (K3)
- Generalize the brick and stone masonry in construction (K2)
- Interpret different aggregates and their specifications (K2)
- Describe the importance of different building components (K2)

SYLLABUS

UNIT I

Stones, Bricks and Tiles: Building stones – classifications and quarrying – properties –structural requirements and dressing. Bricks – Composition of Brick earth – manufacture and structural requirements, Fly ash, Ceramics, Timber, Aluminum, Glass, Paints and Plastics: Wood - structure – types and properties– seasoning – defects; alternate materials for Timber–GI/ fibre – reinforced glass bricks, steel & aluminum, Plastics.

UNIT II

Cement & Admixtures: Ingredients of cement – manufacture – Chemical composition – Hydration - field & lab tests, Admixtures – mineral & chemical admixtures – uses, Various ingredients of lime – Constituents of lime stone – classification of lime – various methods of manufacture of lime

UNIT III

Mortars: Lime and Cement Mortars.

Masonry: Brick masonry – types – bonds; Stone masonry – types; Composite masonry – Brick- stone composite; Concrete, Reinforced brick. Cavity and partition walls, Finishing's, Plastering, Pointing, Painting, Claddings – Types – Tiles – ACP.

UNIT IV

Aggregates: Classification of aggregate – Coarse and fine aggregates- particle shape and texture – Bond and Strength of aggregate – Specific gravity – Bulk





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Density, porosity and absorption – Moisture content of Aggregate- Bulking of sand – Sieve analysis.

Miscellaneous materials: Bitumen and asphaltic materials, structural steel and other metals, geo textiles, carbon composites including properties and uses.

UNIT V

Building Components: Lintels, Arches, walls, vaults – stair cases – types of floors, types of roofs – flat, curved, trussed. Foundations – types; Damp Proof Course; Joinery – doors – windows – materials – types. **Form work:** Types: Requirements – Standards – Scaffolding.

Text Books:

- 1. Building Materials and Construction Arora & Bindra, Dhanpat RoyPublications. 2010,5th edition.
- 2. Building Materials, M. L. Gambhir, Tata McGraw Hill Publishing Co. Ltd. New Delhi. 2014,5th edition,.
- 3. Building Construction by B. C. Punmia, Ashok Kumar Jain and ArunKumar Jain Laxmi Publications (P) ltd., New Delhi. 2016,11th edition.
- 4. Building Materials, S. S. Bhavikatti, Vikas publications House privateltd. 2012, 1st edition.
- 5. Building Construction, S. S. Bhavikatti, Vikas publications Houseprivate ltd. 2012, 1st edition.
- 6. Building planning and drawing, Dr.N.Kumara swamy, A.kameswara Rao, 2012, 6th edition.

- 1. Building Materials and Construction by G C Sahu, Joygopal JenaMcGraw hill Pvt Ltd 2017,1st edition.
- 2. Building Materials by Duggal, New Age International. 2012 ,4th edition.
- 3. Building Materials by P. C. Varghese, PHI. 2015, 2nd edition.
- 4. Building Construction by PC Varghese PHI. 2007, 1st edition.
- 5. Construction Technology Vol I & II by R. Chubby, LongmanUK.1987, 2nd edition.
- Alternate Building Materials and Technology, Jagadish, VenkataramaReddy and others; New Age Publications.2017 ,2nd edition

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Sem	V/VI/VII	L	Т	Р	C	COURSE CODE	
Regulation	V20	3	0	0	3	V20CEOE05	
Name of the	REMOTE SENSING AND GEOGRAPHICAL						
Course	INFORMATION SYSTEM						
Branch	EXCEPT CE						

Course Outcomes:

Upon successful completion of this course the student will be able to

- Generalize the basic principles of Remote Sensing and GIS, including ground, air and satellite based sensor platforms (K2)
- Interpret the aerial photographs and satellite imageries (K2)
- Relate the process of data entry and preparation (K3)
- Examine the Spatial Data for a variety of applications (K3)
- Employ RS and GIS for diverse applications (K3)

SYLLABUS

UNIT I

Introduction to Remote Sensing: Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere, energy interaction with the earth surfaces, Characteristics of remote sensing systems.

Sensors and platforms: Introduction, types of sensors, airborne remote sensing, space borne remote sensing, image data characteristics, digital image data formats-band interleaved by pixel, band interleaved by line, band sequential, IRS, LANDSAT, SPOT, MODIS, ASTER, RISAT and CARTOSAT.

UNIT II

Image analysis: Introduction, elements of visual interpretations, digital image processing- image preprocessing, image enhancement, image classification, supervised classification, unsupervised classification.

UNIT III

Geographic Information System: Introduction, key components, applicationareas of GIS, map projections.

Data entry and preparation: spatial data input, raster data models, vector data models.

UNIT IV

Spatial data analysis: Introduction, overlay function-vector overlay





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operations, raster overlay operations, arithmetic operators, comparison and logical operators, conditional expressions, overlay using a decision table, network analysis-optimal path finding, network allocation, network tracing and buffer analysis.

UNIT V

RS and GIS Applications: Land cover and land use, agriculture, forestry, geology, geomorphology, urban applications.

Applications of Hydrology, Water Resources and Disaster Management: Food zoning and mapping, groundwater prospects and potential recharge zones, watershed management and disaster management with case studies.

Text Books:

- 1. "Remote sensing and GIS", Bhatta, B., Oxford University Press, 2008.
- 2. "Remote Sensing and Geographical Information Systems", Anji Reddy, M., B S Publications, 2008.
- 3. "Basics of Remote Sensing and GIS" Kumar. S., Laxmi Publications,

- 1. "Fundamentals of Remote Sensing", George Joseph, Universities Press, 2013.
- 2. "Concepts and Techniques of Geographical Information System", ChorPang Lo and Yeung, A.K.W., Prentice Hall, India, 2006.
- 3. "Remote Sensing and its Applications", Narayan L.R.A, Universities Press, 2012.
- 4. "Introduction to Geographic Information Systems", Kand Tsung Chang, McGraw Hill Higher Education, 2009.
- 5. "Basics of Remote sensing & GIS", Kumar, S., Laxmi Publications, New Delhi, 2005.
- 6. "Principals of Geographical Information Systems", Burrough, P.A and McDonnell, R.A. Oxford University Press, 1998.
- 7. "Remote Sensing", Schowenger, R. A., Elsevier publishers, 2006.
- 8. "Remote Sensing and Image Interpretation", Lillesand, T.M, Kiefer, R.W.and Chipman, J.W., Wiley India Pvt. Ltd., New Delhi, 2013.
- 9. "Fundamentals of Geographic Information Systems", Demers, M.N, Wiley India Pvt. Ltd, 2013

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Department of Electrical & Electronics Engineering (NBA Accredited)

Sem	V/VI/VII	L	Τ	Р	С	COURSE CODE	
Regulation	V20 3 0 0 3 V20CEOE06						
Name of the	SOLID WASTE MANAGEMENT						
Course							
Branch	EXCEPT CE						

Course Outcomes:

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

- Generalize Solid Waste and its management (K2)
- Assess different elements for managing Solid Waste (K3)
- Employ different methods for transportation and transformation of solidwaste (K3)
- Organize different methods for processing and treatment of municipalsolid waste (K3)
- Practice suitable disposal methods with respect to solid waste (K3)

SYLLABUS

UNIT I

Introduction to Solid Waste Management: Goals and objectives of solid waste management, Classification of Solid Waste – Factors Influencing generation of solid waste – sampling and characterization –Future changes in waste composition, major legislation, monitoring responsibilities.

