



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC Autonomous)

Kandlakoya, Medchal Road, Hyderabad – 501 401

ACADEMIC REGULATIONS - R 22

FOR CBCS & OUTCOME BASED B.TECH (REGULAR, HONOURS and MINOR) PROGRAMMES

(Effective for the students admitted into I year from the Academic Year 2022-23)

1.0 Under-Graduate Degree Programme in Engineering & Technology (UGP in E&T)

CMR College of Engineering & Technology, Hyderabad offers 4 Years (8 Semesters) Bachelor of Technology (B.Tech.) Regular, Honours and Minor degree Programmes, under Choice Based Credit System (CBCS), with effect from the Academic Year 2022-23 and onwards, in the Branches of Engineering.

2.0 Eligibility for Admission

- 2.1** Admissions will be done as per the norms prescribed by the Government of Telangana. The Government orders in vogue shall prevail.
- 2.2** The candidate should have passed the qualifying examination Intermediate or equivalent on the date of admission.
- 2.3** Seats in each program in the college are classified into Category–A (70% of intake) and Category-B (30% of intake) besides Lateral Entry. Category-A seats will be filled by the Convener, TSEAMCET Admissions. Category-B seats will be filled by the College as per the guidelines of the Competent Authority.
- 2.4** Lateral Entry seats for 10% of the candidates from the approved strength of the course shall be admitted into the III Semester directly based on the rank secured by the candidate in TSECET in accordance with the guidelines from the Competent Authority.
- 2.5** The medium of instructions for the entire undergraduate programme in Engineering & Technology will be **English** only

3.0 B.Tech. Programme Structure

- 3.1** A student after securing admission shall complete the B.Tech. programme in a minimum period of **four** academic years (8 semesters), and a maximum period of **eight** academic years (16 semesters) starting from the date of commencement of first year first semester, failing which student shall forfeit seat in B.Tech course. Each student shall secure 160 credits (with CGPA \geq 5) required for the completion of the undergraduate programme and award of the B.Tech. degree.
- 3.2** UGC/ AICTE specified definitions/ descriptions are adopted appropriately for various terms and abbreviations used in these academic regulations/ norms, which are listed below.

3.2.1 Semester Scheme

Each undergraduate programme is of 4 academic years (8 semesters) with the academic year divided into two semesters (First/Odd and Second/Even). Each Semester shall have a minimum of 90 Instructional Days.

semester - ‘Continuous Internal Evaluation (CIE)’ and ‘Semester End Examination (SEE)’ under Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) indicated by UGC, and curriculum/course structure suggested by AICTE are followed.

3.2.2 Credit Courses

All subjects/ courses are to be registered by the student in a semester to earn credits which shall be assigned to each subject/ course in an L: T: P: C (lecture periods: tutorial periods: practical periods: credits) structure based on the following general pattern.

- One credit for one hour/ week/ semester for Theory/ Lecture (L) courses or Tutorials.
- One credit for two hours/ week/ semester for Laboratory/ Practical (P) courses.

Courses like Environmental Science, Constitution of India, Intellectual Property Rights, and Gender Sensitization Lab are mandatory courses. These courses will not carry any credits.

3.2.3 Subject Course Classification

All subjects/ courses offered for the undergraduate programme in E&T (B.Tech. degree programmes) are broadly classified as follows. The University has followed almost all the guidelines issued by AICTE/UGC.

S. No.	Broad Course Classification	Course Group/ Category	Course Description
1	Foundation Courses (FnC)	BSC – Basic Sciences	Includes Mathematics, Physics and Chemistry subjects
2		ESC - Engineering Sciences	Includes Fundamental Engineering Subjects
3		HSMC – Humanities and Social Sciences	Includes subjects related to Humanities, Social Sciences and Management
4	Core Courses (CoC)	PCC – Professional Core	Includes core subjects related to the parent discipline/ department/ branch of Engineering.
5	Elective Courses (ElC)	PEC – Professional Electives	Includes elective subjects related to the parent discipline/ department/ branch of Engineering.
6		OEC – Open Electives	Elective subjects which include inter-disciplinary subjects or subjects in an area outside the parent discipline/ department/ branch of Engineering.

7	Core Courses (PROJ)	Project Work	B.Tech. Project or UG Project or UG Major Project or Project Stage I & II
8		Industry Training/ Internship/ Mini-project/ Mini- Project/ Skill Development Courses	Industry Training/ Internship/ Mini-Project/ Mini-Project/ Skill Development Courses
9		Seminar	Seminar/ Colloquium based on core contents related to parent discipline/ department/ branch of Engineering.
10	Minor Courses	-	1 or 2 Credit Courses (subset of HSMC)
11	Mandatory Courses (MC)	-	Mandatory Courses (non-credit)

4.0 Course Registration

- 4.1 A 'faculty advisor or counselor' shall be assigned to a group of 20 students, who will advise the students about the undergraduate programme, its course structure and curriculum, choice/option for subjects/ courses, based on their competence, progress, pre-requisites and interest.
- 4.2 The academic section of the college invites 'registration forms' from students before the beginning of the semester through 'on-line registration', ensuring 'date and time stamping'. The online registration requests for any 'current semester' shall be **completed before the commencement of SEEs (Semester End Examinations) of the 'preceding semester'**.
- 4.3 A student can apply for **on-line** registration, **only after** obtaining the '**written approval**' from faculty advisor/counselor, which should be submitted to the college academic section through the Head of the Department. A copy of it shall be retained with the Head of the Department, Faculty Advisor/ Counselor and the student.
- 4.4 A student may be permitted to register for all the subjects/ courses in a semester as specified in the course structure with maximum additional subject(s)/course(s) limited to 6 Credits (any 2 elective subjects), based on **progress** and SGPA/ CGPA, and completion of the '**pre-requisites**' as indicated for various subjects/ courses, in the department course structure and syllabus contents.
- 4.5 Choice for '**additional subjects/courses**', not more than any 2 elective subjects in any Semester, must be clearly indicated, which needs the specific approval and signature of the Faculty Advisor/Mentor/HOD.
- 4.6 If the student submits ambiguous choices or multiple options or erroneous entries during **online** registration for the subject(s) / course(s) under a given/ specified course group/ category as listed in the course structure, only the first mentioned subject/ course in that category will be taken into consideration.
- 4.7 Subject/ course options exercised through **on-line** registration are final and **cannot** be changed or inter-changed; further, alternate choices also will not be considered.

However, if the subject/ course that has already been listed for registration by the Head of the Department in a semester could not be offered due to any inevitable or unexpected reasons, then the student shall be allowed to have alternate choice either for a new subject (subject to offering of such a subject), or for another existing subject (subject to availability of seats). Such alternate arrangements will be made by the Head of the Department, with due notification and time-framed schedule, within **a week** after the commencement of class-work for that semester.

4.8 Dropping of subjects/ courses may be permitted, only after obtaining prior approval from the faculty advisor/ counselor 'within a period of 15 days' from the beginning of the current semester.

4.9 Open Electives: The students have to choose three Open Electives (OE-I, II & III) from the list of Open Electives given by other departments. However, the student can opt for an Open Elective subject offered by his own (parent) department, if the student has not registered and not studied that subject under any category (Professional Core, Professional Electives, Mandatory Courses etc.) offered by parent department in any semester. Open Elective subjects already studied should not repeat/should not match with any category (Professional Core, Professional Electives, Mandatory Courses etc.) of subjects even in the forthcoming semesters.

4.10 Professional Electives: The students have to choose six Professional Electives (PE-I to VI) from the list of professional electives given.

5.0 Subjects/ courses to be offered

5.1 A subject/ course may be offered to the students, **only if** a minimum of 15 students opt for it.

5.2 More than **one faculty member** may offer the **same subject** (lab/ practical may be included with the corresponding theory subject in the same semester) in any semester. However, selection of choice for students will be based on - '**first come first serve** basis and CGPA criterion' (i.e. the first focus shall be on early **on-line entry** from the student for registration in that semester, and the second focus, if needed, will be on CGPA of the student).

5.3 If more entries for registration of a subject come into picture, then the Head of the Department concerned shall decide, whether or not to offer such a subject/ course for **two (or multiple) sections**.

5.4 In case of options coming from students of other departments/ branches/ disciplines (not considering **open electives**), first **priority** shall be given to the student of the '**parent department**'.

6.0 Attendance requirements:

6.1 A student shall be eligible to appear for the semester end examinations, if the student acquires a minimum of 75% of attendance in aggregate of all the subjects/ courses (including attendance in mandatory courses and Additional courses if any) for that

semester. **Two periods** of attendance for each theory subject shall be considered, if the student appears for the mid-term examination of that subject. **For Mandatory Course the Student has to acquire minimum attendance of 75% for securing satisfactory result. The student who fails to acquire minimum attendance of 75% has to re-register for the same as and when offered in subsequent semesters.**

- 6.2 Shortage of attendance in aggregate upto 10% (65% and above, and below 75%) in each semester may be condoned by the college academic committee on genuine and valid grounds, based on the student's representation with supporting evidence.
- 6.3 A stipulated fee shall be payable for condoning of shortage of attendance.
- 6.4 Shortage of attendance below 65% in aggregate shall in **NO** case be condoned.
- 6.5 **Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examinations of that semester. They get detained and their registration for that semester shall stand cancelled,** including all academic credentials (internal marks etc.) of that semester. **They will not be promoted to the next semester.** They may seek re-registration for all those subjects registered in that semester in which the student is detained, by seeking re-admission into that semester as and when offered; if there are any professional electives and/ or open electives, the same may also be re-registered if offered. However, if those electives are not offered in later semesters, then alternate electives may be chosen from the **same** set of elective subjects offered under that category.
- 6.6 A student fulfilling the attendance requirement in the present semester shall not be eligible for readmission into the same class.

7.0 Academic Requirements

The following academic requirements have to be satisfied, in addition to the attendance requirements mentioned in Item No. 6.

- 7.1 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course, if student secures not less than 35% (14 marks out of 40 marks) in the Continuous Internal Evaluation (CIE), not less than 35% (21 marks out of 60 marks) in the semester end examinations (SEE), and a minimum of 40% (40 marks out of 100 marks) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together; in terms of letter grades, this implies securing 'C' grade or above in that subject/ course.
- 7.2 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to Real-time Research Project (or) Field Based Research Project (or) Mini Project (or) Internship (or) Technical Seminar, if the student secures not less than 40% marks (i.e. 40 out of 100 allotted marks) in each of them. The student is deemed to have failed, if he (i) does not submit a report on Mini Project/Internship, or (ii) not make a presentation of the same before the evaluation committee as per schedule, or (iii) secures less than 40% marks in Real-time ResearchProject (or) Field Based Research Project (or) Mini Project (or) Internship (or) Technical Seminar evaluations.

A student may reappear once for each of the above evaluations, when they are scheduled again; if the student fails in such 'one reappearance' evaluation also, the student has to reappear for the same in the next subsequent semester, as and when it is scheduled.

7.3 Promotion Rules

S. No.	Promotion	Conditions to be fulfilled
1	First year first semester to first year second semester	Regular course of study of first year first semester.
2	First year second semester to Second year first semester	(i) Regular course of study of first year second semester. (ii) Must have secured at least 20 credits out of 40 credits i.e., 50% credits up to first year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3.	Second year first semester to Second year second semester	Regular course of study of second year first semester.
4	Second year second semester to Third year first semester	(i) Regular course of study of second year second semester. (ii) Must have secured at least 48 credits out of 80 credits i.e., 60% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Third year first semester to Third year second semester	Regular course of study of third year first semester.
6	Third year second semester to Fourth year first semester	(i) Regular course of study of third year second semester. (ii) Must have secured at least 72 credits out of 120 credits i.e., 60% credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
7	Fourth year first semester to Fourth year second semester	Regular course of study of fourth year first semester.

- 7.4 A student (i) shall register for all courses/subjects covering 160 credits as specified and listed in the course structure, (ii) fulfills all the attendance and academic requirements for 160 credits, (iii) earn all 160 credits by securing SGPA ≥ 5.0 (in each semester), and CGPA ≥ 5 (at the end of 8 semesters), (iv) **secured satisfactory grade in all the mandatory courses**, to successfully complete the undergraduate programme. The performance of the student in these 160 credits shall be considered for the calculation of the final CGPA (**at the end of undergraduate programme**), and shall be indicated in the consolidated grade cum credit sheet.
- 7.5 If a student registers for '**extra subjects**' (in the parent department or other departments/branches of Engg.) other than those listed subjects totaling to 160 credits as specified in the course structure of his department, the performances in those '**extra subjects**' (although evaluated and graded using the same procedure as that of the required 160 credits) will not be considered while calculating the SGPA and CGPA. For such '**extra subjects**' registered, percentage of marks and letter grade alone will be indicated in the grade card / marks memo as a performance measure, subject to completion of the attendance and academic requirements as stated in regulations Items 6 and 7.1 – 7.4 above.
- 7.6 A student eligible to appear in the semester end examination for any subject/ course, but absent from it or failed (thereby failing to secure '**C**' grade or above) may reappear for that subject/ course in the supplementary examination as and when conducted. In such cases, internal marks (CIE) assessed earlier for that subject/ course will be carried over, and added to the marks to be obtained in the SEE supplementary examination for evaluating performance in that subject.
- 7.7 A student **detained in a semester due to shortage of attendance may be re-admitted in the same semester in the next academic year for fulfillment of academic requirements**. The academic regulations under which a student has been re-admitted shall be applicable. Further, no grade allotments or SGPA/ CGPA calculations will be done for the entire semester in which the student has been detained.
- 7.8 A student detained **due to lack of credits, shall be promoted to the next academic year only after acquiring the required number of academic credits**. The academic regulations under which the student has been readmitted shall be applicable to him.
- 8.0 Evaluation - Distribution and Weightage of Marks**
- 8.1 The performance of a student in every subject/course (including practicals and Project Stage – I & II) will be evaluated for 100 marks each, with 40 marks allotted for CIE (Continuous Internal Evaluation) and 60 marks for SEE (Semester End-Examination).
- 8.2 In CIE, for theory subjects, during a semester, there shall be two mid-term examinations. Each Mid-Term examination consists of two parts i) **Part – A** for 10 marks, ii) **Part – B** for 20 marks with a total duration of 2 hours as follows:
1. Mid Term Examination for 30 marks:
 - a. Part - A : Objective/quiz/short answer paper for 10 marks.
 - b. Part - B : Descriptive paper for 20 marks.

The objective/quiz/short answer paper is set with multiple choice, fill-in the blanks, match the following type of questions and short answer questions for a total of 10 marks (10 questions). The descriptive paper shall contain 6 full questions out of which, the student has to answer 4 questions, each carrying 5 marks. The **average of the two Mid Term Examinations** shall be taken as the final marks for Mid Term Examination (for 30 marks).

The remaining 10 marks of Continuous Internal Evaluation are distributed as:

2. Assignment for 5 marks. (**Average of 2 Assignments** each for 5 marks)
3. Subject Viva-Voce/PPT/Poster Presentation/ Case Study/quiz on a topic in the concerned subject for 5 marks.

While the first mid-term examination shall be conducted on 50% of the syllabus, the second mid-term examination shall be conducted on the remaining 50% of the syllabus.

Five (5) marks are allocated for assignments (as specified by the subject teacher concerned). The first assignment should be submitted before the conduct of the first mid-term examination, and the second assignment should be submitted before the conduct of the second mid-term examination. The average of the two assignments shall be taken as the final marks for assignment (for 5 marks).

Subject Viva-Voce/PPT/Poster Presentation/ Case Study on a topic in the subject concerned for 5 marks before II Mid-Term Examination.

- The Student, in each subject, shall have to earn 35% of marks (i.e. 14 marks out of 40 marks) in CIE, 35% of marks (i.e. 21 marks out of 60) in SEE and Over all 40% of marks (i.e. 40 marks out of 100 marks) both CIE and SEE marks put together.

The student is eligible to write Semester End Examination of the concerned subject, if the student scores $\geq 35\%$ (14 marks) of 40 Continuous Internal Examination (CIE) marks.

In case, the student appears for Semester End Examination (SEE) of the concerned subject but not scored minimum 35% of CIE marks (14 marks out of 40 internal marks), his performance in that subject in SEE shall stand cancelled inspite of appearing the SEE.

There is NO Computer Based Test (CBT)/onetime improvement test of mid examinations for R22 regulations.

The details of the end semester question paper pattern are as follows:

- 8.2.1** The semester end examinations (SEE), for theory subjects, will be conducted for 60 marks consisting of two parts viz. i) **Part- A** for 10 marks, ii) **Part - B** for 50 marks.
- Part-A is a compulsory question which consists of ten sub-questions from all units carrying equal marks.
 - Part-B consists of five questions (numbered from 2 to 6) carrying 10 marks each. Each of these questions is from each 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.

- The duration of Semester End Examination is 3 hours.

8.3 For practical subjects there shall be a Continuous Internal Evaluation (CIE) during the semester for 40 marks and 60 marks for semester end examination. Out of the 40 marks for internal evaluation:

1. A write-up on day-to-day experiment in the laboratory (in terms of aim, components/procedure, expected outcome) which shall be evaluated for 10 marks
2. **10 marks for viva-voce** (or) tutorial (or) case study (or) application (or) poster presentation of the course concerned.
3. Internal practical examination conducted by the laboratory teacher concerned shall be evaluated for 10 marks.
4. The remaining 10 marks are for Laboratory Project, which consists of the Design (or) Software / Hardware Model Presentation (or) App Development (or) Prototype Presentation submission which shall be evaluated after completion of laboratory course and before semester end practical examination.

The Semester End Examination shall be conducted with an external examiner and the laboratory teacher. The external examiner shall be appointed from the cluster / other colleges which will be decided by the examination branch of the University.

In the Semester End Examination held for 3 hours, total 60 marks are divided and allocated as shown below:

1. 10 marks for write-up
 2. 15 for experiment/program
 3. 15 for evaluation of results
 4. 10 marks for presentation on another experiment/program in the same laboratory course and
 5. 10 marks for viva-voce on concerned laboratory course.
- The Student, in each subject, shall have to earn 35% of marks (i.e. 14 marks out of 40 marks) in CIE, 35% of marks (i.e. 21 marks out of 60) in SEE and Over all 40% of marks (i.e. 40 marks out of 100 marks) both CIE and SEE marks put together.

The student is eligible to write Semester End Examination of the concerned subject, if the student scores $\geq 35\%$ (14 marks) of 40 Continuous Internal Examination (CIE) marks.

In case, the student appears for Semester End Examination (SEE) of the concerned subject but not scored minimum 35% of CIE marks (14 marks out of 40 internal marks), his performance in that subject in SEE shall stand cancelled inspite of appearing the SEE.

8.4 The evaluation of courses having ONLY internal marks in I Year I Semester and II Year II Semester is as follows:

1. I Year I Semester course (ex., *Elements of CE/ME/EEE/ECE/CSE etc*): The internal evaluation is for 50 marks and it shall take place during I Mid-Term examination and

II Mid-Term examination. The average marks of two Mid-Term examinations is the final for 50 marks. Student shall have to earn 40%, i.e 20 marks out of 50 marks from average of the two examinations. There shall be NO external evaluation. The student is deemed to have failed, if he (i) is absent as per schedule, or (ii) secures less than 40% marks in this course.

2. II Year II Semester *Real-Time (or) Field-based Research Project* course: The internal evaluation is for 50 marks and it shall take place during I Mid-Term examination and II Mid-Term examination. The average marks of two Mid-Term examinations is the final for 50 marks. Student shall have to earn 40%, i.e 20 marks out of 50 marks from average of the two examinations. There shall be NO external evaluation. The student is deemed to have failed, if he (i) does not submit a report on the Project, or (ii) does not make a presentation of the same before the internal committee as per schedule, or (ii) secures less than 40% marks in this course.

- 8.5 There shall be Industry training (or) Internship (or) Mini-project (or) Skill Development Courses (or) Paper presentation in reputed journal in collaboration with an industry of their specialization. Students shall register for this immediately after II-Year II Semester Examinations and pursue it during summer vacation/semester break & during III Year without effecting regular course work. Internship at reputed organization (or) Skill development courses (or) Paper presentation in reputed journal (or) Mini Project shall be submitted in a report form and presented before the committee in III-year II semester before end semester examination. It shall be evaluated for 100 external marks. The committee consists of an External Examiner, Head of the Department, Supervisor of the Mini Project (or) Internship etc, Internal Supervisor and a Senior Faculty Member of the Department. There shall be **NO internal marks** for Industry Training (or) Internship (or) Mini-Project (or) Skill Development Courses (or) Paper Presentation in reputed journal.
- 8.6 There shall be a **Technical Seminar** presentation in the VIII Semester. For the Technical Seminar, the student shall collect the information on a specialized topic related to his branch other than the Real-Time (or) Field-based Research Project/ Mini project/ Internship/ Major Projects Phase-I & II topic with due approval of the Head of the department and prepare a technical report and submit to the department. The presentation demonstrating understanding of the topic and technical report shall be evaluated by a Departmental committee consisting of the Head of the department, Technical Seminar supervisor and a senior faculty member from the department. The Technical Seminar will be evaluated for 100 marks.
- 8.7 The UG project shall be initiated at the end of the IV Year I Semester and the duration of the project work is one semester. The student must present Project Stage – I during IV Year I Semester before II Mid examinations, in consultation with his Supervisor, the title, objective and plan of action of his Project work to the departmental committee for approval before commencement of IV Year II Semester. Only after obtaining the approval of the departmental committee, the student can start his project work.
- 8.8 UG project work shall be carried out in two stages: Project Stage – I for approval of

project before Mid-II examinations in IV Year I Semester and Project Stage – II during IV Year II Semester. Student has to submit project work report at the end of IV Year II Semester. The project shall be evaluated for 100 marks before commencement of SEE Theory examinations.

- 8.9** For Project Stage – I, the departmental committee consisting of Head of the Department, project supervisor and a senior faculty member shall approve the project work to begin before II Mid-Term examination of IV Year I Semester. The student is deemed to be not eligible to register for the Project work, if he does not submit a report on Project Stage - I or does not make a presentation of the same before the evaluation committee as per schedule.

A student who has failed may reappear once for the above evaluation, when it is scheduled again; if he fails in such ‘one reappearance’ evaluation also, he has to reappear for the same in the next subsequent semester, as and when it is scheduled.

- 8.10** For Project Stage – II, the external examiner shall evaluate the project work for 60 marks and the internal project committee shall evaluate it for 40 marks. Out of 40 internal marks, the departmental committee consisting of Head of the Department, Project Supervisor and a Senior Faculty Member shall evaluate the project work for 20 marks and Project Supervisor shall evaluate for 20 marks. The topics for Mini Project/ Internship/SDC etc. and the main Project shall be different from the topic already taken. The student is deemed to have failed, if he (i) does not submit a report on the Project, or (ii) does not make a presentation of the same before the External Examiner as per schedule, or (iii) secures less than 40% marks in the sum total of the CIE and SEE taken together.

For conducting viva-voce of project, The External Examiner shall be nominated by the Controller of Examinations from the panel of 3 names of external faculty members (Professors or Associate Professors outside the College) submitted by the HoD.

A student who has failed, may reappear once for the above evaluation, when it is scheduled again; if student fails in such ‘one reappearance’ evaluation also, he has to reappear for the same in the next subsequent semester, as and when it is scheduled.

- 8.11** A student shall be given only one time chance to re-register for a maximum of two subjects in a semester:

- If the internal marks secured by a student in the Continuous Internal Evaluation marks for 40 (Sum of average of two mid-term examinations consisting of Objective & descriptive parts, Average of two Assignments & Subject Viva-voce/PPT/ Poster presentation/ Case Study on a topic in the concerned subject) are less than 35% and failed in those subjects.

A student must re-register for the failed subject(s) for 40 marks within four weeks of commencement of the class work in next academic year.

In the event of the student taking this chance, his Continuous Internal Evaluation marks for 40 and Semester End Examination marks for 60 obtained in the previous attempt

stand cancelled.

9.0 Grading Procedure

- 9.1** Grades will be awarded to indicate the performance of students in each Theory Subject, Laboratory/Practicals/ Mini Project/Internship/SDC and Project Stage. Based on the percentage of marks obtained (Continuous Internal Evaluation plus Semester End Examination, both taken together) as specified in item 8 above, a corresponding letter grade shall be given.
- 9.2** As a measure of the performance of a student, a 10-point absolute grading system using the following letter grades (as per UGC/AICTE guidelines) and corresponding percentage of marks shall be followed:

% of Marks Secured in a Subject/Course (Class Intervals)	Letter Grade (UGC Guidelines)	Grade Points
Greater than or equal to 90%	O (Outstanding)	10
80 and less than 90%	A ⁺ (Excellent)	9
70 and less than 80%	A (Very Good)	8
60 and less than 70%	B ⁺ (Good)	7
50 and less than 60%	B (Average)	6
40 and less than 50%	C (Pass)	5
Below 40%	F (FAIL)	0
Absent	Ab	0

- 9.3** A student who has obtained an 'F' grade in any subject shall be deemed to have 'failed' and is required to reappear as a 'supplementary student' in the semester end examination, as and when offered. In such cases, internal marks in those subjects will remain the same as those obtained earlier.
- 9.4** To a student who has not appeared for an examination in any subject, 'Ab' grade will be allocated in that subject, and he is deemed to have 'Failed'. A student will be required to reappear as a 'supplementary student' in the semester end examination, as and when offered next. In this case also, the internal marks in those subjects will remain the same as those obtained earlier.
- 9.5** A letter grade does not indicate any specific percentage of marks secured by the student, but it indicates only the range of percentage of marks.
- 9.6** A student earns Grade Point (GP) in each subject/ course, on the basis of the letter grade secured in that subject/ course. The corresponding 'Credit Points' (CP) are computed by multiplying the grade point with credits for that particular subject/ course.

Credit Points (CP) = Grade Point (GP) x Credits For a course

- 9.7 A student passes the subject/ course only when **GP \geq 5 ('C' grade or above)**
- 9.8 The Semester Grade Point Average (SGPA) is calculated by dividing the sum of credit points (Σ CP) secured from all subjects/ courses registered in a semester, by the total number of credits registered during that semester. SGPA is rounded off to **two** decimal places. SGPA is thus computed as

$$\text{SGPA} = \{ \sum_{i=1}^N C_i G_i \} / \{ \sum_{i=1}^N C_i \} \dots \text{For each semester,}$$

where 'i' is the subject indicator index (considering all subjects in a semester), 'N' is the no. of subjects '**registered**' for the semester (as specifically required and listed under the course structure of the parent department), C_i is the no. of credits allotted to the i^{th} subject, and G_i represents the grade points (GP) corresponding to the letter grade awarded for that i^{th} subject.

- 9.9 The Cumulative Grade Point Average (CGPA) is a measure of the overall cumulative performance of a student in all semesters considered for registration. The CGPA is the ratio of the total credit points secured by a student in **all** registered courses (of 160) in **all** semesters, and the total number of credits registered in **all** the semesters. CGPA is rounded off to **two** decimal places. CGPA is thus computed from the I year II semester onwards at the end of each semester as per the formula

$$\text{CGPA} = \{ \sum_{j=1}^M C_j G_j \} / \{ \sum_{j=1}^M C_j \} \dots \text{for all S semesters registered}$$

(i.e., up to and inclusive of S semesters, $S \geq 2$),

where '**M**' is the **total** no. of subjects (as specifically required and listed under the course structure of the parent department) the student has '**registered**' i.e., from the 1st semester onwards up to and inclusive of the 8th semester, 'j' is the subject indicator index (takes into account all subjects from 1 to 8 semesters), C_j is the no. of credits allotted to the j^{th} subject, and G_j represents the grade points (GP) corresponding to the letter grade awarded for that j^{th} subject. After registration and completion of I year I semester, the SGPA of that semester itself may be taken as the CGPA, as there are no cumulative effects.

Illustration of calculation of SGPA:

Course/Subject	Credits	Letter Grade	Grade Points	Credit Points
Course 1	4	A	8	$4 \times 8 = 32$
Course 2	4	O	10	$4 \times 10 = 40$
Course 3	2	C	5	$2 \times 5 = 10$
Course 4	3	B	6	$3 \times 6 = 18$
Course 5	1	A+	9	$1 \times 9 = 9$
Course 6	1	C	5	$1 \times 5 = 5$
Course 7	1	O	10	$1 \times 10 = 10$
Course 8	2	A	8	$2 \times 8 = 16$
Course 9	1	B+	7	$1 \times 7 = 7$

Course 10	1	B ⁺	7	1 x 7 = 7
	20			154

$$\text{SGPA} = 154/20 = 7.7$$

Illustration of Calculation of CGPA up to 3rd Semester:

Semester	Course/ Subject Title	Credits Allotted	Letter Grade Secured	Corresponding Grade Point (GP)	Credit Points (CP)
I	Course 1	4	A	8	32
I	Course 2	4	O	10	40
I	Course 3	2	B	6	12
I	Course 4	3	A	8	24
I	Course 5	1	A ⁺	9	9
I	Course 6	1	C	5	5
I	Course 7	1	B	6	6
I	Course 8	2	A	8	16
I	Course 9	1	C	5	5
I	Course 10	1	O	10	10
II	Course 11	2	B ⁺	7	14
II	Course 12	4	B	6	24
II	Course 13	4	A	8	32
II	Course 14	3	O	10	30
II	Course 15	1	A	8	8
II	Course 16	1.5	C	5	7.5
II	Course 17	1.5	O	10	15
II	Course 18	1.5	B ⁺	7	10.5
II	Course 19	1.5	B	6	9
III	Course 20	4	A	8	32
III	Course 21	3	B ⁺	7	21
III	Course 22	3	A	8	24
III	Course 23	3	O	10	30
III	Course 24	3	A	8	24
III	Course 25	2	C	5	10
III	Course 26	1	O	10	10
III	Course 27	1	B ⁺	7	7
	Total Credits	60		Total Credit Points	467

$$\text{CGPA} = 467/60 = 7.78$$

The calculation process of CGPA illustrated above will be followed for each subsequent semester until 8th semester. The CGPA obtained at the end of 8th semester will become the final CGPA secured for entire B.Tech. programme.

- 9.10** For merit ranking or comparison purposes or any other listing, **only** the ‘**rounded off**’ values of the CGPAs will be used.
- 9.11** SGPA and CGPA of a semester will be mentioned in the semester Memorandum of Grades if all subjects of that semester are passed in first attempt. Otherwise the SGPA and CGPA shall be mentioned only on the Memorandum of Grades in which sitting he passed his last exam in that semester. However, mandatory courses will not be taken into consideration.

10.0 Passing Standards

- 10.1** A student shall be declared successful or ‘passed’ in a semester, if he secures a $GP \geq 5$ (‘C’ grade or above) in every subject/course in that semester (i.e. when the student gets an $SGPA \geq 5.0$ at the end of that particular semester); and he shall be declared successful or ‘passed’ in the entire undergraduate programme, only when gets a $CGPA \geq 5.00$ (‘C’ grade or above) for the award of the degree as required.
- 10.2** After the completion of each semester, a grade card or grade sheet shall be issued to all the registered students of that semester, indicating the letter grades and credits earned. It will show the details of the courses registered (course code, title, no. of credits, grade earned, etc.) and credits earned. **There is NO exemption of credits in any case.**

11.0 Declaration of results

- 11.1** Computation of SGPA and CGPA are done using the procedure listed in 9.6 to 9.9.
- 11.2** For final percentage of marks equivalent to the computed final CGPA, the following formula may be used.

$$\% \text{ of Marks} = (\text{final CGPA} - 0.5) \times 10$$

12.0 Award of Degree

- 12.1** A student who registers for all the specified subjects/ courses as listed in the course structure and secures the required number of 160 credits (with $CGPA \geq 5.0$), within 8 academic years from the date of commencement of the first academic year, shall be declared to have ‘**qualified**’ for the award of B.Tech. degree in the branch of Engineering selected at the time of admission.
- 12.2** A student who qualifies for the award of the degree as listed in item 12.1 shall be placed in the following classes.
- 12.3** A student with final CGPA (at the end of the undergraduate programme) ≥ 8.00 , and fulfilling the following conditions - shall be placed in ‘**First Class with Distinction**’. However, he
- (i) Should have passed all the subjects/courses in ‘**First Appearance**’ within the first 4 academic years (or 8 sequential semesters) from the date of commencement of first year first semester.
 - (ii) Should not have been detained or prevented from writing the semester end examinations in any semester due to shortage of attendance or any other reason.

A student not fulfilling any of the above conditions with final CGPA ≥ 8 shall be placed in '**First Class**'.

12.4 Students with final CGPA (at the end of the undergraduate programme) ≥ 7.0 but < 8.00 shall be placed in '**First Class**'.

12.5 Students with final CGPA (at the end of the undergraduate programme) ≥ 6.00 but < 7.00 , shall be placed in '**Second Class**'.

12.6 All other students who qualify for the award of the degree (as per item 12.1), with final CGPA (at the end of the undergraduate programme) ≥ 5.00 but < 6 , shall be placed in '**pass class**'.

12.7 A student with final CGPA (at the end of the undergraduate programme) < 5.00 will not be eligible for the award of the degree.

12.8 Students fulfilling the conditions listed under item 12.3 alone will be eligible for award of '**Gold Medal**'.

12.9 Award of 2-Year B.Tech. Diploma Certificate

1. A student is awarded 2-Year UG Diploma Certificate in the concerned engineering branch on completion of all the academic requirements and earned all the 80 credits (within 4 years from the date of admission) upto B.Tech. II Year II Semester, if the student want to exit the 4-Year B.Tech. program and *requests for the 2 -Year B. Tech. (UG) Diploma Certificate*.
2. The student **once opted and awarded 2-Year UG Diploma Certificate, the student will be permitted to join** in B. Tech. III Year I Semester and continue for completion of remaining years of study for 4-Year B. Tech. Degree ONLY in the next academic year along with next batch students. *However, if any student wishes to continue the study after opting for exit, he/she should register for the subjects/courses in III Year I Semester before commencement of classwork for that semester.*
3. *The students, who exit the 4-Year B. Tech. program after II Year of study and wish to re-join the B.Tech. program, must submit the 2 -Year B. Tech. (UG) Diploma Certificate awarded to him, subject to the eligibility for completion of Course/Degree.*
4. A student may be permitted to take one year break after completion of II Year II Semester or B. Tech. III Year II Semester (with university permission through the principal of the college well in advance) and can re-enter the course in **next Academic Year in the same college** and complete the course on fulfilling all the academic credentials within a stipulated duration i.e. double the duration of the course (Ex. within 8 Years for 4-Year program).

13.0 Withholding of results

13.1 If the student has not paid the fees to the College at any stage, or has dues pending due to any reason whatsoever, or if any case of indiscipline is pending, the result of the

student may be withheld, and the student will not be allowed to go into the next higher semester. The award or issue of the degree may also be withheld in such cases.

14.0 Transitory Regulations

A. For students detained due to shortage of attendance:

1. A Student who has been detained in I year of R18 Regulations due to lack of attendance, shall be permitted to join I year I Semester of R22 Regulations and he is required to complete the study of B.Tech. programme within the stipulated period of eight academic years from the date of first admission in I Year.
2. A student who has been detained in any semester of II to VIII semesters of R18 regulations for want of attendance, shall be permitted to join the corresponding semester of R22 Regulations and is required to complete the study of B.Tech. within the stipulated period of eight academic years from the date of first admission in I Year. The R22 Academic Regulations under which a student has been readmitted shall be applicable to that student from that semester. See rule (C) for further Transitory Regulations.

B. For students detained due to shortage of credits:

3. A student of R18 Regulations who has been detained due to lack of credits, shall be promoted to the next semester of R22 Regulations only after acquiring the required number of credits as per the corresponding regulations of his/her first admission. The student is required to complete the study of B.Tech. within the stipulated period of eight academic years from the year of first admission. The R22 Academic Regulations are applicable to a student from the year of readmission. See rule (C) for further Transitory Regulations.

C. For readmitted students in R22 Regulations:

4. A student who has failed in any subject under any regulation has to pass those subjects in the same regulations.
5. The maximum credits that a student acquires for the award of degree, shall be the sum of the total number of credits secured in all the regulations of his/her study including R22 Regulations. **There is NO exemption of credits in any case.**
6. If a student is readmitted to R22 Regulations and has any subject with 80% of syllabus common with his/her previous regulations, that particular subject in R22 Regulations will be substituted by another subject to be suggested by the Board of Studies.
7. The total credits required are 160 including both R18 & R22 regulations, and if the total credits are less than 160 including both R18 & R22 Regulations then an additional course(s) suggested by the Board of Studies may be given to fulfill the minimum requirements of 160 credits.

Note: If a student readmitted to R22 Regulations and has not studied any subjects/topics in his/her earlier regulations of study which is prerequisite for further subjects in R22 Regulations, the remedial classes shall be conducted to cover those

subjects/topics for the benefit of the students.

15.0 Student Transfers

- 15.1** There shall be no Branch transfers after the completion of Admission Process.
- 15.2** Transfer of candidates from other Institutions will be governed by the regulations of Telangana State Government issued from time to time.
- 15.3** The students seeking transfer to colleges affiliated to JNTUH from various other Universities/institutions have to pass the failed subjects which are equivalent to the subjects of JNTUH, and also pass the subjects of JNTUH which the students have not studied at the earlier institution. Further, though the students have passed some of the subjects at the earlier institutions, if the same subjects are prescribed in different semesters of JNTUH, the students have to study those subjects in JNTUH in spite of the fact that those subjects are repeated.
- 15.4** The transferred students from other Universities/Institutions to JNTUH affiliated colleges who are on rolls are to be provided one chance to write the CBT (for internal marks) in the equivalent subject(s) as per the clearance letter issued by the University.
- 15.5** The autonomous affiliated colleges have to provide one chance to write the internal examinations in the equivalent subject(s) to the students transferred from other universities/institutions to JNTUH autonomous affiliated colleges who are on rolls, as per the clearance (equivalence) letter issued by the University.

16.0 Scope

- i) Where the words “he”, “him”, “his”, occur in the write-up of regulations, they include “she”, “her”, “hers”.
- ii) Where the words “Subject” or “Subjects”, occur in these regulations, they also imply “Course” or “Courses”.
- iii) The Academic Regulations should be read as a whole, for the purpose of any interpretation.
- iv) In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal/College Academic Council/Honourable Vice-Chancellor of JNTUH is final.
- v) The College may change or amend the Academic Regulations, Course Structure or Syllabi at any time, and the changes or amendments made shall be applicable to all Students with effect from the dates notified by the College Authorities.

ACADEMIC REGULATIONS FOR B.TECH (LATERAL ENTRY SCHEME)

(Applicable for the students admitted into II Year B.Tech (Lateral Entry Scheme) from the Academic Year 2023-24 and onwards)

1. Eligibility for the award of B.Tech Degree (LES)

The LES students after securing admission shall pursue a course of study for not less than three academic years and not more than six academic years.