UNIT II

Basic Elements In Solid Waste Management: Elements and their inter relationship – principles of solid waste management- onsite handling, storage and processing of solid waste Collection of Solid Waste: Types and methods of waste collection systems, analysis of collection system – optimization of collection routes.

UNIT III

Transportation and Transformation of Solid Waste: Need for transfer operation, compaction of solid waste – transport means and methods, transfer station types and design requirements.

Unit operations used for separation and transformation: shredding – materials separation and recovery, source reduction and waste minimization.





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UNIT IV

Processing and Treatment: Processing of solid waste – Waste transformation through combustion and composting, anaerobic methods for materialsrecovery and treatment – Energy recovery – biogas generation and cleaning–Incinerators.

UNIT V

Disposal of Solid Waste: Methods of Disposal, Landfills: Site selection, design and operation, drainage and leachate collection systems –designated waste landfill remediation.

Text Books:

- 1. "Integrated Solid Waste Management", George Techobanoglous, McGraw Hill Publication, 1993
- 2. "Environmental Engineering", Gerard Kiely, McGraw Hill Publication, 2007
- 3. "Environmental Science and Engineering", J Glynn Henry,. Gary W.Heinke, Prentice-Hall of India Pvt Ltd, 1996

- 1. "Solid Waste Engineering", Vesilind, P.A., Worrell, W., Reinhart, D., Cenage learning, New Delhi, 2004
- 2. "Hazardous WasteManagement", Charles A.Wentz., McGraw Hill Publication, 1995.
- 3. "Introduction to Environmental Engineering" Mackenzie L Davis, DavidA.Cornwell, McGraw Hill Publication, 2017

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Sem	V/VI/VII	L	Т	Р	С	COURSE CODE
Regulation	V20	3	0	0	3	V20CEOE07
Name of the Course	DISASTER MAN	IAGEM	ENT			
Branch	EXCEPT CE					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Describe different natural hazards and disaster management (K2)
- Generalize the risk and vulnerability of disaster (K2)
- Illustrate the role of technology in disaster management (K3)
- Relate the importance of education and community preparedness todisaster recovery (K3)
- Organize the multi-sectional issues created by disaster (K2)

UNIT I

Natural Hazards and Disaster Management: Introduction of DM Disaster Management cycle – Five priorities for action- Case study methods of the following: floods, droughts – Earthquakes – global warming, cyclones & Tsunamis – Post Tsunami hazards along the Indian coast – landslides. Fire hazards – transport hazard dynamics – solid waste management – post disaster – bio terrotirism - rail and air craft's accidents-Management of these disasters

UNIT II

Risk and Vulnerability: – Building codes and land use planning – social vulnerability – environmental vulnerability - Financial management of disaster.

UNIT III

Role of Technology in Disaster Managements: Disaster management for infra structures, taxonomy of infra structure - mitigation programme for earth quakes –geospatial information in agriculture drought assessment-multimedia technology in disaster risk management and training-transformable indigenous knowledge in disaster reduction.

UNIT IV

Education and Community Preparedness: Education in disaster risk reduction-Essentials of school disaster education-Community capacity and disaster resilience-Community based disaster recovery -Community based disaster management and social capital-Designing resilience- building.





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UNIT V

Multi-sectional Issues: Impact of disaster on poverty and deprivation-Climate change adaptation and human health -Exposure , health hazards and environmental risk-Forest management and disaster risk reduction -The Red cross and red crescent movement.

Text Books:

- 1. Disaster Management Global Challenges and Local Solutions' by Rajibshah & R R Krishnamurthy (2009), Universities press.
- 2. Disaster Science & Management' by Tushar Bhattacharya, TataMcGraw Hill Education Pvt. Ltd., New Delhi.
- 3. Disaster Management Future Challenges and Opportunities' by JagbirSingh (2007), I K International Publishing House Pvt. Ltd.

Reference Books:

- 1. 'Disaster Management' edited by H K Gupta (2003), Universities press.
- 2. Natural Hazards and Disaster Management, Vulnerability and Mitigation by RB Singh
- 3. Disaster Management by Harish K.Gupta

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Sem	V/VI/VII	L	Т	Р	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CEOE08
Name of the	WATED OUALIT	VAND	CONC	EDVA	TION	OVETEME
Course	WATER QUALIT	IAND	CONS	ERVA	TION	5151 EM5
Branch	EXCEPT CE					

Course Outcomes:

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

- Describe different parameters of Engineering Hydrology (K2)
- Relate different sources of surface and ground water (K3)
- Assess the importance of water supply systems and quality of water inreference to IS and WHO standards (K3)
- Develop different systems of plumbing (K3)
- Employ different conservation techniques (K3)

SYLLABUS

UNIT I

Introduction to Hydrology: Engineering hydrology, applications, Hydrologic cycle, evaporation, evapotranspiration, precipitation, run off, infiltration, hydrological data-sources

UNIT II

Sources of Water: Surface water, Lakes, Rivers, Reservoirs, comparison of sources with reference to quality, quantity and other considerations. Groundwater, types of water bearing formations, springs, Wells and Infiltration galleries, Yields from infiltration galleries.

UNIT III

Importance of Protected Water: Supply systems, Flow chart of public water supply system, Water borne diseases, Estimation of water usages in different purpose.

Quality and Analysis of Water: Characteristics of water–Physical, Chemical and Biological-Analysis of Water – Physical, Chemical and Biological characteristics, Comparison of sources with reference to quality- I.S. Drinking water quality standards and WHO guidelines for drinking water.

UNIT IV

Plumbing Systems: Systems of plumbing-types of pipes and sanitary fittings and other accessories–one pipe and two pipe systems – Design parameters





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and factors.

UNIT V

Water conservation: importance and necessity, objectives, systems-rainwater harvesting, recharge pits, watershed.

Text Books:

- Environmental Engineering Howard S. Peavy, Donald R. Rowe, TeorgeGeorge Tchobanoglus – Mc-Graw-Hill Book Company, New Delhi, 1985
- 2. Elements of Environmental Engineering, K. N. Duggal, S. Chand &Company Ltd. New Delhi, 2012.
- 3. Water Supply and Sanitary Engineering G. S. Birdie and J. S. Birdie

- 1. Water Supply Engineering P. N. Modi.
- 2. Water Supply Engineering B. C. Punmia
- 3. Water Supply and Sanitary Engineering G. S. Birdie and J. S. Birdie

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Sem	VI Sem	L	Т	Р	С	COURSE CODE	
Regulation	V20	2	0	0	0	V20CEMC01	
Name of the	INTELLECTUAL PROPERTY RIGHTS & PATENTS						
Course							
Branch	Common to All Branches						

Course Outcomes:

Upon successful completion of this course the student will be able to

- Describe the need of Intellectual Property Rights (K2)
- Generalize different issues regarding Copy Rights (K2)
- Employ the procedure for Patent registration and granting (K3)
- Discuss the importance of Trademark and its related issues (K2)
- Recognize the significance of Trade Secrets in Industry (K2)

SYLLABUSUNIT I

Introduction to Intellectual Property Rights (IPR): Introduction to IPR, Evolutionary Past, Concept of IPR – Purpose of IPR, Types of IPR, WIPO -TRIPS, Nature of IPR, Patents, Trademarks, Copyrights, Neighboring Rights, Agencies responsible for IPR - Infringement, Use and Misuse of Intellectual Property Rights.

UNIT II

Copyrights: Introduction to Copyrights – Principles of Copyright Protection – Law Relating to Copyrights - Copyright Ownership – Transfer and Duration – Copyright Registration – Limitations – Infringement of Copyright – Relief and Remedy – Semiconductor Chip Protection Act.

UNIT III

Patents: Introduction to Patents - Laws Relating to Patents in India – Patent Requirements – Product Patent and Process Patent - Patent Registration and Granting of Patent -Exclusive Rights – Limitations - Ownership and Transfer – Revocation of Patent – Patent Appellate Board - Infringement of Patent – Compulsory Licensing – Software Protection and Computer related Innovations.

UNIT IV

Trademarks: Introduction to Trademarks – Laws Relating to Trademarks – Functions of Trademark – – Trade Mark Registration – Trade Mark Maintenance – Transfer of rights – Deceptive Similarities - Likelihood of Confusion - Dilution of Ownership – Trademarks Claims and Infringement – Remedies – Passing Off Action.





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UNIT V

Trade Secrets: Introduction to Trade Secrets – General Principles - Laws Relating to Trade Secrets - Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreements – Breach of Contract –Law of Unfair Competition – Trade Secret Litigation – Applying State Law, Cyber Law and Cyber Crime

Text Books:

- 1. Intellectual Property Rights (Patents & Cyber Law), Dr. A. Srinivas.Oxford University Press, New Delhi.
- 2. PrabhuddhaGanguli: Intellectual Property Rights, Tata Mc-Graw –Hill, New Delhi
- 3. R.Radha Krishnan, S.Balasubramanian: Intellectual Property Rights, Excel Books. New Delhi.

- 1. Deborah E.Bouchoux: Intellectual Property, Cengage Learning, New Delhi.
- 2. Richard Stim: Intellectual Property, Cengage Learning, New Delhi.
- 3. Kompal Bansal & Parishit Bansal Fundamentals of IPR for Engineers, B. S. Publications (Press).
- 4. Cyber Law Texts & Cases, South-Western's Special TopicsCollections.
- 5. M.Ashok Kumar and MohdIqbal Ali: Intellectual Property Rights,Serials Pub.

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Sem	VI Sem	L	Т	Р	С	COURSE CODE
Regulation	V20	2	0	0	0	V20CEMC02
Name of the Course	PROFESSIONAL	ETHICS	AND	HUMA	N VA	LUES
Branch	Common to All Branches					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Discuss the importance of human values and their context (K2)
- Generalize the professional ethics and norms of engineering practice(K2)
- Review the contextual knowledge of engineering asocial experimentation (K2)
- Identify the engineer's responsibility for Safety & Risks (K2)
- Clarify the professional rights & responsibilities at global level (K2)

UNIT I

Human Values: Morals, Values and Ethics – Integrity – Work Ethics – Service Learning –Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing –Honesty –Courage – Value time – Co-operation – Commitment – Empathy –Self-confidence–Spirituality-Character.

UNIT II

Engineering Ethics: The History of Ethics, Purposes for Engineering Ethics, Consensus and Controversy, Professional and Professionalism, Professional Roles to be played by an Engineer –Self Interest, Customs and Religion, Uses of Ethical Theories, Professional Ethics, Types of Inquiry in Engineering Ethics.

UNIT III

Engineering as Social Experimentation: Comparison with Standard Experiments –now ledge gained–Conscientiousness–Relevant Information–Learning from the Past–Engineers as Managers, Consultants, and Leaders – Accountability – Role of Codes– odes and Experimental Nature of Engineering.

UNIT IV

Engineers' Responsibility for Safety and Risk: Safety and Risk, Concept of Safety – Types of Risks – Voluntary v/s Involuntary Risk- Short term v/s long term Consequences, Delayed v/s Immediate Risk- Safety and the Engineer – Designing for Safety – Risk-Benefit Analysis-Accidents.





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Department of Electrical & Electronics Engineering (NBA Accredited)

UNIT V

Engineers' Responsibilities, Rights & Global Issues: Collegiality, Senses of Loyalty, professionalism and Loyalty, Professional Rights & Responsibilities– confidential and proprietary information, Bribes/Gifts, Whistle Blowing. Globalization- Cross-culture Issues, Environmental Ethics, Computer Ethics, Weapons Development Ethics and Research Ethics, Intellectual Property Rights.

Text Books:

- 1. "Engineering Ethics and Human Values" by M. Govindarajan, S.Natarajan and V.S.Senthil Kumar-PHILearningPvt.Ltd-2009.
- 2. "Professional Ethics and Morals" by Prof. A.R. Aryasri, Dharanikota Suyodhana -Maruthi Publications.
- 3. "Professional Ethics and Human Values" by A.Alavudeen, R.KalilRahman and M.Jayakumaran-Laxmi Publications.

- 1. "Professional Ethics and Human Values" by Prof.D.R.Kiran.
- 2. "Indian Culture, Values and Professional Ethics"by PSRMurthy-BS Publication.
- 3. "Ethics in Engineering" by Mike W.Martin and Roland Schinzinger– TMH.
<u>Open Electives</u>

The following courses are offered to the students of other departments.