2. The student shall register for 120 credits and secure 120 credits with CGPA ≥ 5 from II year to IV-year B.Tech. programme (LES) for the award of B.Tech. degree.
3. The students, who fail to fulfil the requirement for the award of the degree in six academic years from the year of admission, shall forfeit their seat in B.Tech.
4. The attendance requirements of B. Tech. (Regular) shall be applicable to B.Tech. (LES).

5. Promotion rule

S. No	Promotion	Conditions to be fulfilled
1	Second year first semester to second year second semester	Regular course of study of second year first semester.
2	Second year second semester to third year first semester	(i) Regular course of study of second year second semester. (ii) Must have secured at least 24 credits out of 40 credits i.e., 60% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3	Third year first semester to third year second semester	Regular course of study of third year first semester.
4	Third year second semester to fourth year first semester	(i) Regular course of study of third year second semester. (ii) Must have secured at least 48 credits out of 80 credits i.e., 60% credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester.

6. All the other regulations as applicable to B. Tech. 4-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme).
7. LES students are not eligible for 2-Year B. Tech. Diploma Certificate.

MALPRACTICE RULES**Disciplinary Action for Malpractices/Improper 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, smart watches, electronic gadgets 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. Confiscation of Cell phones, pager, palm computers, smart watches, electronic gadgets etc. and the same would be handed over only after punishment finalized by Malpractice Committee.
(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, pager, palm computers, smart watches, electronic gadgets 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. Confiscation of Cell phones, pager, palm computers, smart watches, electronic gadgets etc. and the same would be handed over only after punishment finalized by Malpractice Committee.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers, cell phones, smart watches, electronic gadgets 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 excluding Project work/ Mandatory Courses /Technical Seminar 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. Confiscation of Cell phones, pager, palm computers, smart watches, electronic gadgets etc. and the same would be handed over only after punishment finalized by Malpractice Committee.
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 end semester 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 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 end semester 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 or organizes a walk out or instigates others to examination hall-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	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates are also debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B. Tech- Electrical and Electronics Engineering
CBCS & OUTCOME BASED COURSE STRUCTURE

SEMESTER - I

S. No	Course Code	Course Title	Category	Hours per Week			Credits	Maximum Marks	
				L	T	P		CIE	SEE
1	A400001	Matrices and Calculus	BSC	3	1	0	4	40	60
2	A400009	Engineering Chemistry	BSC	3	1	0	4	40	60
3	A402202	Electrical Circuit Analysis – I	ESC	3	0	0	3	40	60
4	A405202	C Programming and Data Structures	ESC	3	0	0	3	40	60
5	A402501	Elements of Electrical and Electronics Engineering	ESC	0	0	2	1	50	--
6	A405503	C Programming and Data Structures Laboratory	ESC	0	0	2	1	40	60
7	A403502	Computer Aided Engineering Drawing	ESC	1	0	2	2	40	60
8	A400502	Engineering Chemistry Laboratory	BSC	0	0	2	1	40	60
9	A400505	Introduction to Social Innovation	HSMC	0	0	2	1	40	60
10	A400703	Constitution of India	MC	2	0	0	0	-	-
	Total:			15	2	10	20		
	Total hours per Week:			27					

SEMESTER – II

S. No	Course Code	Course Title	Category	Hours per Week			Credits	Maximum Marks	
				L	T	P		CIE	SEE
1	A400002	Ordinary Differential Equations and Vector Calculus	BSC	3	1	0	4	40	60
2	A400101	English for Skill Enhancement	HSMC	2	0	0	2	40	60
3	A400008	Applied Physics	BSC	3	1	0	4	40	60
4	A403504	Engineering Workshop Practice	ESC	0	0	3	1.5	40	60
5	A404202	Analog Electronic Circuits	ESC	3	0	0	3	40	60
6	A400503	English Language and Communication Skills Laboratory	HSMC	0	0	2	1	40	60
7	A400501	Applied Physics Laboratory	BSC	0	0	3	1.5	40	60
8	A404503	Analog Electronic Circuits Laboratory	ESC	0	0	3	1.5	40	60
9	A400506	Engineering Exploration & Practice	HSMC	0	0	3	1.5	40	60
10	A400704	Universal Human Values	MC	2	0	0	0	-	-
	Total:			13	2	14	20		
	Total hours per Week			29					
	Total Credits in I Year: 40								

SEMESTER – III

S.No	Course Code	Course Title	Category	Hours per Week			Credits	Maximum Marks	
				L	T	P		CIE	SEE
1	A400007	Numerical Methods and Complex Variables	BSC	3	1	0	4	40	60
2	A402203	Electrical Circuit Analysis – II	ESC	2	0	0	2	40	60
3	A402302	Electro Magnetic Fields	PCC	3	0	0	3	40	60
4	A402301	Electrical Machines -I	PCC	3	0	0	3	40	60
5	A402303	Power System-I	PCC	3	0	0	3	40	60
6	A402504	Electrical Machines Laboratory-I	PCC	0	0	2	1	40	60
7	A402503	Electrical Circuit Analysis Laboratory	ESC	0	0	2	1	40	60
8	A402509	Electrical Simulation Tools Laboratory	PCC	0	0	2	1	40	60
9	A405506	Python Programming Laboratory	ESC	0	1	2	2	40	60
10	A400702	Gender Sensitization	MC	2	0	0	0		
	Total:			16	2	8	20		
	Total hours per Week:			26					

SEMESTER – IV

S.No	Course Code	Course Title	Category	Hours per Week			Credi t	Maximum Marks	
				L	T	P		CIE	SEE
1	A401201	Fluid Mechanics & Hydraulic Machinery	ESC	3	0	0	3	40	60
2	A402308	Power Systems-II	PCC	3	0	0	3	40	60
3	A404205	Switching Theory and Logic Design	ESC	2	0	0	2	40	60
4	A402304	Electrical Machines-II	PCC	3	0	0	3	40	60
5	A402307	Measurements and Instrumentation	PCC	3	0	0	3	40	60
6	A402508	Measurements and Instrumentation Laboratory	PCC	0	0	2	1	40	60
7	A404510	Switching Theory and Logic Design Laboratory	ESC	0	0	2	1	40	60
8	A402505	Electrical Machines Laboratory -II	PCC	0	0	2	1	40	60
9	A400507	Social Innovation in Practice	HSMC	0	0	2	1	40	60
10	A402801	Real Time project/Field Based Projects	PROJ	0	0	4	2	50	-
11	A400701	Environmental Sciences	MC	2	0	0	0		
	Total:			16	0	12	20		
	Total hours per Week			28					
	Total Credits in II Year: 40								

(A400001) MATRICES AND CALCULUS**B.Tech (EEE): I Year I Semester**

L	T	P	C
3	1	0	4

UNIT-I

Matrices: Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous equations and Non-Homogeneous equations by Gauss elimination method, Gauss Seidel Iteration Method.

UNIT-II**Eigen values and Eigen vectors:**

Linear Transformation and Orthogonal transformation: Eigen values, Eigen vectors and their properties, Diagonalization of a square matrix, Cayley-Hamilton theorem (without proof) -Inverse and power of a matrix by Cayley-Hamilton theorem, Quadratic forms and nature of the quadratic forms, Reduction of quadratic form to canonical form by orthogonal transformations.

UNIT-III**Calculus:**

Mean value theorems: Rolle's theorem, Lagrange's mean value theorem with their geometrical interpretation and applications, Cauchy's mean value theorem, Taylor's series, Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (only in Cartesian coordinates),

Improper Integral: Beta, Gamma functions and their applications.

UNIT-IV**Multivariable calculus (Partial Differentiation and applications):**

Partial differentiation: Euler's Theorem, Total derivative, Jacobian, Functional dependence & independence. Applications: Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

UNIT-V**Multivariable Calculus(Integration):**

Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form), Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals.

TEXT BOOKS:

1. Higher Engineering Mathematics, (36th Edition), B.S. Grewal, Khanna Publishers, 2010.
2. Advanced Engineering Mathematics, (5th Edition), R.K. Jain and S.R.K. Iyengar, Narosa Publications, 2016.

REFERENCE BOOKS:

1. Advanced Engineering Mathematics, (9th Edition), Erwin Kreyszig, John Wiley & Sons, 2006.
2. Calculus and Analytic geometry, (9th Edition), G.B. Thomas and R.L. Finney, Pearson, Reprint, 2002.
3. A text book of Engineering Mathematics, (10th Edition), N.P. Bali and Manish Goyal, Laxmi Publications, Reprint, 2019.
4. Higher Engineering Mathematics, (11th Reprint), Ramana B.V., Tata McGraw Hill New Delhi, 2010.

COURSE OUTCOMES:.

On completion of the course students will be able to

1. Solve linear system of equations represented by matrices
2. Obtain eigen values, eigen vectors and perform diagonalization of a square matrix.
3. Verify mean value theorems & evaluation of improper integrals by using Beta and Gamma functions.
4. Develop the skill of determining optimal values of multivariable functions using classical methods.
5. Evaluate the multiple integrals and apply the concept to find area, volumes.

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

(A400009) ENGINEERING CHEMISTRY

L	T	P	C
3	1	0	4

B.Tech (EEE): I Year I Semester**UNIT-I: Electrochemistry, Batteries and Corrosion**

Electrochemistry: Electrode potential, standard electrode potential and E.M.F of the cell. Electrochemical cell, Nernst equation- derivation and applications, Types of electrodes- Quinhydrone electrode, Calomel electrode and Glass electrode. Electro chemical series and its applications. **Batteries-** primary (Lithium cell), secondary (Lead acid storage battery and Lithium-ion battery) and Fuel cells (H_2 - O_2 and methanol-oxygen), Solar cells - Introduction and applications of Solar cells.

Corrosion: Introduction, Definition, Causes and effects of corrosion, Theories of chemical and electrochemical corrosion, Pilling-Bedworth rule, Types of corrosion- Galvanic, Waterline and Pitting corrosion, Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection, Sacrificial anode and Impressed current cathodic methods, Surface coatings- Metallic coatings, hot dipping, galvanizing and tinning, Electroplating- Copper plating and electroless plating - Nickel plating.

UNIT-II: Material Chemistry - High Polymers

Types of polymerizations (addition, condensation and copolymerization).

Plastics: Thermoplastic and Thermosetting resins, Compounding and fabrication of plastics (compression and injection moulding). Preparation, properties, engineering applications of PVC, Teflon and Bakelite.

Fibers: Characteristics of fibers - preparation, properties and uses of Nylon-6,6 and Dacron, Fiber Reinforced Plastics (FRP) - applications.

Rubbers: Natural rubber and its vulcanization. Elastomers: Buna-s, Butyl rubber and Thiokol rubber. **Conducting polymers:** Characteristics and Classification with examples-mechanism of conduction in trans-polyacetylene and applications of conducting polymers.

Biodegradable polymers: Preparation and applications of Polyvinyl acetate, Polylactic acid and poly vinyl alcohol.

UNIT-III: Energy Sources

Introduction, Calorific value of fuel – HCV, LCV- Dulong's formula. Classification- solid fuels: coal – analysis of coal – proximate and ultimate analysis and their significance. Liquid fuels – petroleum and its refining, cracking types – moving bed catalytic cracking. Knocking – octane and cetane rating, synthetic petrol - Fischer-Tropsch's process; Gaseous fuels – composition and uses of natural gas, LPG and CNG, Biodiesel – Transesterification, advantages

UNIT-IV: Water Technology

Sources of water, Impurities in water, Hardness of water, Temporary and permanent hardness, Units of hardness, Estimation of temporary and permanent hardness of water, EDTA method, Numerical problems, Potable water Treatment-Specifications, Steps involved in Treatment-Sedimentation, Coagulation, Filtration, Sterilization, Desalination of Brackish Water, Reverse Osmosis and Electro dialysis.

Industrial water treatment, Boiler Troubles-Scales and sludges, Caustic embrittlement, Boiler corrosion, Priming and foaming. Hot lime and cold lime soda Process-Numerical problems, Zeolite process and Ion exchange process. Internal conditioning methods like Phosphate, Carbonate, Calgon and Colloidal conditioning.

UNIT-V: Engineering Materials

Cement: Portland cement, its composition, setting and hardening.

Smart materials: Smart materials and their engineering applications

Advanced Glass Technology: Structure and nature of glasses, transformation range behaviour, dependence of physico-chemical characteristic of glasses on their constituents. Strength of glass and glass articles.

Lubricants: Classification of lubricants with examples-characteristics of a good lubricants - mechanism of lubrication (thick film, thin film and extreme pressure)- properties of lubricants: viscosity, cloud point, pour point, flash point and fire point.

Text Books:

1. Engineering chemistry (1st edition), B. Rama Devi & Ch. VenkataRamana Reddy; Cengage Learning, 2012.
2. Engineering Chemistry (1st edition), P. C. Jain and M. Jain, Dhanapat Rai & Sons.
3. Engineering chemistry (1st edition), Dr. Bharathikumari, Dr. Jyotsna.
4. Engineering chemistry (1st edition), Thirumala chary, E. Laxminyarana, SCITECH Publications (India) Pvt. Ltd.

Reference Books:

1. Engineering Chemistry (2nd edition), Shikha Agarwal; Cambridge University Press, 2015.
2. Engineering Chemistry (2nd edition), Wiley India Pvt. Ltd., Vairam and others, 2014.
3. Engineering Chemistry (1st edition), PrasanthRath, Cengage Learning, 2015.
4. Applied Chemistry (1st edition), H.D. Gesser, Springer Publishers.
5. Engineering Chemistry (3rd edition), B. Siva Shankar, Tata McGraw Hill Publishing Limited, 2015.
6. Text of Engineering Chemistry (12th edition), S. S. Dara, Mukkanti, S. Chand & Co, New Delhi, 2006.
7. Chemistry of Engineering Materials (5th edition), C. V. Agarwal, C. P. Murthy, A. Naidu, Wiley India, 2013.
8. Chemistry of Engineering Materials (3rd edition), R. P. Mani, K. N. Mishra, Cengage Learning, 2015

Course Outcomes:

After completion of the course students will be able to

1. Apply the concept of electrochemistry and corrosion science in various practical applications.
2. Predict the different engineering applications by preparing various polymers.
3. Summarize the manufacturing process of various fuels and their applications in daily life.
4. Understand the benefits of treated water as source in steam generation in industrial application.
5. Illustrate the importance and applications of various advanced engineering materials.

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

B.Tech (EEE): I Year I Semester**Prerequisites: Mathematics****Course Objectives:**

- To gain knowledge in circuits and to understand the fundamentals of derived circuit laws.
- To learn steady state and transient analysis of single phase and 3-phase circuits.
- To understand Theorems and concepts of coupled circuits.

UNIT-I:

Network Elements & Laws: Active elements, Independent and dependent sources. Passive elements— R, L and C, Energy stored in inductance and capacitance, Kirchhoff's laws, Source transformations, Star-delta transformations, Node voltage method, Mesh current method including super node and supermesh analysis.

UNIT-II:

Single-Phase Circuits: RMS and average values of periodic sinusoidal and non- sinusoidal waveforms, Phasor representation, Steady-state response of series, parallel and series-parallel circuits. Impedance, Admittance, Current locus diagrams of RL and RC series and parallel circuits with variation of various parameters. Resonance: Series and parallel circuits, Bandwidth and Q-factor.

UNIT-III:

Network theorems: Superposition theorem, Thevenin's theorem, Norton's theorems, Maximum power theorem. Tellegen's theorem, Compensation theorem, Millman's theorem and Reciprocity theorem. (AC & DC).

UNIT-IV:

Poly-phase Circuits: Analysis of balanced and unbalanced 3-phase circuits, Star and delta connections, Measurement of three-phase power for balanced and unbalanced loads.

UNIT-V:

Coupled circuits: Concept of self and mutual inductance, Dot convention, Coefficient of coupling, Analysis of circuits with mutual inductance.

Topological Description of Networks: Graph, tree, chord, cut-set, incident matrix, circuit matrix and cut-set matrix,

TEXTBOOKS:

1. Van Valkenburg M.E, "Network Analysis", Prentice Hall of India, 3rd Edition, 2000.
2. Ravish R Singh, "Network Analysis and Synthesis", McGraw Hill, 2nd Edition, 2019.

REFERENCE BOOKS:

1. B. Subramanyam, "Electric Circuit Analysis", Dreamtech Press & Wiley, 2021.
2. James W. Nilsson, Susan A. Riedel, "Electric Circuits", Pearson, 11th Edition, 2020.
3. A Sudhakar, Shyam Mohan S Palli, "Circuits and Networks: Analysis and Synthesis", McGraw Hill, 5th Edition, 2017.
4. Jagan N.C, Lakshminarayana C., "Network Analysis", B.S. Publications, 3rd Edition, 2014.
William Hayt H, Kimmerly Jack E. and Steven Durbin M, "Engineering Circuit Analysis", McGrawHill, 6th Edition, 2002.
5. Chakravorthy A., "Circuit Theory", Dhanpat Rai & Co., First Edition, 1999.

On completion of the course, students will be able to

1. Understand network analysis, techniques using mesh and node analysis.
2. Explain the principle of AC fundamentals, series parallel circuits, locus diagram and resonance.
3. Analyze electric circuits using network theorems.
4. Explain and analyze polyphase circuits.
5. Explain basic concepts of coupled circuits & analyze networks adopting network topology.
- 6.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12
CO1	3	3	1	1	0	2	1	1	0	0	1	1
CO2	3	3	1	2	0	2	1	1	0	0	2	3
CO3	3	2	1	2	0	2	1	1	0	0	3	2
CO4	3	2	1	2	0	2	1	1	0	0	3	2
CO5	3	2	1	2	0	2	1	1	0	0	3	2

L	T	P	C
3	0	0	3

B.Tech (EEE): I Year I Semester**Course Objectives**

1. Introducing a Programming Language
2. Familiarizing the students with syntax and semantics of various C- programming language constructs.
3. learn to develop solutions to computational problems

UNIT-I

Overview of C: Basic structure of C programs, programming style, Executing a C program. **Constants, Variables, and Data Types:** Introduction, Character set, C-Tokens ,keywords and identifiers, constants, variables, Data types, declaration of variables, declaration of Storage class, assigning values to variables, defining symbolic constant.

Operators& Expressions: Introduction, Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operators, Increment & Decrement Operators, Conditional Operators, Bitwise Operator, Special Operators. Arithmetic Expressions, Evaluation of Expressions, Precedence of Arithmetic Operators.

UNIT-II

Decision Making: Introduction, Decision making with *if* statement, simple *if* statement, the *if---else---* statement, Nesting of *if---else---* statements.the *else-if* ladder, the *switch* statement, the?: operator, the go to statement.

Looping: Introduction, the *while* statement, the *do -while* statement, *for* statement, break and continue statements.

Arrays: Introduction, One-Dimensional Arrays, Declaration of One-Dimensional Arrays, Initialization of One-Dimensional Arrays, Two-Dimensional Arrays, Initializing two dimensional arrays.

UNIT-III

Character Arrays and Strings: Introduction, declaring and initializing string variables, reading strings from terminal, writing strings to screen, string-handling functions. **Functions:** Introduction, definition of functions, return values, function calls, function declaration, scope, visibility and lifetime of variables. **Pointers:** Idea of pointers, Defining pointers, Pointers to Arrays and Structures, Use of Pointers in self-referential structures, usage of self-referential structures in linked list (no implementation)

UNIT-IV

Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks- Operations, array and linked representations of stacks, stack applications, Queues- operations, array, and linked representations.

UNIT-V

Searching and Sorting: Basic searching in an array of elements (linear and binary search techniques), Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms), Basic concept of order of complexity through the example programs.