S.No.	Course Code	Name of the Course
1.	V20CSTOE01	Python Programming Lab
2.	V20CSTOE02	Advanced Python Programming Lab
3.	V20CSTOE03	Operating Systems
4.	V20CSTOE04	Software Engineering
5.	V20CSTOE05	Object Oriented Programming through Java Lab
6.	V20CSTOE06	Computer Graphics
7.	V20CSTOE07	Software Testing Methodologies
8.	V20CSTOE08	Linux Shell Scripting Lab
9.	V20CSTOE09	Computer Networks
10.	V20CSTOE10	Cryptography and Network Security
11.	V20CSTOE11	Database Management Systems Lab
12.	V20CSTOE12	Human Computer Interaction

Semester	V to VII SEM	L	Т	Р	С	COURSE CODE
Regulation	V20	0	0	6	3	V20 CSTOE01
Name of the Course	Python Programming Lab (Open Elective)					
Branch	Common to CIVIL,MECH,EEE,ECE,ECT,CAI & AIM					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate Basic Python Programs	(K3)
CO2: Construct control structures in python.	(K3)
CO3: Demonstrate functions and packages.	(K3)
CO4: Construct python programs using structured data types.	(K3)
CO5: Demonstrate Text Files.	(K3)

<u>Syllabus:</u>

Basics of python programming: Features of python – History of Python - The Future of Python installation and execution - Data types – Identifiers - variables – type conversions- Literal Constants – Numbers – Strings. I/O statements. Operators and expressions, operator precedence – expression evaluation.

Exercise 1 - Basics

a) A sample Python Script using command prompt, Python Command Line and IDLE

b) A program to purposefully raise an Indentation Error and correct it

Exercise 2 - Operations

a) A program to compute distance between two points taking input from the user (Pythagorean Theorem)

b) A program on add.py that takes 2 numbers as command line arguments and prints its sum.

Decision Control statements: conditional (if), alternative (if-else), chained conditional (if-elifelse); **Iteration**: while loop, for loop, nested for loop, range function, break, continue and pass statements.

Exercise - 3 Control Flow

a) A Program to implement for checking whether the given number is a even number or not.

b) A program to construct reverse the digits of a given number and add it to the original, If the sum is not a palindrome repeat this procedure.

c) A program using a while loop that asks the user for a number, and prints a countdown from that number to zero.

Exercise 4 - Control Flow – Continued

a) A program to construct the following pattern, using a nested for loop.

```
*
```

* * * * *

* * * *

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

b) By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.

Functions and modules : Introduction - Function Definition - Function Call – argument types-Scope and Lifetime - The return statement - More on Defining Functions - Lambda Functions or Anonymous Functions.

Exercise - 5 – Problem Solving using Functions

a) Find mean, median, mode for the given set of numbers passed as arguments to a functionb) Develop a function nearly_equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.

c) Develop a Recursive Function to find the Factorial of a given number .

d) Develop function to compute gcd, lcm of two numbers. Each function shouldn't exceed one line.

Lists: list operations, list slices, list methods, mutability, cloning lists, list parameters. **Tuples**: tuple assignment, tuple as return value. **Set:** Set Creation, Set Operations. **Dictionaries**: Creation, operations; comprehension, operations on strings.

Exercise - 6 Structured Data types

a) a program to count the number of strings where the string length is 2 or more and the first and last character are same from a given list of strings.

b) a program to develop unzip a list of tuples into individual lists and convert them into dictionary.

Exercise - 7 Structured Data types Continued

a) A program to count the numbers of characters in the string and store them in a dictionary data structure

b) a program to use split and join methods in the string and trace a birthday with a dictionary data structure.

Documentation Strings- Modules - Packages

Exercise - 8- Modules

a) Install packages requests, flask and explore them using (pip)

b) A program to implement a script that imports requests and fetch content from the page. Eg. (Wiki)

c) Develop a simple script that serves a simple HTTP Response and a simple HTML Page

Introduction - Types of files - Text files - reading and writing files

Exercise - 9 Files

a) a program to count frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file?b) a program to compute the number of characters, words and lines in a file.

Classes, Methods, Constructor, Inheritance, Overriding Methods, Data hiding

Exercise - 10 OOP

a) Class variables and instance variable and illustration of self variablei) Robotii) ATM Machine

Text Books:

1. "Python Programming using problem solving Approach" ReemaThareja, Oxford University Press – 2017.

Python with Machine Learning by A.Krishna Mohan, Karunakar&T.Murali Mohan by S. Chand

Publisher.

Semester	V to VII SEM	L	Т	Р	С	COURSE CODE	
Regulation	V20	0	0	6	3	V20CSTOE02	
Name of the Course	Advanced Python Programming Lab (Open Elective)						
Branch	Common to CIVIL,MECH,EEE,ECE,ECT,CAI & AIM						

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1:	Develop Python Programs using regular expressions.		(K3)
CO2:	Develop programs using GUI.	(K3)	
CO3:	Construct programs using Numpy Arrays.		(K3)
CO4:	Develop python programs using pandas.		(K3)
CO5:	Develop charts using matplotlib.		(K3)
	LIST OF EXPERIMENTS		

1. Regular expressions & GUI:

- a) Develop a python program to create regular expression to replace a string with a new string.
- b) Develop a python program to create regular expression to retrieve all the words starting with 'a' in a given string and other create other regular expression to retrieve all the words with size 5.
- c) A Python Program to create a regular expression to search for string using search(), findall(), match()
- d) A Python Program to create a regular expression to extract E-mail id from files.
- e) A Python Program to create a regular expression to extract Phone number from files.
- **f)** A Python Program to create a regular expression to extract words whose length is greater than 4 from files **GUI**
- g) A Python Program to draw different shapes on canvas
- h) A Python Program to create a push button and bind it with an event handler function using command option
- i) A Python Program to design a simple calculator
- j) A Python Program to create check boxes and display the content of selected boxes

2. Numpy

- a. A Python Program to split arrays using numpy module.
- b. A Python Program to test all aggregate functions in numpy module
- c. A Python Program to generate a matrix of random numbers within range and print its Transpose
- d. A Python Program that calculates variance, co variance, correlation by taking a sample statistical data.
- e. Write a python program to find rank, determinant, and trace of an array.
- f. Write a python program to find eigenvalues of matrices
- g. Write a python program to find matrix and vector products (dot, inner, outer, product), matrix exponentiation.
- h. Write a python program to solve a linear matrix equation, or system of linear scalar equations.

3. Pandas

- a. Write a python program to implement Pandas Series with labels, dictionary and Numpy
- b. Write a program to creating a Pandas DataFrame using dictionary and two dimensional array.
- c. Write a program which make use of following Pandas methods
- d. i) describe() ii) head() iii) tail()
- e. Perform insert, delete row operations on data frame.

4. Pandas Library: Visualization

- a. Write a program which use pandas inbuilt visualization to plot following graphs:
 - i. Bar plots
 - ii. Histograms
 - iii. Line plots
 - iv. Scatter plots
- b. Write a program to demonstrate use of groupby() method.
- c. Write a program to demonstrate pandas Merging, Joining and Concatenating
- d. Creating data frames from csv and excel files.