Textbooks

1. Programming in ANSI C, 8th Edition, E. Balagurusamy McGraw Hill Education publication, 2019.
2. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, Universities Press.

Reference Books

1. C Programming Absolute Beginner's Guide, 3rd Edition, Pearson Education ,2014.
2. Learn C the Hard Way, 1st Edition, Zed A. Shaw, Pearson Education, 2018
3. The C-Programming Language, 2nd Edition, Brian Kernighan and Dennis Ritchie, Pearson Education, 2014.
4. Data Structures using C – A. S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson Education.

Course Outcomes

By the end of the course Students shall be able

1. Describe the structure of C program and explain the various components of it.
2. Use iterative statements for writing the C programs.
3. Organize data in Arrays and perform operations on data stored in Arrays.
4. Define & describe user defined functions in C language.
5. Differentiate structures, unions and manipulate data using pointers.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1									
CO2	3	1	3									
CO3	3	2	2									
CO4	2	2	3									
CO5	3	2	2									

B.Tech (EEE): I Year I Semester

L	T	P	C
0	0	2	1

Course Objectives:

- To measure the electrical parameters for different types of DC and AC circuits using Conventional and theorems approach.
- To study the transient response of various R, L and C circuits using different excitations.
- To determine the performance of different types of DC machines and Transformers.

List of Experiments/Demonstrations:**PART-A (compulsory)**

1. Verification Ohm's Law.
2. Verification of KVL and KCL.
3. Verification of Thevenin's and Norton's theorem.
4. Verification of Superposition theorem
5. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits
6. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
7. Performance Characteristics of a DC Shunt Motor
8. Open Circuit and Short Circuit Tests on 1-phase Transformer

PART-B (any two experiments from the given list)

9. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
10. Verification of Reciprocity and Milliman's Theorem.
11. Verification of Maximum Power Transfer Theorem.
12. Determination of form factor for non-sinusoidal waveform
13. Transient Response of Series RL and RC circuits for DC excitation.

Course Outcomes: After completion of the course the student must be able to

1. Verify the basic Electrical circuits through different experiments.
2. Analyze the transient responses of R, L and C circuits for different input conditions.
3. Calculate the of Impedance and Current of RL, RC and RLC series Circuits.
4. Evaluate the performance calculations of Electrical Machines and Transformers through various testing methods.
5. Measure the Active and Reactive Power in a single phase transformer.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1						1		2	2
CO2	3	2	1			2			1		2	2
CO3	3	2	1			2			1		2	2
CO4	3	2	1			1	1	1	1		1	2
CO5	3	2	1			2	1	1	1		2	2

B.Tech (EEE): I Year I Semester

L	T	P	C
0	0	2	1

[Note: The programs may be executed using any available Open Source/ Freely available IDE

Some of the Tools available are:

Code Lite: <https://codelite.org/>

Code: Blocks: <http://www.codeblocks.org/>

DevC++ : <http://www.bloodshed.net/devcpp.html>

Eclipse: <http://www.eclipse.org>

This list is not exhaustive and is NOT in any order of preference]

Course Objectives

Students will learn the following:

- Work with an IDE to create, edit, compile, run and debug programs
- Analyze the various steps in program development.
- Develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
- Develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.
- Write programs using the Dynamic Memory Allocation concept.
- Create, read from and write to text and binary files

I. OPERATORS AND EVALUATION OF EXPRESSIONS**Demonstration**

1. Write a C program to print greetings message on the screen.
2. Write a C program to illustrate usage of comments in C.
3. Write a simple program that prints the results of all the operators available in C (Including pre/post increment, bitwise and/or/not. etc.). Read required operand values from standard input.
4. Write a C program that converts given data type to another using auto conversion and casting. Take the values from standard input.
5. Write a program for finding the max and min from the three numbers (using ternary operator).

Experiment

6. Write a C program to compute simple, compound interest.
7. Write a C program that declares Class awarded for a given percentage of marks, where mark = 70% = Distinction.
(Read percentage from standard input.)

II. Expression Evaluation**Demonstration**

1. A building has 10 floors with a floor height of 3 meters each. A ball is dropped from the top of the building. Find the time taken by the ball to reach each floor. (Use the formula $s = ut + (1/2)at^2$ where u and a are the initial velocity in m/sec (= 0) and acceleration in m/sec^2 (= 9.8 m/s^2)).
2. Write a program that asks the user to enter the highest rainfall ever in one season for a country, and the rainfall in the current year for that country, obtains the values from the user, checks if the current rainfall exceed the highest rainfall and prints an appropriate message on the screen. If the current rainfall is higher, it assigns that value as the highest rainfall ever. Use only the single-selection form of the if statement.

Experiment

3. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
4. Write a C program to find the roots of a Quadratic equation.

III. Iterative statements

Demonstration

1. Write a program that reads an integer (5 digits or fewer) and determines and prints how many digits in the integer are 9s.
2. Write a program that keeps printing the powers of the integer 3, namely 3, 9, 27, 91, 273, and so on. Your loop should not terminate (i.e., you should create an infinite loop). What happens when you run this program?
3. Write a program that reads the radius of a circle (as a float value) and computes and prints the diameter, the circumference and the area. Use the value 3.14159 for π

Experiment

4. Write a menu driven C program that allows a user to enter n numbers and then choose between finding the smallest, largest, sum, or average. The menu and all the choices are to be functions. Use a switch statement to determine what action to take. Display an error message if an invalid choice is entered.
5. Write a C program to construct a pyramid of numbers as follows:

```

1           1
1 2        2 2
1 2 3      3 3 3
1 2 3 4    4 4 4 4
1 2 3 4 5  5 5 5 5 5

```

IV. Arrays, Pointers, and Functions**Demonstration**

1. Write a C program to find the minimum, maximum and average in an array of integers.
2. Write a function to compute mean, variance, Standard Deviation, sorting of n elements in a single dimension array.
3. Write a C program that uses functions to perform the following:
 - i. Addition of Two Matrices
 - ii. Multiplication of Two Matrices
 - iii. Transpose of a matrix.

Experiment

4. Write a C program to find the GCD (greatest common divisor) of two given integers.
5. Write a C program to compute x^n

V. Strings**Demonstration**

1. Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.
2. Write a C program that converts a number ranging from 1 to 50 to Roman equivalent c.
3. Write a C program that uses functions to perform the following operations:
 - To insert a sub-string into a given main string from a given position.
 - To delete n Characters from a given position in a given string.

Experiment

4. Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abeba, etc.)
5. Write a C program that displays the position of a character ch in the string S or – 1 if S doesn't contain ch.
6. Write a C program to count the lines, words and characters in a given text.

VI Data Structures**Demonstration**

1. Write a program that uses functions to perform the following operations on singly linked list
 - i) Creation
 - ii) Insertion
 - iii) Deletion
 - iv) Traversal
2. Write a program that implement stack (its operations) using
 - i) Arrays
 - ii) Pointers
3. Write a program that implement Queue (its operations) using
 - i) Arrays
 - ii) Pointers

Experiment

4. Write a program that uses functions to perform the following operations on doubly linked List.

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

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

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

VII Searching & Sorting

Demonstration

1. Write a C program that uses non recursive function to search for a Key value in a given list of integers using linear search method.

2. Write a C program that uses non recursive function to search for a Key value in a given sorted list of integers using binary search method.

3. Write a C program that implements the Bubble sort method to sort a given list of integers in ascending order.

Experiment

5. Write a C program that sorts the given array of integers using selection sort in descending order

6. Write a C program that sorts the given array of integers using insertion sort in ascending order

Textbooks

1. Programming in ANSI C, 8th Edition, E. Balagurusamy McGraw Hill Education publication, 2019.
2. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, Universities Press.

Reference Books

1. C Programming Absolute Beginner's Guide, 3rd Edition, Pearson Education, 2014.
2. Learn C the Hard Way, 1st Edition, Zed A. Shaw, Pearson Education, 2018
3. The C-Programming Language, 2nd Edition, Brian Kernighan and Dennis Ritchie, Pearson Education, 2014.
4. Data Structures using C – A. S. Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson Education.

Course Outcomes

By the end of the course students will be able to:

1. Formulate the algorithms for simple problems and translate given algorithms to a working and correct program
2. Correct syntax errors as reported by the compilers identify and correct logical errors encountered during execution
3. Represent and manipulate data with arrays, strings and structures and
4. Develop applications using pointer concept.
5. Develop reusable code with the help C-functions

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	2	1							
CO2			3	3	1						2	2
CO3	3	3		2								
CO4			3		2						2	
CO5	2	2	3								1	1

(A403502) COMPUTER AIDED ENGINEERING DRAWING

B.Tech (EEE) I Year I Sem.

L	T	P	C
1	0	2	2

UNIT – I:

Introduction to Engineering Drawing: Principles of Engineering Drawing and their Significance, Introduction to Computer aided drafting – views, commands.

Computer aided drafting of conic Sections: Ellipse, Parabola and Hyperbola – General Method (eccentricity) only.

Computer aided drafting of Cycloid, Epicycloids and Hypocycloid.

UNIT- II:

Orthographic Projections: Introduction to Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures.

Computer aided orthographic projections – points, lines and planes

UNIT – III:

Projections of Regular Solids: Introduction to Regular Solids – Prism, Cylinder, Pyramid, Cone

Computer aided projections of solids – Regular views

UNIT – IV:

Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views –Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric

Projection of objects having non- isometric lines, Isometric Projection of Spherical Parts using computer aided drafting.

UNIT – V:

Conversion of Isometric Views to Orthographic Views and Vice-versa – Conventions

Conversion of orthographic projection into isometric view and vice versa using computer aided drafting.

TEXT BOOKS:

1. Engineering Drawing, 51st Edition, N.D. Bhatt, Charotar Pub, 2012
2. Computer Aided Engineering Drawing, 2nd Edition, K. Balaveera Reddy et al, CBS Publishers, 2015

REFERENCE BOOKS:

1. Engineering Drawing, 2nd Edition, Basant Agrawal and C M Agrawal, McGraw Hill, 2014
2. Engineering Drawing, 1st Edition, M. B. Shah, B.C. Rane, Pearson, 2015
3. Engineering Drawing, 1st Edition, N. S. Parthasarathy and Vela Murali, Oxford, 2015
4. Engineering Drawing and graphics Using AutoCAD, 3rd Edition, T. Jeyapoovan, Vikas, S.Chand and Company Ltd, 2000

Course Outcomes: At the end of the course, the student will be able to:

1. Apply computer aided drafting tools to create 2D objects like Conic section and Cycloidal curves
2. Sketch the Orthographic projection of Point, Line and Plane objects by drafting tools
3. Create, read and interpret engineering drawings of Solids by computer tools
4. Create and interpret 2D and 3D Isometric objects by drafting tools
5. Conversion of orthographic projection into isometric view and vice versa by using computer aided drafting tools

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

(A400502) ENGINEERING CHEMISTRY LAB
(Common to all Branches)

L T P C
0 0 2 1

B.Tech (EEE) I Year I Sem.**Lab Experiments:**

1. Estimation of Hardness of water by EDTA Method.
2. Estimation of Alkalinity of Water.
3. Estimation of Copper by Colorimetric Method.
4. Conductometric Titration of a Strong Acid vs a Strong Base.
5. Conductometric Titration of a Weak Acid vs a Strong Base.
6. Potentiometric Titration of a Strong Acid vs a Strong Base.
7. Potentiometric Titration of Ferrous Ammonium Sulphate (FAS) vs Potassium Dichromate.
8. Preparation of Thiokol Rubber.
9. Determination of Viscosity of a Liquid.
10. Determination of Surface Tension of a liquid.
11. Adsorption of acetic acid on Activated charcoal.
12. Estimation of Iodine in Table Salt (by potentiometric)
13. Thin Layer Chromatography (Ortho-Nitro phenol & Para-Nitro phenol).
14. Determination of rate constant of acid catalyzed hydrolysis of methyl acetate.

Virtual lab experiments:

1. Construction of Fuel Cell and its working.
2. Smart Materials for biomedical applications.
3. Batteries for Electrical Vehicles.
4. Functioning of Solar Cell and its applications.

Reference Books:

1. Engineering Chemistry Lab Manual (1st edition), Glaze Publishers 2018.
2. Engineering chemistry (1st edition), B. Rama Devi & Ch. VenkataRamana Reddy; Cengage Learning, 2012.
3. A Textbook of Engineering Chemistry (1st edition), Sashi Chawla, Dhanapath Rai & Sons.

Course Outcomes:

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

1. Determine the extent of hardness present in water and its consequences in industrial operations
2. Prepare polymer like Thiokol Rubber
3. Estimate the strength of solutions, p^H of various solutions
4. Determine the viscosity and surface tension of various liquids
5. Apply the electrochemical concepts in conductometric and potentiometric titrations

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

L	T	P	C
0	0	2	1

WEEK-1

Types and features of community- Rural, Suburban, Urban and Regional

WEEK-2

Service based learning, Aims of Community based projects, Sustainable Development Goals

WEEK-3

Community visit, Report Writing, Resource Diagram, Chapati Diagram, Transect Walk

WEEK-4

The non-profit sector, public sector, the private sector, the informal sector

WEEK-5

Poster presentation on four sectors

WEEK-6

Process of Design Thinking

WEEK-7

Social organizations and enterprises, social movements

WEEK-8

Social softwares and open-source methods

WEEK-9

Introduction to Ethics, moral values, significance of professional ethicscode of conduct for engineers

WEEK-10

Identify ethical dilemmas in different tasks of engineering, applying moral theories and codes of conduct for resolution of ethical dilemmas

WEEK-11

Case studies on Engineering Ethics

WEEK-12

Documentation, Steps for Patent filing and Startups, Poster presentation

TEXT BOOKS

1. Social Entrepreneurship for the 21st Century: Innovation Across the Non Profit, Private and Public Sectors; Georgia LevensonKeohane; Tata McGraw Hill
2. Social Enterprises: An Organizational Perspective edited; Benjamin Gidron, YeheskelHasenfeld; Palgrave Macmillan
3. HassoPlattner, ChristophMeinel and Larry Leifer (eds), "Design Thinking: Understand – Improve – Apply", Springer, 2011.
4. Solving Problems with Design Thinking - Ten Stories of What Works (Columbia Business School Publishing) Hardcover – 20 Sep 2013 by Jeanne Liedtka (Author), Andrew King (Author), Kevin Bennett (Author)
5. Engineering Ethics: An Industrial Perspective; Gail Baura; Elsevier
6. Intellectual Property and Financing Strategies for Technology Startups; Gerald B. Halt, Jr., John C. Donch, Jr., Amber R. Stiles, Robert Fesnak; Springer
7. Fundamentals of Intellectual Property (English) 1st Edition (Paperback, Dr. Kalyan C. Kankanala) Publisher: Asia Law House ISBN: 9789381849514, 938184951X Edition: 1st Edition, 2012.
8. Indian Patent Law (English, Paperback, Kalyan C. Kankanala) Publisher: Oxford University Press- New Delhi, ISBN: 9780198089605, 0198089600 Edition: 2012.

Course Outcomes

On Completion of the course, the students will be able to

1. Identify community issues through community Interaction
2. Illustrate the factors affecting social innovation in various sectors
3. Apply design thinking concept to analyze the community problems
4. Adopt the ethical values in implementing the Social innovation
5. Describe the process of property rights and patent filing.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						1	2		3	2		
CO2						2	2		3	3		
CO3				2		2	3		2	3		
CO4						2	3	3	2	2		
CO5		2		2		2	3		2	3		

(A400703) CONSTITUTION OF INDIA
(Common to all branches)

L T P C
2 0 0 0

B.Tech (EEE) I Year I Semester

UNIT - 1

History of Making of the Indian Constitution - History of Drafting Committee

UNIT - 2

Philosophy of the Indian Constitution- Preamble Salient Features

UNIT - 3

Contours of Constitutional Rights & Duties - Fundamental Rights

- Right to Equality
- Right to Freedom
- Right against Exploitation
- Right to Freedom of Religion
- Cultural and Educational Rights
- Right to Constitutional Remedies
- Directive Principles of State Policy
- Fundamental Duties.

UNIT - 4

Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions

UNIT - 5

Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Panchayat raj: Introduction, PRI: ZilaPanchayat. Elected officials and their roles, CEO ZilaPanchayat: Position and role, Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

REFERENCE BOOKS:

- 1) The Constitution of India, 1950 (Bare Act), Government Publication.
- 2) Dr. B. R. Ambedkar framing of Indian Constitution, Dr. S. N. Busi, 1st Edition, 2015.
- 3) Indian Constitution Law (7th Edition), M. P. Jain, Lexis Nexis, 2014.
- 4) Introduction to the Constitution of India, D.D. Basu, Lexis Nexis, 2015.

COURSE OUTCOMES:

On completion of the course students will be able to

- 1) Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- 2) Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
- 3) Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru.
- 4) Discuss the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution
- 5) Discuss the passage of the Hindu Code Bill of 1956.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

B.Tech (EEE) I Year II Semester

L	T	P	C
3	1	0	4

UNIT-I**First Order ODE:**

Exact differential equations, Equations reducible to exact differential equations, linear and Bernoulli's differential equations, Orthogonal Trajectories (only in Cartesian Coordinates). Applications: Newton's law of cooling, Law of natural growth and decay.

UNIT-II**Ordinary Differential Equations of Higher Order:**

Second and higher order linear differential equations with constant coefficients: Non-Homogeneous terms of the type e^{ax} , $\sin ax$, $\cos ax$, polynomials in x , (x) and $x(x)$, method of variation of parameters.

UNIT-III**Laplace transforms:**

Laplace Transforms: Laplace Transform of standard functions, First shifting theorem and Second shifting theorem. Unit step function, Dirac delta function, Laplace transforms of functions when they are multiplied and divided by 't'. Evaluation of integrals by Laplace transforms, Laplace transform of periodic functions. Inverse Laplace transform by different methods, convolution theorem (without proof). Applications: solving Initial value problems by Laplace Transform method..

UNIT-IV**Vector Differentiation:**

Vector point functions and scalar point functions, Gradient, Tangent plane and normal line, Directional derivatives, Divergence and Curl, Solenoidal and Irrotational vectors, Scalar potential functions, Vector Identities.

UNIT-V**Vector Integration:**

Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stoke's (without proofs) and their applications.

TEXT BOOKS:

1. Higher Engineering Mathematics, (36th Edition), B.S. Grewal, Khanna Publishers, 2010.
2. Advanced Engineering Mathematics, (5th Edition), R.K. Jain and S.R.K. Iyengar, Narosa Publications, 2016.

REFERENCE BOOKS:

1. Advanced Engineering Mathematics, (9th Edition), Erwin Kreyszig, John Wiley & Sons, 2006.
2. Calculus and Analytic geometry, (9th Edition), G.B. Thomas and R.L. Finney, Pearson, Reprint, 2002.
3. A text book of Engineering Mathematics, (10th Edition), N.P. Bali and Manish Goyal, Laxmi Publications, Reprint, 2019.
4. Higher Engineering Mathematics, (9th Edition), H.K. Dass and Er. Rajnish Verma, S Chand and company Limited, New Delhi, 2011.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Determine first order differential equations and obtain solutions.
2. Solve the Higher order differential equations and apply the differential equation concepts to real world problems.
3. Use the Laplace transforms techniques for solving ODE's.
4. Evaluate Gradient – Divergence – Curl, Directional derivatives.
5. Evaluate the line, surface and volume integrals and converting them from one to another.

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

B.Tech (EEE) I Year II Semester

L	T	P	C
2	0	0	2

UNIT - I

Chapter entitled ‘Toasted English’ by R.K.Narayan from “English: Language, Context and Culture” published by Orient Black Swan, Hyderabad.