Text Books:

- 1. Core Python Programming Dr. R Nageswara Rao Dreamtech publications.
- 2. Problem solving and python programming fundametals and application: Numpy, Pandas and Matplotlib. HarshaBhasin.

Semester	V to VII SEM	L	Т	Р	C	COURSE CODE
Regulation	V20	3	0	0	3	V20 CSTOE03
Name of the CourseOperating Systems (Open Elective)						
Branch Common to CIVIL,MECH,EEE,ECE,ECT,CAI & AIM						
Gullahua Dataila						

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Operating System Services and System Calls.	(K2)
CO2: Illustrate Process Management Concepts and CPU Scheduling Algorithms.	(K3)
CO3: Demonstrate Process Synchronization primitives and Process Deadlocks.	(K3)
CO4: Illustrate Memory Management Techniques and Page Replacement Algorithms.	(K3)
CO5: Describe File System Concepts and Mass Storage Structures.	(K2)

UNIT-I: Introduction: Operating-System Structure, Operating-System Services, User and Operating System Interface, System Calls, Types of System Calls.

UNIT-II: Process Management: Process Concept, Process Scheduling, Operations on Processes, Inter process Communication. **Threads:** Overview, Multithreading Models **CPU Scheduling:** Basic Concepts, Scheduling Criteria, Scheduling Algorithms.

UNIT-III: Process Synchronization: The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Monitors. **Deadlocks:** System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

UNIT-IV: Memory Management: Main Memory: Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table.

Virtual Memory: Introduction, Demand Paging, Page Replacement Algorithms, Allocation of Frames, Thrashing.

UNIT-V: Storage Management: Overview of Mass-Storage Structure, Disk Scheduling, File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Allocation Methods.

Text Book:

1. Operating System Concepts, Abraham Silberschatz, ,Peter Baer Galvin,Greg Gagne, 9th Edition, John Wiley and Sons Inc., 2012.

- 1. Operating Systems Internals and Design Principles, William Stallings, 7th Edition, Prentice Hall, 2012 .
- 2. Modern Operating Systems, Andrew S. Tanenbaum, Third Edition, Addison Wesley, 2007.

Semester	V to VII SEM	L	Т	Р	С	COURSE CODE
Regulation	V20	3	0	0	3	V20CSTOE04
Name of the CourseSoftware Engineering (Open Elective)						
Branch	ranchCommon to CIVIL,MECH,EEE,ECE,ECT,CAI & AIM					

Syllabus Details

(K3)

Course Outcomes: After Successful completion of the Course, the student will be able to:

- Demonstrate the Software Development life cycle Models. CO1:
- CO2: Illustrate the Requirements engineering process and SRS document. (K3) (K3)
- CO3: Develop the Software Architecture and Design Modeling.
- Apply the Coding & Testing techniques and Risk management strategies. CO4: (K3) CO5:

Describe Project estimation techniques and Quality Management& Metrics. (K2)

UNIT-I: Software and Software Engineering: The Nature of Software, Software Engineering, Software Process, Software Engineering Practice, Software Myths. Software process models: Waterfall model, Prototyping, Iterative development, Unified process, RAD model, Spiral model, and agile process.

UNIT-II: Software Requirements: Functional and non-functional requirements, User requirements, System requirements, Interface specification, SRS document. Requirements engineering process: Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management.

UNIT-III: Software Architecture: Role of software architecture, Architecture views, components and connector view, Cohesion and Coupling, documenting architecture design. Design: Design concepts, Function-oriented design, object-oriented design, UML diagrams, and Data flow diagram.

UNIT-IV: Coding and Testing: Programming principles and guidelines, incrementally developing code. Testing concepts, testing process, Black-box & White-box testing.Risk management: Reactive vs. Proactive Risk strategies, Software risks, Risk identification, Risk projection, Risk refinement, RMMM Plan.

UNIT-V: Software Project Estimation& Maintenance: Decomposition techniques, Empirical Estimation Models, Maintenance Process, Reengineering, Configuration Management. Metrics for Products & Quality Management: Software Measurement, Metrics for software quality, Quality concepts, Software Reviews, Formal technical reviews, SEI-CMM Model, Six Sigma and ISO 9000 quality standards.

Text Books:

- Software Engineering, A practitioner's Approach- Roger S.Pressman, 7th Edition, 1. McGrawHill International Edition.
- 2. Software Engineering- Ian Sommerville, 9th Edition, Pearson education.Software Engineering, A Precise approach, PankajJalote, Wiley

- 1. CMMI and Six Sigma: Partners in Process Improvement, Jeannine M. Siviy, M. Lynn Penn, Robert W. Stoddard, 1st edition, Addison Wesley;
- 2. SoftwareEngineeringprinciplesandpractice,WSJawadekar, 3rdEdition,TMH.

Semester	V to VII SEM	L	Т	Р	С	COURSE CODE	
Regulation	V20	0	0	6	3	V20CSTOE04	
Name of the Course	Object-Oriented Programming through Java Lab (Open Elective)						
Branch	Common to CIVIL,MECH,EEE,ECE,ECT,CAI & AIM						

Syllabus Details

CO1: Use code editors and JDK tools to write, compile, and run Java prog	rams. (K3)
CO2: Use control statements and arrays while programming.	(K3)
CO3: Develop programs using classes and objects.	(K3)
CO4: Use inheritance, interfaces and packages while developing program	ns in Java. (K3)
CO5: Develop exception-handling and multithreaded programs.	(K3)

Syllabus:

CYCLE–I:Overview of Object-oriented Programming: Introduction to Object-oriented Programming, Principles of Object-oriented Programming Languages, and Applications of OOP.

Introduction to Java: History of Java, Java Features, Java Virtual Machine, Java Program Structure, Literals, Identifiers, Primitive Data types, Variables, Operators and Expressions, Operator Precedence and Associativity, Type Conversion and Casting.

Exercises

- a) Develop a Java program to display the default values of all primitive data types of Java.
- b) Construct a Java program that calculates the area of a triangle, given the lengths of all three sides.

Area = $\sqrt{(S(S-a)(S-b)(S-c))}$, where S = (a+b+c)/2.

CYCLE- II: Control Statements: Conditional Statements - if, switch; Iteration Statements - while, do-while, for, for-each version of for; Jump Statements - break, continue, return.

Arrays: Introduction to Arrays, Array Declaration and Initialization, One-Dimensional Arrays, Multi-Dimensional Arrays, Basic String Handling.