Vocabulary: The Concept of Word Formation -The Use of Prefixes and Suffixes -Acquaintance with Prefixes and Suffixes from Foreign Languages to form Derivatives -Synonyms and Antonyms

Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions.

Reading: Reading and Its Importance- Techniques for Effective Reading.

Writing: Sentence Structures -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for writing precisely – Paragraph Writing – Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

UNIT – II

Chapter entitled ‘Appro JRD ‘ bySudha Murthy from “ English Language , Context and Culture” published by Orient Black Swan ,Hyderabad.

Vocabulary: Words Often Misspelt - Homophones, Homonyms and Homographs Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

Reading: Sub-Skills of Reading – Skimming and Scanning

UNIT – III

Chapter entitled ‘Lessons from Online Learning’ by F.HaiderAlvi, Deborah Hurst et al from “English: Language, Context and Culture” published by Orient BlackSwan, Hyderabad.

Vocabulary: Words Often Confused - Words from Foreign Languages and their Use in English.

Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

Reading: Sub-Skills of Reading – Intensive Reading and Extensive Reading – Exercises for Practice.

Writing: Format of a Formal Letter-Writing Formal Letters E.g., Letter of Complaint, Letter of Requisition, Email Etiquette, Job Application with CV/Resume.

UNIT - IV

Chapter entitled ‘Art and Literature’ by Abdul Kalam from “English: Language, Context and Culture” published by Orient BlackSwan, Hyderabad.

Vocabulary: Standard Abbreviations in English Grammar: Redundancies and Clichés in Oral and Written Communication.

Reading: Writing: Survey, Question, Read, Recite and Review (SQ3R Method) - Exercises for Practice Writing Practices

Essay Writing-Writing Introduction and Conclusion -Précis Writing

UNIT - V

Grammar: Common Errors in English (Covering all the other aspects of grammar which were not covered in the previous units)

Reading: Writing: Reading Comprehension-Exercises for Practice Technical Reports- Introduction.

NOTE:

Listening and Speaking Skills which are given under in AICTE Model Curriculum are covered in the syllabus of ELCS Lab Course.

- NOTE 1: As the syllabus of English given in AICTE Model Curriculum-2018 for B.Tech First Year is Open-ended, besides following the prescribed textbook, it is required to prepare teaching/learning materials by the teachers collectively in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning in the class.
- NOTE 2: Based on the recommendations of NEP2020, teachers are requested to be flexible to adopt Blended Learning in dealing with the course contents .They are advised to teach 40 percent of each topic from the syllabus in blended mode.

TEXT BOOK:

1. “English: Language, Context and Culture” by Orient BlackSwan Pvt. Ltd, Hyderabad. 2022. Print.

REFERENCE BOOKS:

1. Effective Academic Writing, (2nd edition) by Liss and Davis (OUP) 2014.
2. Richards, Jack C. Interchange Series. Introduction, ,(4th edition), Cambridge University Press 2022
3. Remedial English Grammar by Wood F.T, Macmillan.2007.
4. Learn English: A Fun Book of Functional Language, Grammar and Vocabulary, (2ndedition)Chaudhuri, Santanu Sinha,. Sage Publications India Pvt. Ltd.2018
5. Technical Communication,(1st edition), Wiley India Pvt. Ltd.2019
6. English for Technical Communication for Engineering, Vishwamohan, Aysha 2013

Course Outcomes:

On completion of the course students will be able to

1. Understand the importance of vocabulary and sentence structures.
2. Choose appropriate vocabulary and sentence structures for their oral and written communication.
3. Demonstrate their understanding of the rules of functional grammar.
4. Develop comprehension skills from the known passages.
5. Acquire basic proficiency in reading and writing modules of English and take an active part in drafting paragraphs, letters, essays, abstracts, precis, and reports in various contexts.

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

B.Tech (EEE) I Year II Semester

L	T	P	C
3	1	0	4

UNIT – I**QUANTUM MECHANICS:**

Introduction to quantum physics, blackbody radiation – Stefan-Boltzmann's law, Wein's and Rayleigh-Jean's law, Planck's radiation law - photoelectric effect – de Broglie hypothesis- Davisson and Germer experiment – Heisenberg uncertainty principle - Born interpretation of the wave function – time independent Schrodinger wave equation - particle in one dimensional potential box.

ELECTRIC PROPERTIES OF SOLIDS:

Free electron theory (Drude & Lorentz, Sommerfeld) - Fermi-Dirac distribution - Bloch's theorem - Kronig-Penney model – E-K diagram- effective mass of electron-origin of energy bands- classification of solids.

UNIT – II**SEMICONDUCTORS AND DEVICES:**

Intrinsic and extrinsic semiconductors, Variation of Fermi level with temperature – Hall Effect - Construction, principle of operation and characteristics of P-N Junction diode, Zener diode

PHOTONIC DEVICES

Direct and indirect band gap semiconductors –LED, PIN diode, avalanche photo diode (APD) and solar cells, their structure, materials, working principle and characteristics.

UNIT – III**LASERS**

Laser beam characteristics-three quantum processes-Einstein coefficients and their relations- lasing action - pumping methods- ruby laser, He-Ne laser, CO₂ laser - semiconductor laser-applications of laser.

FIBER OPTICS:

Introduction to optical fiber - advantages of optical fibers - total internal reflection - construction of optical fiber - acceptance angle - numerical aperture- classification of optical fibers- losses in optical fiber - optical fiber for communication system - applications.

UNIT - IV**DIELECTRIC MATERIALS**

Dielectric Materials: Basic definitions- types of polarizations (qualitative) –Local field – Clausius Mossotti Equation ferroelectric, piezoelectric, and pyroelectric materials – applications

MAGNETIC MATERIALS:

Introduction to magnetic materials - Hysteresis-soft and hard magnetic materials- magnetostriction, magnetoresistance - applications - bubble memory devices, magnetic field sensors and multiferroics.

UNIT - V**ENERGY MATERIALS:**

Conductivity of liquid and solid electrolytes- superionic conductors - materials and electrolytes for super capacitors - rechargeable ion batteries, solid fuel cells.

NANOTECHNOLOGY

Nano scale, quantum confinement, surface to volume ratio, bottom-up fabrication: sol-gel, precipitation, combustion methods – top-down fabrication: ball milling - physical vapour deposition (PVD) - chemical vapor deposition (CVD) - characterization techniques - XRD, SEM & TEM - applications of nano materials.

TEXT BOOKS

1. Engineering Physics(3rd edition), PK Palanisamy, SciTech Publications, 2015.
2. Essentials of Nan science&Nanotechnology(1st Edition), Narasimha Reddy Katta, Typical Creatives NANO DIGEST, 2021.

REFERENCES

1. Fundamentals of Physics.(6th edition), Halliday, R.Resnick and J.Walker,John Wiley and Sons, 2001.
2. Quantum Physics,(2nd edition), H.C. Verma, TBS Publication, 2012
3. Introduction to Solid State Physics, (7th edition), Charles Kittel, Wiley Eastern, 2019.
4. Physics of Semiconductor devices (4th edition), Simon.M Sze and Kwok K . Ng, Wiley Student Edition,2006.

COURSE OUTCOMES

On completion of the course students will be able to

1. Understand the concepts of Quantum mechanics and visualize the differences between the solids by their classification.
2. Identify and analyze the importance of semiconductors and semiconductor devices in Science and Engineering Applications.
3. Appreciate the features and applications of Lasers and Optical fibers.
4. Applying the fundamental properties of dielectric and magnetic materials in different engineering fields.
5. Evaluate various aspects of Energy Materials and Nano-materials and their applications in diverse fields.

CO PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	1	-	-	-	-	-	-	-	1
CO2	3	3	1	1	-	-	-	-	-	-	-	1
CO3	3	3	1	1	-	-	-	-	-	-	-	1
CO4	3	3	1	1	-	-	-	-	-	-	-	1
CO5	3	3	1	1	-	-	-	-	-	-	-	1

L	T	P	C
0	0	3	1.5

B.Tech. I Year II Sem**Pre-requisites:** Practical skill**1. TRADES FOR EXERCISES:****At least two exercises from each trade:**

- I. Carpentry
- II. Fitting
- III. Tin-Smithy
- IV. Foundry
- V. Welding Practice
- VI. House-wiring

2. TRADES FOR DEMONSTRATION & EXPOSURE:

Black Smithy ,Plumbing, Lathe, Power tools

TEXT BOOKS:

1. Workshop Practice, B. L. Juneja, Cengage, 2016
2. Workshop Manual, K. Venugopal, Anuradha Pub, 2012

REFERENCE BOOKS:

1. Work shop Manual, 2nd Edition, P. Kannaiah & K.L. Narayana, Scitech Publishers, 2008
2. Workshop Manual, 6th Edition, Venkat Reddy, BS Publications, 2008

Course Outcomes:

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

1. Study and practice on trade tools and their operations
2. Practice and prepare components using workshop trades including carpentry, fitting, Tin smithy.
3. Practice and prepare components using workshop trades including Foundry, welding.
4. Practice and prepare components using workshop trades including House wiring, black smithy and Plumbing.
5. Acquire knowledge by exposure to modern Tools.

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

B. Tech. (EEE) I Yr II-Semester

L	T	P	C
3	0	0	3

UNIT-I

Diode and Bipolar Transistor Circuits: P-N junction diode, I-V characteristics of a diode; review of half-wave and full-wave rectifiers, clamping and clipping circuits. Input output characteristics of BJT in CB, CE, CC configurations, biasing circuits, Load line analysis, common-emitter, common-base and common collector amplifiers; Small signal equivalent circuits.

UNIT-II

FET Circuits: FET Structure and VI Characteristics, MOSFET structure and I-V characteristics. MOSFET as a switch. small signal equivalent circuits-gain, input and output impedances, small-signal model and common-source, common-gate and common-drain amplifiers, trans conductance, high frequency equivalent circuit.

UNIT-III

Multi-Stage and Power Amplifiers: Direct coupled and RC Coupled multi-stage amplifiers; Differential Amplifiers, Power amplifiers-Class A, Class B, Class C

UNIT-IV

Feedback Amplifiers: Concepts of feedback– Classification of feedback amplifiers– General characteristics of Negative feedback amplifiers – Effect of Feedback on Amplifier characteristics –Voltage series, Voltage shunt, Current series and Current shunt Feedback configurations – Simple problems.

Oscillators: Condition for Oscillations, RC type Oscillators –RC phase shift and Wien-bridge Oscillators, LC type Oscillators–Generalized analysis of LC Oscillators, Hartley and Colpitts Oscillators.

UNIT-V

Operational Amplifiers: Ideal op-amp, Output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product, Inverting and non-inverting amplifier, Differentiator, integrator, Square-wave and triangular-wave generators

TEXTBOOKS:

1. Integrated Electronics, Jacob Millman, Christos Chalkias, McGraw Hill Education, 2nd edition 2010
2. Op-Amps & Linear ICs–Ramakanth A. Gayakwad, PHI, 2003.

REFERENCEBOOKS:

1. Electronic Devices Conventional and current version-Thomas L. Floyd 2015, Pearson.
2. J. Millman and A. Grabel, “Microelectronics”, McGraw Hill Education, 1988.
3. P. Horowitz and W. Hill, “The Art of Electronics”, Cambridge University Press, 1989.
4. P. R. Gray, R. G. Meyer and S. Lewis, “Analysis and Design of Analog Integrated Circuits” John Wiley & Sons, 2001.

Course Outcomes

Upon successful completion of the course, students will be able to:

1. Analyze the characteristics of different diodes, BJT and its applications.
2. Explain the characteristics of FET and analyze its amplifier circuits.
3. Construct different multistage amplifiers and create the circuits with power amplifiers.
4. Comprehend the fundamental concepts in positive, negative feedback amplifier circuits.
5. Design and analyze Op Amp based circuits.

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

The English Language and Communication Skills (ELCS) Lab focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

English Language and Communication Skills Lab (ELCS) shall have two parts:

- a. Computer Assisted Language Learning (CALL) Lab
- b. Interactive Communication Skills (ICS) Lab

Listening Skills Objectives

1. To enable students develop their listening skills so that they may appreciate the role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening, so that they can comprehend the speech of people of different backgrounds and regions. Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.
 - Listening for general content
 - Listening to fill up information
 - Intensive listening
 - Listening for specific information

Speaking Skills Objectives

1. To involve students in speaking activities in various contexts
2. To enable students express themselves fluently and appropriately in social and professional
 - Oral practice
 - Describing objects/situations/people
 - Role play – Individual/Group activities
 - Just A Minute (JAM) Sessions

The following course content is prescribed for the English Language and Communication Skills Lab

Exercise – I

CALL Lab: Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers- Effective Listening. Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants – Minimal Pairs - Past Tense Marker and Plural Marker- Testing Exercises

ICS Lab: Understand: Spoken vs. Written language- Formal and Informal English. Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

Exercise – II

CALL Lab: Understand: Structure of Syllables – Word Stress– Weak Forms and Strong Forms – Stress pattern in sentences – Intonation. Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms- Stress pattern in sentences – Intonation - Testing Exercises.

ICS Lab: Understand: Features of Good Conversation – Strategies for Effective Communication. Practice: Situational Dialogues – Role Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette.

Exercise – III

CALL Lab: Understand: Errors in Pronunciation-Neutralising Mother Tongue Interference (MTI). Practice: Common Indian Variants in Pronunciation – Differences between British and American Pronunciation -Testing Exercises

ICS Lab: Understand: Descriptions- Narrations- Giving Directions and Guidelines – Blog Writing Practice: Giving Instructions – Seeking Clarifications – Asking for and Giving Directions – Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

Exercise – IV

CALL Lab: Understand: Listening for General Details. Practice: Listening Comprehension Tests - Testing Exercises

ICS Lab: Understand: Public Speaking – Exposure to Structured Talks - Non-verbal Communication Presentation Skills. Practice: Making a Short Speech – Extempore- Making a Presentation.

Exercise – V

CALL Lab: Understand: Listening for Specific Details. Practice: Listening Comprehension Tests -Testing Exercises

ICS Lab: Understand: Group Discussion Practice: Group Discussion

Minimum Requirement of infrastructural facilities for ELCS Lab:

1. **Computer Assisted Language Learning (CALL) Lab:** The Computer Assisted Language Learning Lab has to accommodate 30 students with 30 systems, with one Master Console, LAN facility and English language learning software for self- study by students. System Requirement (Hardware component): Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications: i) Computers with Suitable Configuration ii) High Fidelity Headphones
2. **Interactive Communication Skills (ICS) Lab :** The Interactive Communication Skills Lab: A Spacious room with movable chairs and audiovisual aids with a Public Address System, a T. V. or LCD, a digital stereo – audio & video system and camcorder etc. Source of Material (Master Copy): • Exercises in Spoken English. Part 1,2,3. CIEFL and Oxford University Press Note: Teachers are requested to make use of the master copy and get it tailor-made to suit the contents of the syllabus

REFERENCE BOOKS:

1. English Language Communication Skills Lab Manual cum Workbook, (1st edition) ,by Rajesh Kumar Cengage Learning India Pvt. Ltd, 2022
2. Communicative English - A workbook, (Revised Edition) by Shobha, KN & Rayen, J. Lourdes, Cambridge University Press, 2019.
3. Communication Skills: A Workbook. Kumar, (2nd edition) by Sanjay & Lata, Pushp, Oxford University Press, 2019.
4. ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities, (Board of Editors), Orient Black Swan Pvt. Ltd, 2016
5. English Language Skills: A Practical Approach, Mishra, Veerendra et al., Cambridge University Press, 2020.

Course Outcomes:

On completion of the course students will be able to

1. Understand the nuances of English language through audio- visual experience and group activities.
2. Neutralise their accent for intelligibility.
3. Speak with clarity and confidence which in turn enhances their employability skills
4. Students will learn public speaking skills and overcome stage fear.
5. Express clarity of thoughts, capability to hold the discussion with everyone and develop analytical thinking.

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

B.Tech (EEE) I Year II Sem**(Any 8 experiments are to be performed)**

1. Determination of work function and Planck's constant using photoelectric effect.
2. Determination of Hall co-efficient and carrier concentration of a given semiconductor.
3. Characteristics of series and parallel LCR circuits.
4. V-I characteristics of a p-n junction diode and Zener diode
5. a) V-I and L-I characteristics of light emitting diode (LED) b) V-I Characteristics of solar cell
6. Determination of Energy gap of a semiconductor.
7. Determination of the resistivity of semiconductor by two probe method.
8. Study of B-H curve of a magnetic material.
9. Determination of dielectric constant of a given material
10. a) Determination of the beam divergence of the given LASER beam) Determination of Acceptance Angle and Numerical Aperture of an optical fiber.
11. Understanding the method of least squares – torsional pendulum as an example.
12. Diffraction grating: Determination of wavelength of a source (LASER).

LABORATORY MANUAL:

1. Applied Lab (2nd Edition) Dr M Chandra Shekhar Reddy, Dr Neelima Patnaik, Jaya Prakash Reddy Kasu, Skytech Publications, 2022.
2. "A Text book of Practical Physics"(2nd Edition) - S. Balasubramanian, M.N. Srinivasan S Chand Publishers, 2017.

COURSE OUTCOMES

On completion of the course students will be able to

1. Appreciate quantum physics in optoelectronics.
2. Determine the Planck's constant using Photo electric effect
3. Determine energy gap of a semiconductor diode and magnetic fields.
4. Identify the material whether it is n-type or p-type by Hall experiment.
5. Evaluate the basic properties of lasers and optical fibers.

COPOMAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	1	-	-	-	-	-	-	-	1
CO2	3	3	1	1	-	-	-	-	-	-	-	1
CO3	3	3	1	1	-	-	-	-	-	-	-	1
CO4	3	3	1	1	-	-	-	-	-	-	-	1
CO5	3	3	1	1	-	-	-	-	-	-	-	1

B. Tech. (EEE) II-Semester

L	T	P	C
0	0	3	1.5

Note: Minimum of 12 experiments to be conducted from the following.**List of Experiments:**

1. Draw the VI Characteristics of given PN Junction diode. Determine the Static and Dynamic resistance of the Diode.
2. Determine the Ripple factor, % Regulation PIV and TUF of the given Rectifier with & without filter.
3. Obtain the I/O Characteristics of CE configurations of BJT. Calculate h-parameters from the Characteristics.
4. Obtain the I/O Characteristics of CB configurations of BJT. Calculate h-parameters from the Characteristics.
5. Obtain the I/O Characteristics of CC configurations of BJT. Calculate h-parameters from the Characteristics.
6. Obtain the Drain and Transfer characteristics of CD, CS configuration of JFET. Calculate g_m , r_d from the Characteristics Adder and Subtract or using Op Amp.
7. Inverting and Non-inverting Amplifiers using Op Amps
8. Adder and Subtract or using Op Amp
9. Integrator Circuit using IC741.
10. Differentiator circuit using Op Amp.
11. Voltage Shunt Feed back amplifier
12. Design an RC phase shift oscillator circuit and derive the gain condition for oscillations practically for given frequency.
13. Design a Colpitts oscillator circuit for the given frequency and draw the output wave form.
14. Design transformer coupled class A power amplifier and draw the input and output waveforms ,find its efficiency

Course Outcomes

Upon completing this course, the student will be able to

1. Know the characteristics, utilization of various components.
2. Understand the biasing techniques
3. Design and analyze various rectifiers, small signal amplifier circuits.
4. Design sinusoidal and non-sinusoidal oscillators.
5. Design OP-AMP based circuits with linear integrated circuits

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

(A400506) ENGINEERING EXPLORATION & PRACTICE
(Common to all branches)

L	T	P	C
0	0	3	1.5

Week-1

Difference between Science and Engineering, Scientist and Engineer needs and wants, various disciplines of engineering, some misconceptions of engineering, Expectation for the 21st century engineer. Significance of teamwork, Importance of communication in engineering profession

Week-2

Engineering Design Process, Need statement to Problem conversion, Pair wise comparison chart, decision matrix, Concepts of reverse engineering

Week-3

Project management tools: Checklist, Timeline, Gantt chart, Requirement Analysis

Week-4

Basic Components of a Mechanism, Degrees of Freedom or Mobility of a Mechanism, 4 Bar Chain, Crank Rocker Mechanism, Slider Crank Mechanism

Week-5

3-D Modelling of a Box with two holes and curvature

Week-6

3-D Modelling of Electronic Enclosure and Assembly of two parts

Week-7

Introduction to various platform-based development, Introduction to basic components, transducers, actuators and sensors, Introduction to Tinkercad

Week-8

Introduction to Arduino, basics of programming

Week-9

Interfacing Arduino with actuators and transducers

Week-10

Interfacing Arduino with Sensors, Liquid Crystal Display (LCD)

Week-11

Assembly and Crafting the Prototype

Week-12

Test and Validate the Prototype, Documentation, Panel Presentation

Text Books

1. Engineering Fundamentals: An Introduction to Engineering (MindTap Course List) 5th Edition by Saeed Moaveni
2. Software Project Management (SIE), (Fifth Edition); Bob Hughes, Mike Cotterell, Rajib Mall; Published by Tata McGraw-Hill Education Pvt. Ltd (2011) ; ISBN 10: 0071072748 ISBN 13: 9780071072748
3. A Ghosh and AK Malik: Theory of Mechanism and Machine; East West Press (Pvt) Ltd., New Delhi.
4. Arduino Cookbook, 2nd Edition by Michael Margolis: O'Reilly Media
5. Introduction to autocad@2017-2D and 3D design by Bernd S. Palm and Alf Yarwood, Routledge (Taylor and Francis group)
6. Concepts in Engineering Design – 2016; by Sumesh Krishnan (Author), Dr. Mukul Shukla (Author), Publisher : Notion Press.

Course Outcomes

On Completion of the course, the students will be able to

1. Explain the importance of engineering profession in the world.
2. Identify multi-disciplinary approach required in solving an engineering problem
3. Build a mechanism for a given application
4. Create basic 3D models and animations
5. Design a mechatronic system using Arduino and electronic components

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1					3	3	2		3	
CO2		3	1	3	2				3		3	
CO3	3		2		3				3		3	
CO4	2	3	2		3				3	2	3	
CO5			2	1	2		3		3		3	

(A400704) UNIVERSAL HUMAN VALUES
(Common to all branches)**L T P C**
2 0 0 0**UNIT - I**

Basic Guidelines, Content and Process for Value Education

- Purpose and motivation for the course, recapitulation from Universal Human Values-I
- Self-Exploration—what is it? - Its content and process; ‘Natural Acceptance’ and Experiential Validation- as the process for self-exploration
- Continuous Happiness and Prosperity- A look at basic Human Aspirations
- Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority
- Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
- Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking

UNIT - II

Understanding Harmony in the Human Being - Harmony in Myself!

- Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’
- Understanding the needs of Self (‘I’) and ‘Body’ - happiness and physical facility
- Understanding the Body as an instrument of ‘I’ (I being the doer, seer and enjoyer) • Understanding the characteristics and activities of ‘I’ and harmony in ‘I’
- Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
- Programs to ensure Sanyam and Health. Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one’s own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

UNIT – III

Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship

- Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
- Understanding the meaning of Trust; Difference between intention and competence • Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
- Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals • Visualizing a universal harmonious order in society- Undivided Society, Universal Order from family to world family.

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 - IV

Understanding Harmony in the Nature and Existence – Whole existence as Coexistence

- Understanding the harmony in the Nature
- Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self- regulation in nature
- Understanding Existence as Co-existence of mutually interacting units in all- pervasive space
- Holistic perception of harmony at all levels of existence. 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 – V

Implications of the above Holistic Understanding of Harmony on Professional Ethics

- Natural acceptance of human values
- Definitiveness of Ethical Human Conduct
- Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
- Competence in professional ethics:
 - a. Ability to utilize the professional competence for augmenting universal human order
 - b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems,
 - c. Ability to identify and develop appropriate technologies and management patterns for above production systems.
- Case studies of typical holistic technologies, management models and production systems
- Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations
- Sum up. 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.

Textbooks:

1. R R Gaur, R Asthana, G P Bagaria, “A Foundation Course in Human Values and Professional Ethics”, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
2. R R Gaur, R Asthana, G P Bagaria, “Teachers’ Manual for A Foundation Course in Human Values and Professional Ethics”, 2nd Revised Edition, Excel Books, New Delhi, 2019.

Reference Books:

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantak, 1999.
2. A. N. Tripathi, “Human Values”, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. Mohandas Karamchand Gandhi “The Story of My Experiments with Truth”

Course Outcomes:

On completion of the course students will be able to

1. Students are expected to become more aware of themselves, and their surroundings (family, society, nature)
2. They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind. •
3. They would have better critical ability about various issues in life.
4. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
5. It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

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

B.Tech. III SEM

L	T	P	C
3	1	0	4

UNIT-I**NUMERICAL METHODS-I:**

Solution of polynomial and transcendental equations: Bisection method, Iteration method, Newton-Raphson method and Regula-False method.

Interpolation: Finite differences, Forward differences, Backward differences, Central differences, Symbolic relations and separation of symbols, Interpolation using Newton's forward and backward difference formulae. Central difference interpolation, Gauss's forward and backward formulae, Lagrange's method of interpolation.

UNIT-II**NUMERICAL METHODS-II:**

Numerical integration : Trapezoidal rule, Simpson's 1/3rd and 3/8 rules.

Numerical Solutions of Ordinary Differential Equations -Taylor's series, Picard's method, Euler and modified Euler's methods, Runge-Kutta method of fourth order.

UNIT-III**COMPLEX VARIABLES: DIFFERENTIATION**

Limit, Continuity and Differentiation of Complex functions. Cauchy-Riemann equations (without proof), Milne-Thomson's methods, Analytic function, Harmonic function, Finding harmonic conjugate, Conformal mapping and Mobius transformations.

UNIT-IV**COMPLEX VARIABLES: INTEGRATION**

Line integrals, Cauchy's theorem, Cauchy's Integral formula, Liouville's theorem, Maximum-Modulus theorem (All theorems without proof), Zeros of analytic functions, singularities.

Complex Power series: Taylor's series, Laurent's series, Residues, Cauchy Residue theorem (without proof)

.

UNIT-V**FOURIER SERIES & FOURIER TRANSFORMS:**

Fourier series - Dirichlet's Conditions - Half-range Fourier series - Fourier Transforms: Fourier Sine and cosine transforms-Inverse Fourier transforms.

TEXT BOOKS:

- Higher Engineering Mathematics, (36th Edition), B.S. Grewal, Khanna Publishers, 2010.
- Advanced Engineering Mathematics, (5th Edition), R.K. Jain and S.R.K. Iyengar, Narosa Publications, 2016.

REFERENCE BOOKS:

- Advanced Engineering Mathematics, (9th Edition), Erwin Kreyszig, John Wiley & Sons, 2006.
- Calculus and Analytic geometry, (9th Edition), G.B. Thomas and R.L. Finney, Pearson, Reprint, 2002.
- Introductory methods of Numerical Analysis, (4th Edition), S.S. Sastry, PHI, 2005.
- Complex Variables and Applications, (7th Edition), J. W. Brown and R. V. Churchill, Mc-Graw Hill, 2004.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Find the root of given equation and estimate unknown value using interpolation.
2. Find numerical solutions of ordinary differential equations.
3. Analyze the complex function with reference to their analyticity.
4. Evaluate integrals using Cauchy's integral and residue theorems, Taylor's and Laurent's series expansions of complex function.
5. Express any periodic function in terms of sine and cosine.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

(A402203)ELECTRICAL CIRCUIT ANALYSIS – II**B.Tech EEE III SEM**

L	T	P	C
2	0	0	2

UNIT-I:

Transient analysis: Transient response of R, L & C circuits, Formulation of integral differential equations, Initial conditions, Transient Response of RL, RC and RLC (series and parallel) networks subjected to internal energy, Response to impulse, step, and ramp, exponential and sinusoidal excitations.

UNIT-II:

Electrical circuit Analysis using Laplace Transforms: Application of Laplace Transforms to RL, RC and RLC (series and parallel) Networks for impulse, step, and ramp, exponential and sinusoidal excitations.

UNIT-III:

Two port network parameters: Open circuit impedance, short-circuit admittance, Transmission, Hybrid parameters & inter-relationships, Series, parallel and cascade connection of two port networks, System function, and Impedance and admittance functions.

UNIT-IV:

Fourier Series and Integral: Fourier series representation of periodic functions, Symmetry conditions, Exponential Fourier series, Discrete spectrum, Fourier integral and its properties, Continuous spectrum, Application to simple networks

UNIT-V:

Filters: Classification of filters – Low pass, High pass, Band pass and Band Elimination, Constant-k and M-derived filters-Low pass and High pass Filters and Band pass and Band elimination filters(Elementary treatment only)

TEXTBOOKS:

1. Van Valkenburg M.E, “Network Analysis”, Prentice Hall of India, 3rd Edition, 2000.
2. Ravish R Singh, “Network Analysis and Synthesis”, McGraw Hill, 2nd Edition, 2019.

REFERENCE BOOKS:

1. B. Subramanyam, “Electric Circuit Analysis”, Dreamtech Press & Wiley, 2021.
2. James W. Nilsson, Susan A.Riedel, “Electric Circuits”, Pearson, 11th Edition, 2020.
3. A Sudhakar, Shyammoan S Palli, “Circuits and Networks: Analysis and Synthesis”, McGrawHill, 5th Edition, 2017.
4. Jagan N.C, Lakshminarayana C., “Network Analysis”, B.S. Publications, 3rd Edition, 2014.
5. William Hayt H, Kimmerly Jack E. and Steven Durbin M, “Engineering Circuit Analysis”, McGrawHill, 6th Edition, 2002.
6. Chakravarthy A., “Circuit Theory”, DhanpatRai& Co., First Edition, 1999.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Observe the response of various R, L and C circuits for different excitations.
2. Examine the behavior of circuits using Laplace transforms
3. Obtain two port network parameters and applications
4. Examine the behavior of circuits using Fourier transforms and transfer function of single port network.
5. Design of various filters.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

**(A402302) ELECTROMAGNETIC FIELDS
PROFESSIONAL CORE**

B.Tech EEE III SEM

L	T	P	C
3	0	0	3

UNIT I: REVIEW OF VECTOR CALCULUS

Vector algebra -addition, subtraction, components of vectors, scalar and vector multiplications, triple products, three orthogonal coordinate systems (rectangular, cylindrical and spherical). Analysis of differential volumes, differential surfaces and differential lengths in Rectangular, Cylindrical and Spherical coordinate systems. Conversion of a vector from one coordinate system to another.

UNIT II: STATIC ELECTRIC FIELDS

Coulomb's law, Electric field intensity, Electrical field due to point charges. Line, Surface and Volume charge distributions. Gauss law and its applications. Maxwell's first law, $\text{div}(\mathbf{D}) = \rho_v$ Absolute Electric potential, potential difference, Calculation of potential differences for different configurations. Electric dipole, Electrostatic Energy and Energy density.

UNIT III: CONDUCTORS, DIELECTRICS AND CAPACITANCE

Current and current density, Ohms Law in Point form, Continuity of current, Boundary conditions of perfect dielectric materials. Permittivity of dielectric materials, Boundary Conditions between two dielectrics and between conductor and dielectric, Capacitance, Capacitance of a two wire line, Poisson's equation, Laplace's equation, Solution of Laplace and Poisson's equation, Application of Laplace's and Poisson's equations.

UNIT IV: STATIC MAGNETIC FIELDS

Biot-Savart Law, Ampere Law, Magnetic flux and magnetic flux density, Scalar and Vector Magnetic potentials. Steady magnetic fields produced by current carrying conductors. Maxwell's second Equation, $\text{div}(\mathbf{B}) = 0$.

Ampere's circuital law and its applications Ampere's circuital law and its applications viz. MFI due to an infinite sheet of current and a long current carrying filament – Point form of Ampere's circuital law – Maxwell's third equation, $\text{Curl}(\mathbf{H}) = \mathbf{J}_c$, Field due to a circular loop, rectangular and square loops.

Magnetic Forces, Materials and Inductance

Force on a moving charge, Force on a differential current element, Force between differential current elements, Nature of magnetic materials, Magnetization and permeability, Magnetic boundary conditions, Magnetic circuits, inductances and mutual inductances.

UNIT V: TIME VARYING FIELDS AND MAXWELL'S EQUATIONS

Faraday's law for Electromagnetic induction, Displacement current, Point form of equation, Integral form of Maxwell's equations, Motional Electromotive forces..

TEXT BOOKS:

1. W. Hayt, "Engineering Electro magnetics", McGraw Hill Education, 2012.
2. M. N. O. Sadiku, "Elements of Electro magnetics", Oxford University Publication, 2014.

REFERENCE BOOKS:

1. A. Pramanik, "Electromagnetism - Theory and applications", PHI Learning Pvt. Ltd, New Delhi, 2009.
2. A. Pramanik, "Electromagnetism-Problems with solution", Prentice Hall India, 2012.
3. G. W. Carter, "The electromagnetic field in its engineering aspects", Longmans, 1954.
4. W. J. Duffin, "Electricity and Magnetism", McGraw Hill Publication, 1980.
5. W. J. Duffin, "Advanced Electricity and Magnetism", McGraw Hill, 1968
6. .E. G. Cullwick, "The Fundamentals of Electromagnetism", Cambridge University Press, 1966.
7. B. D. Popovic, "Introductory Engineering Electro magnetics", Addison-Wesley Educational Publishers, International Edition, 1971.

COURSE OUTCOMES:

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

1. Apply the vector algebra for understanding different coordinate systems
2. Explain the basic laws of electrostatic field
3. Obtain the electric fields for simple configurations under static conditions.
4. Evaluate static magnetic fields using different laws and explore the forces & torques on various current distributions
5. Analyze time varying electric and magnetic fields and Express Maxwell's equations in different forms and different media.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

(A402301) ELECTRICAL MACHINES - I
PROFESSIONAL CORE

B.Tech EEE III SEM

L	T	P	C
3	0	0	3

UNIT-I:

D.C. GENERATORS: Principle of operation – Action of commutator – constructional features –armature windings – lap and wave windings – simplex and multiplex windings – use of laminated armature – E. M.F Equation.

Armature reaction – Cross magnetizing and de-magnetizing AT/pole – compensating winding – commutation – reactance voltage – methods of improving commutation.

Methods of Excitation – separately excited and self-excited generators – build-up of E.M.F - critical field resistance and critical speed - causes for failure to self-excited and remedial measures. Load characteristics and applications of shunt, series and compound generators.

UNIT-II:

D.C MOTORS: Principle of operation – Back E.M.F. - Torque equation – characteristics and application of shunt, series and compound motors – Armature reaction and commutation.

Speed control of D.C. Motors - Armature voltage and field flux control methods.

Motor starters (3- point and 4- point starters) Testing of D.C. machines - Losses – Constant & Variable losses – calculation of efficiency – condition for maximum efficiency.

UNIT-III:

TESTING OF DC MACHINES: Methods of Testing – direct, indirect, and regenerative testing – Brake test – Swinburne's test – Hopkinson's test – Field's test - separation of stray losses in a D.C. motor test.

UNIT-IV:

SINGLE PHASE TRANSFORMERS: Types - constructional details-minimization of hysteresis and eddy current losses- EMF equation - operation on no load and on load - phasor diagrams and Applications.

Equivalent circuit - losses and efficiency – regulation - All day efficiency - effect of variations of frequency & supply voltage on iron losses.

UNIT-V:

TESTING OF TRANSFORMERS AND POLY-PHASE TRANSFORMERS:

Open Circuit and Short Circuit tests - Sumpner's test - predetermination of efficiency and regulation-separation of losses test parallel operation with equal and unequal voltage ratios - auto transformers-equivalent circuit - comparison with two winding transformers.

Poly-phase transformers – Poly-phase connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ and open Δ, Scott connection and Applications.

Text Books:

1. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.
2. I. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.

Reference books:

1. PrithwirajPurkait, IndrayudhBandyopadhyay, "Electrical Machines", Oxford, 2017.
2. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
3. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 2013.
4. A. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBS Publishers, 2004.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

1. Describe operation of dc generators for different excitation, starting, speed control methods.
2. Analyse the operation of DC motor.
3. Explain different tests on testing of DC machines
4. Analyse the operation of single phase transformers.
5. Analyze poly phase transformers and their performance through testing.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

L	T	P	C
3	0	0	3

UNIT-I: GENERATION OF ELECTRIC POWER: Structure of Power System, Conventional Sources (Qualitative: Site selection, Layout, Working) : Hydro station, Steam Power Plant, Nuclear Power Plant and Gas Turbine Plant.

UNIT-II: OVER HEAD TRANSMISSION LINES: Line conductors, inductance and capacitance of single phase and three phase lines with symmetrical and unsymmetrical spacing, Composite conductors transposition, bundled conductors, and effect of earth on capacitance, skin and proximity effects.

OVERHEAD LINE INSULATORS: Introduction, types of insulators, Potential distribution over a string of suspension insulators, Methods of equalizing the potential, testing of insulators, Sag and tension calculations.

UNIT-III: DC DISTRIBUTION: Classification of Distribution Systems. - Comparison of DC vs. AC and Under Ground vs. Over- Head Distribution Systems. - Requirements and Design features of Distribution Systems. - Voltage Drop Calculations (Numerical Problems) in D.C Distributors for the following cases: Radial D.C Distributor fed one end and at the both the ends (equal/unequal Voltages) and Ring Main Distributor.

UNIT-IV: A.C. DISTRIBUTION: Introduction, AC distribution, Single phase, 3-phase, 3 phase 4 wire system, bus bar arrangement, Selection of site for substation. Voltage Drop Calculations (Numerical Problems) in A.C. Distributors for the following cases: Power Factors referred to receiving end voltage and with respect to respective load voltages.

UNIT-V: ECONOMICS OF POWER GENERATION: Introduction, definitions of connected load, maximum demand, demand factor, load factor, diversity factor, Load duration curve, number and size of generator units. Base load and peak load plants. Cost of electrical energy-fixed cost, running cost, Tariff on charge to customer.

TEXT BOOKS

1. C.L. Wadhwa, "Generation, Distribution and Utilization of Electrical Energy", 2nd Edition, New Age International, 2009.
2. V.K Mehta and Rohit Mehta, "Principles of Power Systems", S. Chand & Company Ltd, New Delhi, 2004.

REFERENCE BOOKS

1. Chakrabarti, M.L. Soni, P.V. Gupta, U.S. Bhatnagar, "A Text book on Power System Engineering", Dhanpat Rai Publishing Company (P) Ltd, 2008.
2. C.L. Wadhwa, "Electrical Power Systems", 5th Edition, New Age International, 2009.
3. M.V. Deshpande, "Elements of Electrical Power Station Design", 3rd Edition, Wheeler Pub. 1998.
4. H.Cotton & H. Barber, "The Transmission and Distribution of Electrical Energy", 3rd Edition, 1970.
5. W.D.Stevenson, "Elements of Power System Analysis", 4th Edition, McGraw Hill, 1984.