Exercises

- a) Develop a Java program that displays
 - i) The roots of a quadratic equation $ax^2+bx+c=0$
 - ii) The nature of roots by calculating the discriminate D.
- b) N bikers compete in a race such that they drive at a constant speed, which may or may not be the same as the other. To qualify the race, the speed of a racer must be more than the average speed of all N racers. Take as input, the speed of each racer and print back the speed of qualifying racers.
- c) Develop a Java program that displays the name of the day, based on the value of day, using the switch statement.
- d) Develop a Java program to search for an element in a given list of elements using Linear Search.
- e) Develop a Java program to perform multiplication of two matrices.
- f) Develop a Java program using StringBuffer to perform various operations on a string.

CYCLE– III: Introduction to Classes and Objects: General Form of a Class, Methods, Declaring Objects using new, Constructors, this Keyword, Understanding static, Method and Constructor Overloading, Using Command-Line Arguments, Garbage Collection.

- a) Construct a Java program to demonstrate class mechanism Create a class that contains variables, methods, constructors and invoke those methods inside main().
- b) Develop a Java program demonstrating the use of static variables, methods.
- c) Develop a Java program demonstrating the use of this keyword.
- d) Develop a Java program that implements method overloading.
- e) Develop a Java program that implements constructor overloading.
- f) Develop a Java program demonstrating the use of command-line arguments.

CYCLE- IV: Inheritance: Access Control, Introduction to Inheritance, Types of Inheritance, Using super, Method Overriding and Dynamic Method Dispatch, Using final, Abstract Classes. **Interfaces:** Defining and Implementing Interfaces. **Packages:** Creating Packages, Importing Packages, Importance of CLASSPATH.

Exercises

- a) Construct a Java program to demonstrate single inheritance.
- b) Construct a Java program to demonstrate multi-level inheritance.
- c) Construct a Java program that illustrates the use of super.
- d) Develop a Java program that illustrates runtime polymorphism.
- e) Develop a Java program that uses an abstract class to find areas of different shapes.
- f) Develop a Java program using interfaces. In addition, use interfaces to achieve multiple inheritance.
- g) Construct a Java program that creates a user-defined package. Use the package by importing it in another Java program.

CYCLE- V: Exception Handling: Exception-Handling Fundamentals, Using try and catch, Using throw, Using throws and finally, User-defined Exceptions.

Exercises

- a) Develop a Java program to demonstrate exception-handling mechanism using try/catch. Use multiple catch clauses.
- b) Construct a Java program for illustrating the use of throw.
- c) Construct a Java program for illustrating the use of finally.
- d) Construct a java program for demonstrating the creation and use of user-defined exceptions.

CYCLE– VI: Multithreading: Introduction to Multithreading, Creation of Threads, Thread Life Cycle, isAlive() and join(), Thread Synchronization, and Interthread Communication.

Exercises

- a) Construct a Java program that creates threads by extending Thread class. The first thread displays "Good Morning" every 1 second, the second thread displays "Hello" every 2 seconds and thethird displays "Welcome" every 3 seconds.
- b) Use Runnable to develop a Java program for the above problem.
- c) Construct a java program illustrating isAlive() and join().
- d) Develop a Java program to solve producer consumer problem using thread synchronization.

Text Books:

- 1. Java: The Complete Reference; 8th edition; Herbert Schildt; TMH.
- 2. Programming in Java; 2nd edition; SachinMalhotra, SaurabhChoudhary; Oxford University Press.
- 3. Core JAVA, An Integrated Approach; Dr. R. Nageswara Rao; Dreamtech Press.

Semester	V to VII SEM	L	Т	Р	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CSTOE06
Name of the CourseComputer Graphics (Open Elective)						
Branch Common to CIVIL,MECH,EEE,ECE,ECT,CAI & AIM						
Cullabus Dataila						

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Discuss the applications of computer graphics and learn basic algorithms.	(K2)
CO2: Discuss the concepts of 2D graphics along with transformation techniques.	(K2)
CO3: Demonstrate3D graphics and 3D object representation.	(K3)
CO4: Discuss different visible surface detection methods and color models.	(K2)
CO5: Illustrate different animation sequences .	(K2)

UNIT-I: Introduction: Application of Computer Graphics, raster scan systems, random scan systems, raster scan display processors. Output Primitives : Points and lines, line drawing algorithms(Bresenham's and DDA Line derivations and algorithms), mid-point circle algorithms. **Filled area primitives:** Boundary-fill and flood-fill algorithms.

UNIT-II: 2-D geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, and homogeneous coordinates, composite transforms.**2-D viewing:** The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland line clipping, Sutherland–Hodgeman polygon clipping algorithm.

UNIT-III: 3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations. **3-D object representation:** Polygon surfaces, quadric surfaces, spline representation, Bezier curve and B-Spline curves.

UNIT-IV: Visible surface detection methods: Classification, back-face detection, depth-buffer, scan-line, BSP tree methods, area sub-division. **Color Models –** RGB, YIQ, CMY, HSV.

UNIT-V: Computer Animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications.

Text Books:

- 1. Computer Graphics C version, Donald Hearn, M.Pauline Baker, Pearson
- 2. Computer Graphics, Schaum's outlines", Zhigandxiang, RoyPlastock, 2nd Edition, TataMc-Graw HillEdition.

- 1. Computer Graphics Principles & practice, 2/e, Foley, VanDam, Feiner, Hughes, Pearson
- 2. Computer Graphics, Peter, Shirley, CENGAGE
- 3. Principles of Interactive Computer Graphics, Neuman ,Sproul,TMH.

Semester	V to VII SEM	L	Т	Р	С	COURSE CODE	
Regulation	V20	3	0	0	3	V20CSTOE07	
Name of the Course	Software Testing Methodologies (Open Elective)						
Branch Common to CIVIL,MECH,EEE,ECE,ECT,CAI & AIM							
<u>Svllabus Details</u>							

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Describe Software testing objectives and methodology.	(K2)
CO2: Apply various Software testing techniques.	(K3)
CO3: Discuss Static testing techniques for software testing.	(K2)
CO4: Distinguish Software testing and debugging process.	(K2)
CO5: Explain modern Software testing tools to Support software testing.	(K2)

UNIT-I: Introduction to Software Testing: Evolution of software Testing, Myths and Facts, Goals of software Testing, Definitions of Testing, Model for Software Testing, Software Testing Terminology, Software Testing Life Cycle.

UNIT-II: Verification and Validation: Verification & Validation Activities, Verification, Verification of Requirements, Verification of High level and low level designs, How to verify code, Validation. **Dynamic Testing I:** Black Box testing techniques: Boundary Value Analysis, Equivalence Class Testing, Decision Table based Testing,

UNIT-III: Dynamic Testing II: White-Box Testing: Need of White-Box Testing, Logic coverage criteria, Basis path testing, Loop testing. **Static Testing:** Inspections, Structured Walkthroughs, Technical reviews.