COURSE OUTCOMES

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

1. Understand the operation of different types of conventional power plants
2. Illustrate about overhead line insulators
3. Explain DC distribution systems.
4. Explain AC distribution systems.
5. Evaluate the power tariff methods and Economics associated with power generation.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

(A402504) ELECTRICAL MACHINES LABORATORY – I
B.Tech EEE III SEM **PROFESSIONAL CORE**

L T P C
0 0 2 1

The following experiments are required to be conducted compulsory experiments:

1. Magnetization characteristics of DC shunt generator (Determination of critical field resistance and critical speed)
2. Load test on DC shunt generator (Determination of characteristics)
3. Load test on DC series generator (Determination of characteristics)
4. Hopkinson's test on DC shunt machines (Predetermination of efficiency)
5. Swinburne's test and speed control of DC shunt motor (Predetermination of efficiencies)
6. Brake test on DC compound motor (Determination of performance curves)
7. OC and SC Test on Single Phase Transformer
8. Brake test on DC shunt motor (Determination of performance curves)

In addition to the above eight experiments, at least any two of the experiments from the following list are required to be conducted:

1. Load test on DC compound generator (Determination of characteristics).
2. Fields test on DC series machines (Determination of efficiency)
3. Retardation test on DC shunt motor (Determination of losses at rated speed)
4. Separation of losses in DC shunt motor.
5. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
6. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)

COURSE OUTCOMES:

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

1. Explain the process of emf induced in DC generator.
2. Analyze the characteristics of different types of DC generators by performing load test.
3. Evaluate performance of DC machines through different tests.
4. Determine the efficiency of DC M/G by conducting Hopkinson's test.
5. Draw the performance curves of a different DC motors by brake tests.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

(A402503)ELECTRICAL CIRCUIT ANALYSIS LABORATORY**B.Tech EEE III SEM**

L	T	P	C
0	0	2	1

The following experiments are required to be conducted as compulsory

1. Verification of Series and Parallel Resonance.
2. Determination of Time response of first order RL and RC circuit for periodic non – sinusoidal inputs – Time Constant and Steady state error.
3. Determination of Two port network parameters – Z & Y parameters.
4. Determination of Two port network parameters – A, B, C, D parameters.
5. Determination of Co-efficient of Coupling and Separation of Self and Mutual inductance in a Coupled circuits.
6. Frequency domain analysis of Low-pass filter.
7. Frequency domain analysis of Band-pass filter.
8. Measurement of Active Power for Star and Delta connected balanced loads

In addition to the above eight experiments, at least any two of the experiments from the following list are required to be conducted

1. Measurement of Reactive Power for Star and Delta connected balanced loads.
2. Frequency domain analysis of High-pass filter.
3. Determination of Two port network parameters -Hybrid parameters.
4. Determination of Time response of first order RLC circuit for periodic non – sinusoidal inputs – Time Constant and Steady state error
5. To draw the locus Diagrams of RL (R-Varying) and RC (R-Varying) Series Circuits.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

B.Tech EEE III SEM

L	T	P	C
0	0	2	1

Suggested List of Laboratory Experiments:

Minimum of 10 experiments to be conducted from the following.

1. Introduction to basic block sets of simulation platforms. Basic matrix operations, Generation of standard test signals
2. Solving the linear and nonlinear differential equations
3. Measurement of Voltage, Current and Power in DC circuits.
4. Verification of different network theorems with dependent and independent sources using suitable simulation tools.
5. Verification of performance characteristics of basic Electronic Devices using suitable simulation tools.
6. Analysis of series and parallel resonance circuits using suitable simulation tools
7. Obtaining the response of electrical network for standard test signals using suitable simulation tools.
8. Modeling and Analysis of Low pass and High pass Filters using suitable simulation tools
9. Performance analysis of DC motor using suitable simulation tools
10. Modeling and analysis of Equivalent circuit of transformer using suitable simulation tools.
11. Analysis of single-phase bridge rectifier with and without filter using suitable Simulation tools.
12. Modeling and Verification of Voltage Regulator using suitable simulation tools.
13. Modeling of transmission line using simulation tools.
14. Performance analysis of Solar PV model using suitable simulation tools

Course Objectives:

- To understand basic block sets of different simulation platform used in electrical/electronic circuit design.
- To understand use and coding in different software tools used in electrical/ electronic circuit design.
- To understand the simulation of electric machines/circuits for performance analysis.

Course Outcomes: After learning the contents of this paper the student must be able to

1. Develop knowledge of software packages to model and program electrical and electronics systems.
2. Model different electrical and electronic systems and analyze the results.
3. Articulate importance of software packages used for simulation in laboratory experimentation By analyzing the simulation results.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

(A405506) PYTHON PROGRAMMING

(Common to All)

B.Tech II Semester

L	T	P	C
0	1	2	2

Course Objectives

- To train the students in solving computational problems
- To elucidate solving mathematical problems using Python programming language.
- To understand the fundamentals of Python programming concepts and its applications.
- To understand the object-oriented concepts using Python in problem solving.

Course Outcomes

Students shall be able to:

- CO1 Design solutions to computational problems using Python programming language constructs.
- CO2 Write python programs to manipulate string objects.
- CO3 Use appropriate Data structures to organize and manipulate data items.
- CO4 Design modular application using python module & package concepts.
- CO5 Develop application to read and write from various file formats.

Week 1.

(Python Language Fundamentals-Installation -Identifiers, Reserved Words, Data Types, Type Casting, Immutability)

Demonstration

Experiment-1: Install Anaconda open-source framework for python.

Experiment-2: Write a program to display 'Hello World'.

Experimentation

Experiment-3: Explore various IDEs for python program development.

Experiment-4: The volume of a sphere with radius r is $\frac{4}{3} \pi r^3$. Write a Python program to find the volume of a sphere with radius 5?**Week 2.**

(Arithmetic Operators, Relational Operators, Logical operators, Bitwise operators, Assignment operators, Special operators)

Demonstration

Experiment-1; Write a python program to find minimum and maximum of given three numbers.

Experiment-2: Suppose the cover price of a book is \$24.95, but bookstores get a 40% discount.

Shipping costs \$3 for the first copy and 75 cents for each additional copy. Write a python program to compute the total wholesale cost for 60 copies?.

Experimentation

Experiment-3: Write a Python Program to Find the Square Root of a number with out using sqrt function.

Experiment-4: Python Program to Convert Celsius To Fahrenheit.

Experiment-5: Python program to find themaximum of two numbers using ternary operator

Week 3.

(Mathematical Functions, Input and Output statements, Command Line Arguments, String Functions)

Demonstration

Experiment-1: Write a Python program to find area of circle.

Experiment-2: Write a program to read Employee data from the keyboard and print that data.

Experimentation

Experiment-3: Write a program to read 3 float numbers from the keyboard with comma separator and print their sum.

Experiment-4: Write a Program to display Command Line Arguments.

Week 4.

(Flow Control Statements-Conditional Statements, Transfer Statements, Iterative Statements)

Demonstration

Experiment-1. Write a Python program to take a single digit number from the key board and print its value in English word?.

Experiment-2. Write a Python Program to check whether an n-digit integer is an Armstrong number or not.

Experimentation

Experiment-3. Write a Python program to display *'s in pyramid style(also known as equivalent triangle).

Experiment-4. Write a Python Program to Display the multiplication Table.

Week 5.

(Functions-Built in functions, user defined functions, Parameters ,return statement, returning multiple values from function, type of arguments, Types of variables-global, local. Recursive functions, Lambda functions, filter function, reduce function, Function aliasing, Function decorators, Generators)

Demonstration

Experiment-1: Write a python function to find factorial of given number?

Experiment-2: Write a program to create a lambda function to find square of given number?

Experimentation

Experiment-3: Lambda Function to find biggest of given values.

Experiment-4:Program to filter only even numbers from the list by using filter() function?

Week 6.

(Working with Strings-Defining String, Multi-line Strings, Accessing characters of a string, Mathematical operators for strings, Membership operator, Comparison of Strings, Removing spaces from the string, Finding Substring, String replacement, Splitting of Strings, Changing cases of a string, Formatting the strings)

Demonstration

Experiment-1: Write a program to accept some string from the keyboard and display its characters by index wise(both positive and negative index).

Experiment-2: Write a program to access each character of string in forward and backward direction by using while loop?

Experimentation

Experiment-3: Program to display all positions of substring in a given main string.

Experiment-4: Write a program to reverse the given String.

Week 7.

(Python Data Structures-List: Creating a list-Accessing elements of a List, Traversing the List, List Manipulation, Ordering the elements of a List, Mathematical Operators for List objects, Membership Operator, Nested Lists, List Comprehensions)

Demonstration

Experiment-1: Write a Python program to display unique vowels present in the given word.

Experiment-2: Write a Python program to Count the Occurrence of an Item in a List.

Experimentation

Experiment-3: Write a Python program to segregate even and odd numbers from the given list of numbers.

Experiment-4: Write a Python program to find the cumulative sum of elements of the list.

Week 8.

(Python Data Structures-Tuple: Creating a Tuple, Accessing the elements of a tuple, mathematical operators for tuple, Tuple packing and Unpacking)

Demonstration

Experiment-1: Python program for adding a Tuple to List and Vice-Versa.

Experiment-2: Write a Python program to perform the summation of all elements of each tuple from the list of tuples.

Experimentation

Experiment-3: Write a Python program to multiply adjacent elements of a tuple.

Experiment-4: Write a Python program to find the maximum element in the tuple list.

Week 9.

(Python Data Structures-Set: Creating a Set object, functions of set, Mathematical operations on set, Membership Operators, Set Comprehension, Python Data Structures-Dictionary: Creating a Dictionary Object, accessing data from the dictionary, updating dictionaries, Deleting from dictionary, Functions on dictionary, dictionary comprehension)

Demonstration

Experiment-1. Write a Python program to perform set operations.

Experiment-2: Write a program to print different vowels present in the given word?

Experiment-3: Write a Python program to generate powers of 2 using set comprehensions.

Experiment-4: Write a program to eliminate duplicates present in the list using set

Experiment-5: Write a Python program to enter name and percentage marks in a dictionary and display information on the

console.

Experimentation

Experiment-6: Write a program to take dictionary from the keyboard and print the sum of values?

Experiment-7: Write a program to find number of occurrences of each letter present in the given string using dictionary.

Experiment-8: Write a program to accept student name and marks from the keyboard and creates a dictionary. Also display student marks by taking student name as input?

Week 10.

(Python Modules-Creating Modules, Accessing members, module aliasing, member aliasing, reloading a module, The special variable: __name__. Working with Math, random modules, Python Packages. Python-File Handling-Types of Files, Opening a file, closing a file, properties of File object, writing data to text file, Reading character data from text files, seek (), tell() functions.)

Demonstration

Experiment-1: Create a module **fibonacci.py** containing Fibonacci(**n**) function(s) and import fibo module in a python script to print Fibonacci series upto **n**.

Experiment-2: Write a python program to print all the contents of a given module.

Experiment-3: Write a python program to create a package containing two or modules.

Experiment-4: Write a python program to import module from a package created in Experiment-3.

Experimentation

Experiment-5: Write a program to check whether the given file exists or not. If it is available then print its content?

Experiment-6: Write a python Program to print the number of lines, words and characters present in the given file?

Experiment-7: Program to read image file and write to a new image file?

Experiment-8: Write a python program to read and write to a CSV file.

Note:

Experiments under Demonstration section are to be demonstrated by the concerned faculty and the experiments under Experimentation section must be performed by the students individually.

Reference Books:

1. Allen B. Downey, "Think Python", 2nd edition, SPD/O'Reilly, 2016.
2. Martin C. Brown, "The Complete Reference: Python", McGraw-Hill, 2018.
3. Kenneth A. Lambert, B.L. Juneja, "Fundamentals of Python", CENGAGE, 2015.
4. R. Nageswara Rao, "Core Python Programming", 2nd edition, Dreamtech Press, 2019.

Web links:

1. <https://docs.python.org/3/tutorial/modules.html#packages>
2. <https://www.includehelp.com/python/programs.aspx>.
3. <https://www.anaconda.com/products/individual>
4. <https://www.jetbrains.com/pycharm/>

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

(A400702)GENDERSENSITIZATION**B.Tech EEE III SEM**

L	T	P	C
2	0	0	0

COURSE DESCRIPTION

This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questions about the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines – such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and media studies – to examine cultural assumptions about sex, gender, and sexuality.

This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and strengthen programmes combating gender-based violence and discrimination. The course also features several exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender-based violence on education, health and development.

Objectives of the Course

- To develop students' sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

Learning Outcomes

- Students will have developed a better understanding of important issues related to gender in contemporary India.
- Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
- Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
- Students will acquire insight into the gendered division of labor and its relation to politics and economics.
- Men and women students and professionals will be better equipped to work and live together as equals.
- Students will develop a sense of appreciation of women in all walks of life.
- Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

Unit-I: UNDERSTANDING GENDER

Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender-Construction of Gender-Socialization: Making Women, Making Men - Preparing for Womanhood. Growing up Male. First lessons in Caste.

Unit – II: GENDER ROLES AND RELATIONS

Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences- Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary

Unit – III: GENDER AND LABOUR

Division and Valuation of Labour-Housework: The Invisible Labor- “My Mother doesn’t Work.” “Share the Load.”- Work: Its Politics and Economics -Fact and Fiction. Unrecognized and Unaccounted work. -Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming.

Unit – IV: GENDER - BASED VIOLENCE

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No!-Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment-Further Reading: “Chupulu”. Domestic Violence: Speaking OutIs Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-“I Fought for my Life....”

Unit – V: GENDER AND CULTURE

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender and Popular Literature - Just Relationships: Being Together as Equals Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa ParksThe Brave Heart.

Note: Since it is Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field from engineering departments.

- Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments. Apart from the above prescribed book, Teachers can make use of any authentic materials related to the topics given in the syllabus on “Gender”.
- ESSENTIAL READING: The Textbook, “Towards a World of Equals: A Bilingual Textbook on Gender” written by A.Suneetha, Uma Bhargubanda, Duggirala Vasanta, Rama Melkote, VasudhaNagaraj, Asma Rasheed, GoguShyamala, DeepaSreenivas and Susie Tharu published by Telugu Akademi, Telangana Government in 2015.

ASSESSMENT AND GRADING:

- Discussion & Classroom Participation: 20%
- Project/Assignment: 30%
- End Term Exam: 50%

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

(A401201)FLUID MECHANICS & HYDRAULIC MACHINERY

B.Tech(EEE) IV-Semester

L	T	P	C
3	0	0	3

UNIT – I:

Fluid statics: Dimensions and units: physical properties of fluids- specific gravity, viscosity, and surface tension - vapour pressure and their influence on fluid motion- atmospheric, gauge and vacuum pressures – measurement of pressure- Piezometer, U-tube and differential manometers.

UNIT – II:

Fluid Kinematics: Stream line, path line and streak lines and stream tube, classification of flows, steady & unsteady, uniform & non-uniform, laminar & turbulent, rotational & irrotational flows-equation of continuity for one dimensional flow and three-dimensional flows.

Fluid Dynamics: Surface and body forces –Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its application on force on pipe bend.

UNIT – III:

Boundary Layer Concepts: Definition, thicknesses, characteristics along thin plate, laminar and turbulent boundary layers (No derivation) boundary layer in transition, separation of boundary layer, submerged objects – drag and lift.

Closed conduit flow: Reynold's experiment- Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel- total energy line-hydraulic gradient line. **Measurement of flow:** Pitot tube, venturi meter, and orifice meter, Flow nozzle

UNIT – IV:

Basics of turbo machinery: Hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency, flow over radial vanes. Hydraulic Turbines: Classification of turbines, Heads and efficiencies, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies, hydraulic design –draft tube theory-functions and efficiency.

Performance of hydraulic turbines: Geometric similarity, Unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank, water hammer.

UNIT – V:

Centrifugal pumps: Classification, working, work done – barometric head- losses and efficiencies specific speed-performance characteristic curves, NPSH.

Reciprocating pumps: Working, Discharge, slip, indicator diagrams.

TEXT BOOKS:

1. Hydraulics, Fluid mechanics and Hydraulic Machinery - Modi and Seth, 21st Edition, standard Book House.
2. Fluid Mechanics and Hydraulic Machines by Er. R. K. Rajput, S. Chand, 2019.

REFERENCE BOOKS:

1. Fluid mechanics and fluid power engineering by d.s. kumar, s.k. kataria & sons, 2018
2. Fluid mechanics and machinery by d. rama durgaiah, new age international publishers
3. Hydraulic machines by t.r.banga & s.c. sharma, 7 th edition, khanna publishers

Course Outcomes: At the end of the Course, student will be

1. Able to explain the effect of fluid properties on a flow system.
2. Able to identify type of fluid flow patterns and describe continuity equation.
3. Able To analyze a variety of practical fluid flow and measuring devices and utilize Fluid Mechanics principles in design.
4. Able To select and analyze an appropriate turbine with reference to given situation in power plants.
5. To estimate performance parameters of a given Centrifugal and Reciprocating pump.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

**(A402308) POWER SYSTEMS-II
PROFESSIONAL CORE****B.Tech EEE IV SEM**

L	T	P	C
3	0	0	3

UNIT - I: PERFORMANCE OF LINES: Representation of lines, short transmission lines, medium length lines, nominal T and PI- representations, long transmission lines. The equivalent circuit representation of a long Line, A, B, C, D constants, Ferranti Effect. Corona: Introduction, disruptive critical voltage, corona loss, Factors affecting corona loss and methods of reducing corona loss, Disadvantages of corona, interference between power and Communication lines.

UNIT-II: Mechanical Design of Transmission Lines

Types of Insulators, String efficiency and Methods for improvement, Numerical Problems - voltage distribution, calculation of string efficiency, Capacitance grading and Static Shielding.

Sag and Tension Calculations: Sag and Tension, Calculations with equal and unequal heights of towers, Effect of Wind and Ice on weight of Conductor, Numerical Problems -Stringing chart and sag template and its applications

UNIT-III: VOLTAGE CONTROL & POWER FACTOR IMPROVEMENT: Introduction – methods of voltage control, shunt and series capacitors / Inductors, tap changing transformers, synchronous phase modifiers, power factor improvement methods.

TRAVELLING WAVES ON TRANSMISSION LINES: Production of travelling waves, open circuited line, short-circuited line, line terminated through a resistance, line connected to a cable, reflection and refraction at T-junction line terminated through a capacitance, capacitor connection at a T-junction, Attenuation of travelling waves.

UNIT-IV: COMPENSATION IN POWER SYSTEMS: Introduction - Concepts of Load compensation – Load ability characteristics of overhead lines – Uncompensated transmission line – Symmetrical line – Radial line with asynchronous load – Compensation of lines.

PER UNIT REPRESENTATION OF POWER SYSTEMS: The one-line diagram, impedance and reactance diagrams, per unit quantities, changing the base of per unit quantities, advantages of per unit system.

UNIT-V: SYMMETRICAL COMPONENTS AND FAULT CALCULATIONS: Significance of positive, negative and zero sequence components, Average 3-phase power in terms of symmetrical components, sequence impedances and sequence networks, fault calculations, sequence network equations, single line to ground fault, line to line fault, double line to ground fault, three phase fault, faults on power systems, faults with fault impedance, reactors and their location, short circuit capacity of a bus.

TEXT BOOKS:

1. C.L. Wadhwa, “Electrical Power Systems”, New Age International Pub. Co, Third Edition, 2001.
2. D.P. Kothari and I.J. Nagrath, “Modern Power System Analysis”, Tata McGraw Hill Pub. Co. New Delhi, Fourth edition, 2011.