UNIT-VI: Regression Testing: Progressive Vs Regressive Testing, Regression testability, Objectives of regression testing, When is Regression Testing done? Regression Testing Types, Regression testing techniques. **Debugging:** Debugging process, Techniques, correcting bugs.

UNIT-V: Software Quality Management: Software quality concept, Quality control and Quality Assurance, Software Quality metrics. **Automation and Testing Tools:** Need for automation, categorization of Testing tools, selection of testing tools, Overview of some commercial testing tools.

Text Books:

1. Software Testing, Principles and Practices, Naresh Chauhan, 9th Edition, Oxford Publisher.

- 1. Software testing techniques Boris Beizer, 2nd Edition, Dreamtech publisher.
- 2. Foundations of Software testing, Aditya P Mathur, 2nd ed, Pearson.
- 3. Software Testing- Yogesh Singh, CAMBRIDGE.

Semester	V to VII SEM	L	Т	Р	C	COURSE CODE
Regulation	V20	0	0	6	3	V20CSTOE08
Name of the CourseLinux Shell Scripting Lab (Open Elective)						
Branch Common to CIVIL,MECH,EEE,ECE,ECT,CAI & AIM						

Course Outcomes: After Successful completion of the Course, the student will be able to:

- **CO1:** Demonstrate the basic knowledge of Linux commands and utilities by using Linux shell environment. (K3)
- **CO2:** Experiment with the Concept of shell Programming on Files and Directories. (K3) **CO3:** Experiment with the Concept of shell Programming on File Permissions. (K3)
- **CO4:** Experiment with the Concept of shell Programming on Conditional Statements. (K3)
- **CO5:** Experiment with the Concept of shell Programming on Looping Statements. (K3)

LIST OF EXPERIMENTS

- 1. Experiment the following Unix Commands:
 - a) **General Purpose Utilities:** cal, date,man,who.
 - b) Directory Handling Commands: pwd,cd,mkdir,rmdir.
 - c) **File Handling Utilities:** cat,cp,ls,rm,nl,wc
 - d) **Displaying Commands:** head, tail
 - e) **Filters:** cmp,comm.,diff,sort,uniq
 - f) **Disk Utilities:** du,df
- 2. Develop a Shell Program to Display all the words which are entered as command line arguments.
- 3. Develop a shell script that Changes Permissions of files in PWD as rwx for users.
- 4. Develop a shell script to print the list of all sub directories in the current directory.
- 5. Develop a Shell Program which receives any year from the keyboard and determine whether the year is leap year or not. If no argument is supplied the current year should be assumed.
- 6. Develop a shell script which takes two file names as arguments-If their contents are same then delete the second file.
- 7. Develop a shell script to print the given number in the reversed order.
- 8. Develop a shell script to print first 25 Fibbonacci numbers.
- 9. Develop a shell script to print the Prime numbers between the specified range.
- 10. Develop a shell script to delete all lines containing the word 'unix' in the files supplied as arguments.
- 11. Develop a shell script Menu driven program which has the following options. i) contents of /etc/passwd
 - ii) list of users who have currently logged in.
 - iii) present working directory. iv) exit.

Text Books:

- 1. UNIX and Shell Programming: A Textbook, Behrouz A. Forouzan | Richard F. Gilberg, Cengage Learning.
- 2. UNIX: Concepts and Applications, Sumithaba Das, 4th Edition, Tata McGrawHill.
- 3. Unix & Shell Programming, M.G.Venkatesh Murthy, Pearson Education.
- 4. UNIX shells by example, 4th Edition Ellie Quigley, Pearson Education.

Semester	V to VII SEM	L	Т	Р	C	COURSE CODE	
Regulation	V20	3	0	0	3	V20CSTOE09	
Name of the CourseComputer Networks (Open Elective)							
Branch Common to CIVIL,MECH,EEE,ECE,ECT,CAI & AIM							
Syllabus Datails							

Course Outcomes: After Successful completion of the Course, the student will be a	ble to:
CO1: Discuss fundamentals of network concepts and Reference Models.	(K2)
CO2: Discuss Communication media and switching techniques.	(K2)
CO3: Demonstrate Error control and Data link layer protocols.	(K3)
CO4: Apply Routing algorithms and congestion control algorithms.	(K3)
CO5: Discuss Transport layer protocols and Application layer protocols.	(K2)

UNIT-I: Introduction: Reference models: The OSI Reference Model- the TCP/IP Reference Model, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN.

UNIT-II: Physical Layer: Transmission Media, Multiplexing: FDM, WDM and TDM- LAN Technologies, introduction to switching: Circuit Switched Networks, Datagram Networks, and Virtual Circuit Networks.

UNIT-III: Data link layer: Design issues, Framing, Flow control, error control, error detection -Parity bit, CRC, Checksum, error correction- Hamming code. MAC: ALOHA, CSMA. Elementary Data Link Layer protocols: simplex protocol, Simplex stop and wait, Simplex protocol for Noisy Channel. Sliding window protocol: One bit, Go back N, Selective repeat-Stop and wait protocol, HDLC, point to point protocol (PPP).Piggybacking.

UNIT-IV: Network Layer :Network layer design issues- Algorithm shortest path routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical routing, Broad cast, Multi cast Routing algorithms-Congestion control and algorithms, Internet Protocol (IP) Addresses, Subnet masking. Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm.

UNIT-V:Transport Layer: Services, Primitives and sockets, Elements of transport protocols, Internet Transport protocols(TCP,UDP,RPC,RTTP/RTP,RTCP) Segment headers, Primitives, Control, Congestion control.

Application layer: DNS, SMTP, POP, FTP HTTP Presentation formatting. Network security: Cryptography, DES Public key and RSA private key cryptography Algorithms.

Text Books:

- 1. Computer Networks Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI.
- 2. Data Communications and Networks Behrouz A. Forouzan. Third Edition TMH.

- 1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.
- 2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson.

Semester	V to VII SEM	L	Т	Р	C	COURSE CODE	
Regulation	V20	3	0	0	3	V20CSTOE10	
Name of the Course	Cryptography and Network Security (Open Elective)						
Branch	Common to CIVIL,MECH,EEE,ECE,ECT,CAI & AIM						

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Discuss fundamentals and mathematical support of Cryptography and Network Security.(**K2**)

CO2: Discuss symmetric and asymmetric cryptosystems.	(K2)
CO3 : Discuss about HASH functions & Digital Signatures to provide authentication and	
integrity.	(K2)
CO4: Demonstrate various methods of Mutual trust and mail security.	(K3)
CO5: Review the Network& Internet Security Scenarios.	(K2)

UNIT-I: Overview: Security attacks, Services, Mechanisms, A model for network security, Symmetric cipher model. **Classical encryption techniques**: Substitution Techniques, Transposition Techniques. **Number Theory**: Prime numbers, Fermat's theorem, Euler's Theorem, the Chinese Remainder Theorem.