REFERENCE BOOKS:

1. A. Chakrabarti, M.L. Soni, P.V. Gupta, U.S. Bhatnagar, “A Text book on Power SystemEngineering”, DhanpatRai Publishing Company (P) Ltd, 2008.
2. John J. Grainger & W.D. Stevenson, “Power System Analysis”, McGraw Hill International, 1994.
3. HadiScadat, “Power System Analysis”, Tata McGraw Hill Pub. Co. 2002.
4. W.D. Stevenson, “Elements of Power system Analysis”, McGraw Hill International Student Edition.

Course Outcomes: After completion of the course student must be able to

1. Analyze transmission line performance
2. Explain the Mechanical Design of Transmission Lines
3. Understand the concept of voltage control and power factor improvement.
4. Understand the application of per unit quantities in power systems and apply loadCompensation techniques to control reactive power.
5. Determine the fault currents forsymmetrical and unbalanced faults.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

(A404205) SWITCHING THEORY AND LOGIC DESIGN

B. Tech. (EEE) IV-Semester

L	T	P	C
2	0	0	2

UNIT-I

Number Systems: Number systems, Complements of Numbers, Codes- Weighted and Non-weighted codes and its Properties, Parity check code and Hamming code.

Boolean algebra: Basic Theorems and Properties, Switching Functions- Canonical and Standard Form, Algebraic Simplification, Digital Logic Gates, EX-OR gates, Universal Gates, Multilevel NAND/NOR realizations.

UNIT-II

Minimization of Boolean functions: Karnaugh Map Method - Up to five Variables, Don't Care Map Entries, Tabular Method

Combinational Logic Circuits: Adders, Subtractors, Comparators, Multiplexers, Demultiplexers, Encoders, Decoders and Code converters.

UNIT-III

Sequential Circuits Fundamentals: Basic Architectural Distinctions between Combinational and Sequential circuits, SR Latch, Flip Flops: SR, JK, JK Master Slave, D and T Type Flip Flops, Excitation Table of all Flip Flops, Timing and Triggering Consideration, Conversion from one type of Flip-Flop to another.

UNIT-IV

Registers and Counters: Shift Registers – Left, Right and Bidirectional Shift Registers, Applications of Shift Registers-Design and Operation of Ring and Twisted Ring Counter, Operation of Asynchronous and Synchronous Counters.

Sequential Machines: Finite State Machines, Synthesis of Synchronous Sequential Circuits- Serial Binary Adder, Sequence Detector, Parity-bit Generator, Synchronous Modulo N –Counters.

UNIT-V

Finite state machine: capabilities and limitations, Mealy and Moore models, State equivalence and machine minimization, simplification of incompletely specified machines, Merger graphs.

TEXTBOOKS

1. Zvi Kohavi & Niraj K. Jha, - Switching and Finite Automata Theory, 3rd Ed., Cambridge, 2010.
2. Digital Design - Morris Mano, PHI, 3rd Edition, 2006.

REFERENCEBOOKS

1. R. P. Jain - Modern Digital Electronics, 3rd Edition, 2007 - Tata McGraw-Hill
2. Charles H. Roth - Fundamentals of Logic Design, 5th Ed., Cengage Learning, 2004.

Course Outcomes

Upon Completion of the Course, Students will be able to

1. Identify and differentiate the various number systems and number conversions.
2. Apply the basic theorems to simplify the Boolean Functions.
3. Design various digital applications with combinational circuits.
4. Design various digital applications with combinational circuits and sequential circuits.
5. Distinguish the Moore and Mealy models in Finite State Machines.

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

**(A402304) ELECTRICAL MACHINES – II
PROFESSIONAL CORE****B.Tech EEE IV SEM**

L	T	P	C
3	0	0	3

UNIT-I:

POLY-PHASE INDUCTION MACHINES: Constructional details of cage and wound rotor machines production of a rotating magnetic field - principle of operation - rotor EMF and rotor frequency – rotor reactance, rotor current and Power factor at standstill and during operation. Rotor power input, rotor copper loss and mechanical power developed and their inter relation.

UNIT-II:

CHARACTERISTICS OF INDUCTION MACHINES: Torque equation-expressions for maximum torque and starting torque - torque slip characteristic - equivalent circuit - phasor diagram - crawling and cogging, No-load Test and Blocked rotor test –Predetermination of performance-Methods of starting and starting current and Torque calculations, Applications.

SPEED CONTROL METHODS: Change of voltage, change of frequency, voltage/frequency, injection of an EMF into rotor circuit (qualitative treatment only)-induction generator-principle of operation.

UNIT-III:

SYNCHRONOUS MACHINES: Constructional Features of round rotor and salient pole machines –Armature windings – Integral slot and fractional slot windings; Distributed and concentrated windings –distribution, pitch and winding factors – E.M.F Equation. Harmonics in generated e.m.f. – suppression of harmonics – armature reaction - leakage reactance – synchronous reactance and impedance –experimental determination - phasor diagram – load characteristics.

Regulation by synchronous impedance method, M.M.F. method, Z.P.F. method and A.S.A. methods –salient pole alternators – two reaction analysis – experimental determination of X_d and X_q (Slip test)Phasor diagrams – Regulation of salient pole alternators.

UNIT-IV:**PARALLEL OPERATION OF SYNCHRONOUS MACHINES:**

Synchronizing alternators with infinite bus bars – synchronizing power torque – parallel operation and load sharing - Effect of change of excitation and mechanical power input. Analysis of short circuit current wave form – determination of sub-transient, transient and steady state reactance's and Applications.

SYNCHRONOUS MOTORS: Theory of operation – phasor diagram – Variation of current and power factor with excitation – synchronous condenser – Mathematical analysis for power developed. – Hunting and its suppression – Methods of starting – synchronous induction motor.

UNIT-V:

SINGLE PHASE MACHINES: Single phase induction motor – Constructional Features-Double revolving field theory – split-phase motors – AC series motor- Universal Motor- -Shaded pole motor and Applications.

Text Books:

1. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.
2. I. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.

Reference Books:

1. PrithwirajPurkait, Indrayud hBandyopadhyay, "Electrical Machines", Oxford, 2017.
2. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
3. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 2013.
4. A. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBS Publishers, 2004

Course Outcomes:

By the end of the course students will be able to

1. Explain the operation of poly phase Induction Machine and its performance characteristics of Induction Motor
2. Analyze performance characteristics of ac machines.
3. Explain constructional features, types, operation of synchronous machines
4. Examine the parallel operation of synchronous machines.
5. Illustrate the operation of different types of single phase induction motor and special motors

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01												
C02												
C03												
C04												
C05												

**(A402307)MEASUREMENTS AND INSTRUMENTATION
PROFESSIONAL CORE**

B.Tech EEE IV SEM

L	T	P	C
3	0	0	3

UNIT - I: INTRODUCTION TO MEASURING INSTRUMENTS: Classification – deflecting, control and damping torques – Ammeters and Voltmeters – PMMC, moving iron type instruments – expression for the deflecting torque and control torque – Errors and compensations, extension of range using shunts and series resistance. Electrostatic Voltmeters-electrometer type and attracted disc type – extension of range of E.S. Voltmeters

UNIT-II: POTENTIOMETERS & INSTRUMENT TRANSFORMERS: Principle and operation of D.C. Crompton's potentiometer – standardization – Measurement of unknown resistance, current, voltage. A.C. Potentiometers: polar and coordinate type's standardization – applications. CT and PT – Ratio and phase angle errors

UNIT-III: MEASUREMENT OF POWER & ENERGY: Single phase dynamometer wattmeter, LPF and UPF, Double element and three element dynamometer wattmeter, expression for deflecting and control torques – Extension of range of wattmeter using instrument transformers – Measurement of active and reactive powers in balanced and unbalanced systems. Single phase induction type energy meter – driving and braking torques – errors and compensations – testing by phantom loading using R.S.S. meter. Three phase energy meter – tri-vector meter, maximum demand meters.

UNIT-IV: DC & AC BRIDGES: Method of measuring low, medium and high resistance – sensitivity of Wheatstone's bridge – Carey Foster's bridge, Kelvin's double bridge for measuring low resistance, measurement of high resistance – loss of charge method. Measurement of inductance- Maxwell's bridge, Hay's bridge, Anderson's bridge - Owen's bridge. Measurement of capacitance and loss angle –Desauty's Bridge - Wien's bridge – Schering Bridge.

UNIT-V: TRANSDUCERS: Definition of transducers, Classification of transducers, Advantages of Electrical transducers, Characteristics and choice of transducers; Principle operation of LVDT and capacitor transducers; LVDT Applications, Strain gauge and its principle of operation, gauge factor, Thermistors, Thermocouples, Piezo electric transducers, photovoltaic, photo conductive cells, and photo diodes.

INTRODUCTION TO SMART AND DIGITAL METERING: Digital Multi-meter, True RMS meters, Clamp-on meters, Digital Energy Meter, Cathode Ray Oscilloscope, Digital Storage Oscilloscope.

TEXTBOOKS:

1. A. K. Sawhney, "Electrical & Electronic Measurement & Instruments", Dhanpat Rai & Co. Publications, 2005.
2. Dr. Rajendra Prasad, "Electrical Measurements & Measuring Instruments", Khanna Publishers 1989.

REFERENCE BOOKS:

1. G. K. Banerjee, "Electrical and Electronic Measurements", PHI Learning Pvt. Ltd., 2 nd Edition, 2016.
2. R. K. Rajput, "Electrical & Electronic Measurement & Instrumentation", S. Chand and Company Ltd., 2007.
3. S. C. Bhargava, "Electrical Measuring Instruments and Measurements", BS Publications, 2012.
4. Buckingham and Price, "Electrical Measurements", Prentice – Hall, 1988.
5. Reissland, M. U, "Electrical Measurements: Fundamentals, Concepts, Applications", New Age International (P) Limited Publishers, 1 st Edition 2010.
6. E.W. Golding and F. C. Widdis, "Electrical Measurements and measuring Instruments", fifth Edition, Wheeler Publishing, 2011.

Course Outcomes:

After completion of the course the student must be able to

1. Understand different types of measuring instruments, their construction,
2. Explain the operation and characteristics and identify the instruments suitable for typical measurements
3. Elucidate the measurement of voltage, current, Power factor, power and energy
4. Illustrate operation of various bridges
5. Apply the knowledge about transducers and instrument transformers to use them effectively and also smart and digital metering for industrial applications.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

(A402508) MEASUREMENTS AND INSTRUMENTATION LABORATORY**B.Tech EEE IV SEM**

L	T	P	C
0	0	2	1

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

1. Calibration and Testing of single-phase energy Meter.
2. Calibration of dynamometer power factor meter.
3. Crompton D.C. Potentiometer – Calibration of PMMC ammeter and PMMC voltmeter.
4. Kelvin's double Bridge – Measurement of resistance – Determination of Tolerance.
5. Dielectric oil testing using H.T. testing Kit.
6. Schering Bridge & Anderson Bridge.
7. Measurement of 3 - Phase reactive power with single-phase wattmeter.
8. Measurement of Parameters of choke coil using 3 voltmeter and 3 ammeter method

In addition to the above eight experiments, at least any two of the experiments from the following list are required to be conducted:

1. Calibration of LPF wattmeter – by Phantom testing.
2. Measurement of 3-phase power with single watt meter and two CTs.
3. C.T. testing using mutual Inductor – Measurement of % ratio error and phase angle of given CT by Null method.
4. PT testing by comparison – V. G. as Null detector – Measurement of % ratio error and phase angle of the given PT
5. Resistance strain gauge – strain measurements and Calibration.
6. Measurement of displacement with the help of LVDT.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

(A404510) SWITCHING THEORY AND LOGIC DESIGN LABORATORY

B. Tech. (EEE) IV-Semester

L	T	P	C
0	0	2	1

List of Experiments:

1. Realization of given Boolean function using universal gates and minimizing the same. Compare the gate count before and after minimization.
2. Design and realize Full Adder circuit using gates/universal gates. Implement Full Subtractor using full adder.
3. Realize 4-bit Magnitude Comparator.
4. Realize 2:1 MUX using the given gates and Design 8:1 using 2:1 MUX.
5. Realize a 2x4 Decoder using logic gates and implement 3x8 Decoder using 2x4 Decoder.
6. Implement the given Boolean function using given Decoders.
7. Verification of truth tables of flip flops using different clocks (level triggering, positive and negative edge triggering) also converts the given flip flop from one type to other.
8. Designing of Universal n-bit shift register using flip flops and Multiplexers. Draw the timing diagram of the Shift Register.
9. Design a Synchronous binary counter using D-flip flop/given flipflop
10. Design Asynchronous counter for the given sequence using given flipflops.
11. Designing of MOD 8 Counter using JK flipflops.
12. Designing of sequence detecting State Machine with minimal states using the given flipflops.

TEXTBOOKS:

1. A.Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.
2. M.M.Mano, "Digital Logic and Computer Design", Pearson Education India, 2016.

REFERENCEBOOKS:

1. R.S.Sedha, "A Text book of Digital Electronics", S.Chand, 2005
2. R.P.Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.

Course Outcomes

Upon completing this course, the student will be able to

1. Identify the various logic gates, logic families and also working principles.
2. Design and implement Combinational and Sequential logic circuits.
3. Analyze different types of semi conductor memories
4. Compare various types of registers for storage.
5. Design and verify various Flip Flops operations.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2		1							2
CO2	3	3	2		1							2
CO3	3	3	2		1							2
CO4	3	3	2		1							2
CO5	3	3	2		1							2

(A402505) ELECTRICAL MACHINES LABORATORY – II
B.Tech EEE IV SEM **PROFESSIONAL CORE**

L T P C
 0 0 2 1

COURSE OBJECTIVE:

This lab is an extension to Electrical Machines –I lab which facilitates to know the performance of transformers, Induction motors and synchronous motors

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

1. Sumpner's test on a pair of single-phase transformers
2. No-load & Blocked rotor tests on three phase Induction motor
3. Regulation of a three –phase alternator by synchronous impedance & m.m.f. methods
4. 'V' and 'Inverted V' curves of a three—phase synchronous motor.
5. Equivalent Circuit of a single-phase induction motor
6. Determination of X_d and X_q of a salient pole synchronous machine
7. Brake test on three phase Induction Motor
8. Regulation of three-phase alternator by Z.P.F. method

In addition to the above eight experiments, at east any two of the following experiments are required to be conducted from the following list:

1. Separation of core losses of a single-phase transformer
2. Efficiency of a three-phase alternator
3. Parallel operation of Single-phase Transformers
4. Heat run test on a bank of 3 Nos. of single-phase Delta connected transformers
5. Measurement of sequence impedance of a three-phase alternator.
6. Scott Connection of transformer

COURSE OUTCOMES:

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

1. Analyze the performance of transformers by conducting different tests
2. Identify the performance of a 3- ϕ & 1- ϕ induction motor using various methods
3. Apply different methods for finding regulation of 3- ϕ alternator.
4. Analyse various curves of synchronous motor.
5. Determine X_d & X_q of a salient pole synchronous machine

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

(A400507)SOCIAL INNOVATION IN PRACTICE
(Common for all branches)

L	T	P	C
0	0	2	1

B.Tech EEE IV SEM**Week-1**

Identify community issues to be addressed, Requirements Analysis: Extensive User requirements analysis

Week-2

Generating effective System Requirement document

Week-3

Social Innovation – Case Studies

Week-4

Impact of Social Innovation on communities

Week-5

Process of Social Innovation Prompts – identifying needs, Proposals –generating ideas,
Prototyping – testing the idea in practice,

Week-6

Sustaining-developing a business model, Scaling and diffusion-growing social innovations, Systematic change

Week-7

Introduction to sustainability, Sustainability leadership, Life cycle assessment

Week-8

Carbon footprint Calculation

Week-9

Types of Start-Ups, Types of business models, Market risks and Marketing strategies

Week-10

Verification of Business Model and Validation

Week-11

Business Model Development

Week-12

Documentation and Panel presentation

Course Outcomes

On Completion of the course, the students will be able to

1. Identify several social issues to be addressed
2. Analyse the impact of social innovations on the society
3. Illustrate the process of social innovation for a community problem
4. Demonstrate the solution from sustainability perspectives.
5. Develop a scalable business model.

Reference Books

1. Requirements Analysis: From Business Views to Architecture; David C. Hay; Prentice Hall Professional
2. Social Enterprises: An Organizational Perspective edited; Benjamin Gidron, YeheskelHasenfeld; Palgrave Macmillan
3. Social Enterprise Law: Trust, Public Benefit and Capital Markets By Dana Brakman Reiser & Steven A. Dean
4. Introduction to Sustainability by Robert Brinkmann, Wiley-Blackwell

(400701) ENVIRONMENTAL SCIENCES
(Common to All Branches)

L T P C
2 0 0 0

B.Tech EEE IV SEM**UNIT-I**

Environmental Studies: Introduction, Definition, scope and importance, Ecosystems: Introduction, types, characteristic features, structure and functions of ecosystems, Bio-geo chemical cycle, Classification of Eco system.

UNIT-II

Natural Resources: Classification of Resources, Land resources, Land as resource, Common property resources, Land degradation, Soil erosion and desertification, Effects of modern agriculture, fertilizer –pesticide problems, Forest resources, Use and over-exploitation.

Mining and dams – their effects on forest and tribal people, Water resources, Use and over- utilization of surface and groundwater, Floods, droughts, Water logging and salinity, Dams –benefits and costs, Conflicts over Water, Energy resources.

UNIT-III

Bio-diversity and its conservation, Value of bio-diversity-consumptive and productive use, social, ethical, aesthetic and option values, Bio-geographical classification of India – India as a mega diversity habitat, Threats to bio-diversity –Hot-spots, habitat loss, poaching of wild life, loss of species, seeds, etc. Conservation of bio-diversity– In-situ and Ex-situ conservation.

UNIT-IV

Environmental Pollution–Local and Global Issues, Nature of thermal pollution and nuclear hazards, Global warming, Acid rain, Ozone depletion, Environmental case studies.

UNIT-V

Environmental Problems in India, Drinking water, sanitation and public health, Effects of the activities on the quality of environment, Water scarcity and groundwater depletion, Controversies on major dams – resettlement and rehabilitation of people: problems and concerns, Rain water harvesting, cloud seeding and watershed management. Economy and Environment, The economy and environment interaction, Economics of development, preservation and conservation, Sustainability: theory and practices, Limits to growth, Equitable use of resources for sustainable life styles, Environmental Impact Assessment.

Text Books

1. Environmental Science (1st edition), Y. Anjaneyulu, B S Publications.
2. Environmental studies (1st edition), Deekshadave, Cengage learning India Pvt. Ltd.

Reference books

1. Environmental sciences and Engineering (1st edition), P. Venugopal Rao, PHI learning Pvt. Ltd.,
2. Environmental Science and Technology (1st edition), M. Anji Reddy, B S Publications.
3. Clark, R.S., Marine Pollution, Clarendon Press, Oxford, 2002.
4. Environmental Encyclopedia (Cunningham, W.P., et al., Jaico Publishing House, Mumbai, 2003.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

Course Outcomes:

On successful completion of this course, it is expected that students should be able to

1. Acquire the knowledge on environmental science
2. Acquire the knowledge of various natural resources
3. Understand the importance of conservation and preserve the biodiversity
4. Understand the hazardous effects of environmental pollution
5. Develop skills in understanding various environmental problems

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			2				3					1
CO2			2				3					1
CO3			2				3					1
CO4			2				3					1
CO5			2				3					1