UNIT-II: Block Cipher: Principles, DES, Strength of DES, AES, Block cipher Modes of Operations. **Public Key Cryptography:** Principles, Public Key Crypto system, RSA Algorithm, Diffie Hellman Key Exchange.

UNIT-III: Cryptographic Hash Functions: Application of Cryptographic Hash Functions, Requirements & Security, SHA-512, Message Authentication Functions, Requirements, HMAC. **Digital Signatures**: Properties, Attacks and Forgeries, Requirements, Digital Signature Standards, NIST Digital Signature Algorithm.

UNIT-IV:Key Management and Distribution: Symmetric Key Distribution Using Symmetric Encryption, Asymmetric Key Distribution Using Symmetric Encryption, Distribution of Public Keys, X.509 Certificates. **User Authentication**: Remote User Authentication Principles, Kerberos. **Electronic Mail Security:** Pretty Good Privacy (PGP) And S/MIME.

UNIT-V: IP Security: Two modes, two security protocols Authentication Header, Encapsulating Security Payload. **Transport Level Security:** Secure Socket Layer (SSL) and Transport Layer Security (TLS). **HTTPS:** Connection Initiation Connection Closure.

Text Books:

- 1. William Stallings, "Cryptography and Network Security, Principles and Practices", Pearson Education, Sixth Edition.
- 2. Cryptography and Network Security, Behrouz A Forouzan, Debdeep Mukhopadhyay, (3e) Mc Graw Hill.

Reference Books:

1. Charlie Kaufman, Radia Perlman and Mike Speciner, "Network Security – Private Communication in a Public World" Pearson/PHI.

Semester	V to VII SEM	L	Т	Р	C	COURSE CODE
Regulation	V20	0	0	6	3	V20CSTOE11
Name of the CourseDatabase Management System Lab (Open Elective)						
Branch Common to CIVIL,MECH,EEE,ECE,ECT,CAI & AIM						

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1: Construct SQL queries to perform different database operations. (K3) CO2: Experiment with various constraints and Database Indexing Techniques. (K3) CO3: Construct PL/SQL Cursors and Exceptions. (K3) CO4: (K3)
- Develop PL/SQL Functions and Procedures.
- CO5: Develop PL/SQL Packages.

LIST OF EXPERIMENTS

(K3)

- 1. Construct SQL queries to facilitate acquaintance of Built-In Functions, String Functions, Numeric Functions, Date Functions and Conversion Functions.
- 2. Construct SQL queries using Operators.
- 3. Construct SQL queries to Retrieve and Change Data: Select, Insert, Delete and Update
- 4. Construct SQL queries using Group By, Order By and Having Clauses.
- 5. Construct SQL queries on Controlling data: commit, rollback and savepoint
- 6. Construct report using SQL*PLUS
- 7. Construct SQL queries for Creating, Dropping and Altering Tables, Views and Constraints
- 8. Construct SQL queries on Joins and Correlated Subqueries
- 9. Demonstrate Index, Sequence and Synonym.

PL/SOL

- 11. DemonstrateBasicVariables,AnchoredDeclarations,andUsageofAssignmentOperation Using PL SOL block
- 12. Demonstrate Bind and Substitution Variables using PL SQL block
- 13. Demonstrate Control Structures in PL SOL
- 14. Demonstrate Cursors, Exception and Composite Data Types in PL SQL.
- 15. Demonstrate Procedures, Functions, and Packages in PLSQL.

Textbooks:

- 1. OracleDatabase11gTheCompleteReferencebyOraclePress,Kevin Loney
- 2. DatabaseSystemsUsingOracle,NileshShah,2ndEdition, PHI.
- 3. IntroductiontoSQL,RickFVanderLans, 4thEdition, Pearson Education.

- 1. OraclePL/SQLInteractiveWorkbook,B.RosenzweigandE.Silvestrova,2ndEditi on,Pearsoneducation.
- 2. SQL&PL/SQLforOracle10 g,BlackBook, Dr.P.S.Deshpande, DreamTech.

Semester	V to VII SEM	L	Т	Р	C	COURSE CODE	
Regulation	V20	3	0	0	3	V20CSTOE12	
Name of the Course	of the CourseHuman Computer Interaction (Open Elective)						
Branch Common to CIVIL,MECH,EEE,ECE,ECT,CAI & AIM							
Svllabus Details							

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1 : Describe the principles and characteristics of GUI.	(K2)
CO2 :Describe how a computer system may be modified to include human diversity.	(K2)
CO3 : Select an effective style and screen design for a specific business application.	(K2)
CO4: Discuss System Menus & Navigation Schemes.	(K2)
CO5: Select Device and Screen based controls.	(K2)

UNIT I:The User Interface: Introduction, Importance of the User Interface, Importance and benefits of Good Design, Characteristics of Graphical and Web User Interface Graphical User Interface, popularity of graphics, concepts of Direct Manipulation, Graphical System advantage and disadvantage, Characteristics of GUI, Characteristics of Web Interface, Principles of User Interface Design.

UNITII:TheUserInterfaceDesignProcess:ObstaclesandPitfallinthedevelopmentProcess,Usability , The Design Team, Human Interaction with Computers, Important Human Characteristics in Design, Human Consideration in Design, Human Interaction Speeds, Performance versus Preference, Methods for Gaining and Understanding of Users.

UNIT III: Understanding Business Functions: Business Definitions& Requirement analysis, Determining Business Functions. **Principles of Good Screen Design:** Human considerations in screen Design, interface design goals, screen meaning and purpose, Technological considerations in Interface Design.

UNIT IV: System Menus and Navigation Schemes: Structure, Functions, Context, Formatting, PhrasingandSelecting,NavigatingofMenus,KindsofGraphicalMenusWindowsInterface:Windowsch aracteristic,ComponentsofWindow,WindowsPresentationStyles,TypesofWindows,WindowManag ement,

UNITV: Device and Screen-Based Control: Device based controls, Operable Controls, Textentry/read-Only Controls, Section Controls, Combining Entry/Selection Controls Presentation Controls, Selecting proper controls.

Text Books:

- 1. "The Essential Guide to User Interface Design", Wilbert O. Galitz, 2nd edition, 2002, Wiley India Edition.
- 2. Prece, Rogers, "Sharps Interaction Design", Wiley India.
- 3. "Designing the user interfaces". Ben Shneidermann 3rd Edition, Pearson Education Asia.

- 1. "User Interface Design", SorenLauesen, Pearson Education
- 2. "Essentials of Interaction Design", Alan Cooper, Robert Riemann, David Cronin, Wiley
- 3. "Human Computer Interaction", Alan Dix, Janet Fincay, GreGoryd, Abowd, Russell, Bealg, Pearson Education.